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Abstract

Virtual reference services (VRS) is increasingly being implemented and used to muster increase real time interaction between library users and the libraries. While the implementation and the use of the VRS in academic libraries is growing rapidly in today's world, particularly in the developed countries, in the developing countries, the development has recorded a medium of success. This study presents an extensive synthesis of literature on VRS from different electronic databases, including EbscoHost, Elsevier, Emerald, Google Scholar, JSTOR, Science Direct and Taylor & Francis Online. Consequently, four commonly used VRS communication technologies that can help ease the impact of COVID-19 pandemic in meeting library user's information needs are presented. The paper also look at the plethora of challenges of VRS implementation and use in developing countries and makes recommendations for a way forward. As a contribution to this area of research, the study argues that there may be a space for the extension of social media tools such as Facebook Express Wi-Fi, Facebook Free Basic Model and Twitter in the academic libraries VRS. This is unarguably because of its immense occupation of the real time information space in COVID-19 pandemic era, whose second wave return explicitly spells out that its end is far from sight.

Keywords: *Implementation, Virtual Reference Services, Academic Libraries, COVID-19 Pandemic, Communication Technology, Developing Countries*

1. Introduction

Information and Communication Technology (ICT) plays an increasing role in academic library services and information delivery ever. The impact of the communication technology is significantly recognised in the delivery of Virtual Reference Services (VRS). Moreover, the VRS now belongs to one of the most popular form of communications between academic library and its users. This innovative service has created a platform for providing library services and information delivery irrespective of time, space and distance. The virtual reference methods preferably used

in interacting and meeting the academic community's information needs today include but is not limited to email, web-based chat, video conferencing and voice over IP, co-browsing, digital reference robots, and instant messaging or texting services (Mawhinney, 2020; Bera, 2019; Fagbola & Babarotimi, 2017; Shachaf & Horowitz, 2008).

Although there isn't single generic definition of the term ''virtual reference services'', various definitions of virtual reference services are provided in the library and information science literature. According to Nicol & Crook (2012), VRS can be defined as a reference service that is delivered online, which either could be synchronous or asynchronous. Shachaf & Horowitz (2008:6), assert that ''VRS refer to question answering services that libraries provide via email, an asynchronous channel of communication, either through a mailto link on a library website or a web form that users can fill out to ask reference questions online''. Furthermore, the American Library Association (2004) has defined VRS as an electronic and real time service that is facilitated by the use of computers and other communication technology tools to interconnect with information seekers. Simply put, a synthesis of these definitions demonstrate that a VRS is a non-physical reference service that can be provided, using communication technology tools that include email, VoIP, IM and social media.

Virtual reference services have certain characteristics. Personal, informal, and conversational (Mawhinney, 2020). Personalised and timely services (Luo, 2017). 24/7 online reference services access (Jain, 2013). Unified workflow and user-friendly interface (Nicol & Crook (2012). Higher user satisfaction (Mu, Dimitroh, Jordan & Burclaff, 2011). Furthermore, VRS is expandable in nature. Thus it can be provided at any given time and place (Shachaf & Horowitz, 2008). What is more, it can also be provided independently or collaboratively with others (Shaw & Spink, 2009).

In the midst of the COVID-19 pandemic, which has profoundly affected all forms of physical and social human interactions, traditional face-to-face reference delivery model has been negatively impacted by lockdowns, isolations, self-quarantines, and physical and social distancing as well. Amidst this scenario, it's critical that reference librarians and information seekers have familiarised themselves with the knowledge and understanding of the most common forms of real time communication in the library today, as Nicol & Crook (2012) have pointed out, reference services have been transformed and the prospects and relevance of libraries will depend on the role of VRS. In the light of this, over the past 20 years, academic libraries in the developed countries have continued to prioritise the implementation and the use of VRS to meet user's information needs. An America Library Survey (ALS) carried out in 2010 and 2012 has reveal that 75% of the academic libraries have maintained VRS, using chat, instant messaging and email (Yang & Dalal, 2015). While in the developing countries, the implementation and the usage of the VRS particularly synchronous VRS has not received the much desired recognitions, for which reason this review could only find a few number of studies in this particular area in such countries. For example, (Anna & Srirahayu, 2020; Kiana & Mabeifam, 2020; Akpan & Eni, 2019; Madu, Usman & Abba, 2018; Nemati-Anaraki et al., 2017; Sekyere, 2011; Gama, 2008). Anna & Srirahayu (2020) are of the view that in Indonesia, many University libraries are yet to implement VRS. Similarly, in a study by Sekyere (2011), less than 40% of 79 academic libraries in ten West African countries provide any form of VRS, including phone, email, chat or instant messaging.

Given the above circumstances, academic libraries in the developing countries, need to implement and integrate the use of virtual reference services to meet the high expectations of their customers. Failure to embrace this ever-growing service delivery

model, reference librarians have limited their chances to optimally address user's information needs. Meanwhile, there are plethora of challenges hindering the success of VRS globally. These challenges include, cost of internet, staffing, funding, limited Internet access, poor Internet service, inadequate technological infrastructure, and low digital skills among others (Kiana & Mabeifam, 2020; Abubakar, 2019; Nicol & Crook, 2012). Nevertheless, a full implementation and the use of the VRS, with the participation and cooperation of all stakeholders, is essential to increase the chances of its success in academic libraries in developing countries. Furthermore, the implementation and the use of the VRS will contribute immeasurably in curtailing the effect of the COVID-19 pandemic on library and information service delivery. Therefore, a comprehensive understanding of the implementation and the use of the VRS in academic libraries in developing countries is central to this paper.

2. Problem Statement

According to the Center for Systems Science and Engineering (CSSE) at John Hopkins University, as of 4th January, 2021 over 92.5 million people have been inflected by COVID-19 pandemic globally, with more than 1.98 million deaths in 191 countries. Consequently, the COVID-19 pandemic has adversely affected learning activities globally, leading to the closure of all public places including academic libraries. In response to this situation, various innovative service approach are being deployed to reach out to information seekers. Virtual interactions have increasingly replaced person-to-person engagements and further limit the total disruptions in many sectors. At the same time, traditional library service and in specific term reference service, has not been able to satisfy user's needs optimally. To this end, it is appropriate that academic libraries in developing countries ought to potentially develop, implement and use the VRS.

Various studies that comprise of case studies, surveys, and reviews have been conducted, addressing virtual reference services in academic libraries setting. The studies include Kiana & Martin (2020), who have investigated the perception and use of virtual library by conducting a semi-structured interview with reference librarians. Mawhinney (2020), who has conducted an exploratory study to examine user preferences of virtual reference services. Nicol & Crook (2012), who have studied virtual reference services at Washington State University, focusing on the library user and the library employee, and Shaw & Spink (2009), who have examined the issues of best practices and continuous improvement of virtual reference service. However, despite the significant level of research interest in this area, none of these studies has validated existing framework to establish a comprehensive review of communication technology tools that can be implemented and use in VRS particularly in academic libraries in the developing world.

This is why the present study intends to bridge this knowledge gap by examining different VRS communication technology tools, exploring as to how they can be implemented and used in academic libraries in developing countries.

3. Objectives of the Study

The main objective of this paper is to present an exposition of virtual reference services implementation and use in academic libraries in developing countries. Specifically, it aims as achieving the followings:

1. Examine various VRS communication technology tools implemented and use in academic libraries.
2. Identify the challenges related to the VRS communication technology tools implementation and use in academic libraries.

3. To forward practicable recommendations for policy makers and service providers.

4. Methodology

To address the study objectives, the researcher has undertaken an extensive desktop review of literature on virtual reference services. No time span or restriction was been placed on the literature referred to in this study. However, the study guarantees that only current and varying degrees literature from different academic databases have been used. The descriptors used for the literature search include ''virtual reference services'', ''academic libraries'', ''communication technology tools'', ''social media'', ''e-mail'', ''instant messaging'', ''mobile devices'', and ''developing countries''. The findings of the review have been discussed based on the specific objectives of the paper.

5. Theoretical Grounding

A significant number of theories, models, and frameworks have been proposed and applied to understand innovation implementation in different settings and libraries inclusive. Strifler, Barnsley, Hillmer & Straus (2020) provide a comprehensive list of relevant theories, models and frameworks to choose from, as well as a glossary of terms and the contexts in which they can be applied. Of relevance to this study, is Diffusion of Innovation (DOI) Theory. Rogers (2003:12) defines innovation as an ''idea, practices or object that is perceived by an individual or other units of adoption''. In this paper, virtual reference service is defined as an innovation that be provided using email, instant messaging, VoIP and social media.

The existence of e-mail, voice over internet protocol, instant messaging and social media tools contribute to a paradigm shift in information service delivery. These new technology tools appear to have clear implications among academic libraries and their

users, so they may be an important consideration in information service delivery in the COVID-19 era.

6. Findings and Discussions

In the following section, the findings of this review have outlined and discussed three main themes developed from the objective of the study namely; VRS communication technology tools, challenges of VRS communication technology tools implementation and use in academic libraries, in developing countries and recommendations.

i. Virtual Reference Services Communication Technology Tools

a) Email Technology

Electronic mail is a communication channel of transferring messages from one electronic device to another usually via a network. The e-mail technology is one of the most popular means of communications over the worldwide information superhighway. Various studies have demonstrated that academic libraries are considerably implementing and using e-mail reference service as one type of virtual reference services (Anna & Srirahayu, 2020; Mawhinney, 2020; Karami, Danesh, Samiee & Rashidi, 2020; Nicol & Crook, 2012; Shaw & Spink, 2009; Shachaf & Horowitz, 2008). For example, Nicol & Crook (2012) in a case study of Washington State University, Pullman show that there is a dramatic increase of 46. 85 % in email questions which demonstrate that the VRS is growing rapidly in comparable with other reference services in the University. Similarly, Karami et al. (2020) in a study on ''*digital reference services in academic libraries of Iran*'' report that several academic libraries in the country are providing VRS using email.

Furthermore, Shaw & Spink, (2009) argue that in the literature, one of the most discussed VRS is the e-mail technology service. Shaw & Spink further argue that

because the e-mail is endlessly supported by Frequent Asked Question (FAQ) database, it is mostly regarded as the most cost effective in the VRS delivery. E-mail VRS are generally supported by the use of desktop computers/laptops and mobile-phone devices. Regardless of email's ubiquity in our day-to-day activities, in terms of turnaround times and general satisfaction, e-mail is still considered as the least efficient method to communicate with or use for the VRS (Mawhinney, 2020). Regardless of some of the pessimisms linked to the e-mail, the platform's wide usage and general acceptability as one of the most expedient channels of communication cannot be over-emphasised. Anna & Srirahayu (2020) have characterised the e-mail technology as low-priced, fast and easy to implement and use. In this regard, academic libraries in developing countries that are challenged by the paucity of funds can leverage on the power of the e-mail to provide the VRS.

b) Voice Over Internet Protocol (VoIP) Technology

Since its emergence in the later part of the 19th century, Voice over Internet Protocols (VoIP) technology has continued to prevail as a dynamic communication tool. Kumar & Roy (2021) describe the Voice over Internet Protocols as a communication technology used for sending voice in the form of digital packets overs IP-based networks. These IP-based networks could either be on private or public network. Recently, the VoIP is increasingly becoming more prevalent in many national and multinational organisations and this owing to its lower cost and supporting the integration of voice and data (Ali, Javed, Qurban, Yasir, & Jehangir, 2020). The VoIP software allows users to connect to each other in a real time over the internet. Amor (2013) summarises some of the key benefits of the VoIP technology for customers to include provision of new communication services, cost savings, rich media service, phone and service portability, and its integration with other applications.

At the moment, different VoIP tools are rapidly implemented and used in academic libraries to provide virtual reference services, particularly in the developed countries. Google Hangout – an online communication platform developed by Google which supports messaging, video chat, SMS, and VoIP features is one of such applications. Another application that supports both instant messaging and VoIP is WhatsApp. WhatsApp is a free application that uses internet to send messages, audio or video.

c) Instant Messaging (IM) Technology

Instant messaging (IM) is a type of online communication which offers real time text transmission over the internet (Bera, 2019). The IM allows two people to chat online by typing a message into a specialised window or 'chat'' room generated by the IM software (Foley, 2002:37). More advanced IM can add file transfer, clickable hyperlinks, voice or video chat. Examples of IM communication tools that can be freely used for chat reference services include AOL, Morris Messenger, Yahoo, WeChat, and WhatsApp. Studies on the implementation and use of IM or chat method in the VRS show that it is one of the most efficient ways to communicate with reference librarians in terms of convenience and ease of use (Mawhinney, 2020). However, there is a continuous debate in the literature as to whether chat services are viable in terms of cost benefit and effectiveness (Shaw & Spink, 2009).

Studies show that the implementation and the use of IM virtual reference services in academic libraries is growing rapidly in the developed countries (Mawhinney, 2020; Nicol & Crook, 2012; Shaw & Spink, 2009). Whereas in the developing countries, majority of the academic libraries are not providing real-time VRS (Anna & Srirahayu, 2020; Karami et. al., 2020; Madu et al., 2018; Sekyere, 2011). For instance, in an evaluative study of VRS and information services at University libraries in Indonesia,

as reported by Anna & Srirahayu (2020) of the 382 Universities sampled, only four (4) libraries use chat technology for VRS and only one library uses WhatsApp. This represents 1.05% and 0.26% respectively. In a similar scenario, in ten West African countries, Sekyere (2011) has discovered that of the 79 academic libraries investigated in the sub-region, none of the academic libraries uses innovative technology such as chat or text messages to provide the VRS.

Thus, academic libraries in developing countries can leverage on the power of various IM technology tools to provide virtual reference services. To ensure a successful implementation and use of IM into library's VRS, consideration of price of the IM product, ease of use, privacy, platforms, Web browser integration, file transfers, document sharing, policy, training and spam protection are pertinent factors to profoundly consider.

d) Social Media Technology

The dominance of social media in the information space is undeniable. Ashiq, Rehman & Mujtaba (2020) assert that the social media is now occupying an ascending position in the information landscape. Consequently, the erstwhile perception of social media as being alien to the information professionals and academic libraries is no longer justifiable today (Williams, 2020). To this end, social media implementation and its daily usage is increasingly becoming significant among academic libraries around the globe. The benefits of implementing and using social media in academic libraries services include communicating with the community across distances (Lou & Hostetler, 2020), engaging directly with customers (Gruss, Abrahams, Song, Berry & Al-Daihani, 2020), and promoting library events, including library services, and library guides, as well as exhibition (Maniki & Jain, 2019; Taylor & Francis, 2014).

Various studies conducted to explore different facets of the implementation, adoption and the use of social media in academic libraries worldwide are remarkable over the years. For example, Williams (2020) has researched the adoption of social media and the implementation of web 2.0 technologies and their use in academic libraries in the Flanders region of Belgium and in South Africa. The study found that all the three Flemish academic libraries were adopters of social media. Two Universities in South Africa were adopters of at least two social media and one University is non-adopter. Exploring the adoption of social media in some selected academic libraries in Botswana, Maniki & Jain (2019) using self-administered questionnaire and structured face-to-face interviews found that some of the selected Universities are utilising social media to communicate and collaborate with their patrons.

Despite the increase in research on social media implementation and use, its presence in the virtual reference services has not been given significant consideration and this is a critical gap that needs to be filled in. Several studies have argued for the relevance of including social media into the VRS. For example, HILWIKI International (2012) recommends that information professionals should be able to use the social media so as to solve information problems and also communicate digitally with users to provide reference and instructional services in libraries. Similarly, Nicol & Crook (2012) opine that if academic libraries want to remain responsive and relevant to their customers, they must leverage on the conversational nature of social media services such as Facebook and Twitter. Therefore, by creating Facebook and Twitter profiles in the library's webpage, academic libraries would be able to reach out to innumerable users and provide VRS to them. Information seekers will be able to access the library through Wi-Fi service, stand-alone computers in the library, laptops or tablets (Williams, 2018).

Since social media applications can freely be downloaded and used, many people in the developing countries use them for various forms of interactions. So, academic libraries can start implementing and using them to provide VRS. Academic libraries in developing countries in collaboration with mobile operators can also key into initiatives such as Facebook Express Wi-Fi which make web access cheaper. Similarly, Facebook Free Basics model, which offers access to basic on-line services without data charges can also be leveraged for the VRS implementation.

ii. Challenges of the VRS Communication Technology Implementation and Use in Academic Libraries in Developing Countries

The arguments and understandings of researchers have demonstrated that the plethora of challenges hindering the VRS communication technology implementation and use in academic libraries is hinged on various levels. These are the individual, the organisational and the governmental levels.

From the individual level viewpoint, this review has found out that behavioural changes, ICT or digital skills, networking skills, privacy and security concern, and social media skills are important determining factors in the VRS implementation and use in academic libraries (Ashiq, Rehman & Mujtaba, 2020; Mawhinney, 2020; Madu et al., 2018; Jain, 2013). For example, Ashiq et al. (2020) assert that academic libraries in Pakistan are lagging behind in workforce training and development, especially in connection with the IT, equipment, higher education and the use of social media. Similarly, in Nigeria, it has been recognised that a number of information professionals do not have the requisite digitals skills and competencies for modern academic librarians of the 21st century (Madu et al., 2018).

At the organisational viewpoint level, the challenges are hinged upon work load implication, inadequate communication technology infrastructure, guideline and

training, internet interruption, non- functional library website, human resources and continuous budget decline or funding (Williams, 2020; Madu et al., 2018; Nemati-Anaraki et al., 2017; Jain, 2013; Nicol & Crook, 2012). In a comparison on the adoption and the implementation of social media and its use in academic libraries in the Flanders region of Belgium and South Africa, financial resources, infrastructure and management support are found to be crucial determining factors in service delivery (Williams, 2020). In Nigeria, most of the academic libraries in the country do not have a functional website that can support real time interactions with client (Madu et al., 2018). Similarly, Nemati-Anaraki et al. (2017) argue that the biggest challenges of implementing and using communication technology tools to provide the VRS services in academic libraries in Iran are paucity of funds and high price of information resources. Furthermore, Nicol & Crook (2012) opine that the VRS may require a sizeable number of staff and funds, particularly when implementing chat services.

At the governmental level however, this review has found out that lack of internet-based resources and support system, regulatory adjustments, poor internet access, high bandwidth cost, low bandwidth penetration and irregular power supply have continued to bedevil the academic library's implementation and use of the VRS (Anna & Srirahayu, 2020; Madu et al., 2018; Longshank, 2010). Over the years, sufficient and uninterrupted power supply has continued to elude many developing countries, particularly countries in the Sub-Saharan Africa. Unfortunately enough, this has greatly affected academic libraries in implementing and providing the VRS. There is no doubt that technology implementation and use is centred on the provision of adequate power supply. In Nigeria for instance, the country is faced with dearth of electricity supply and this has fundamentally affected every form of service delivery including the VRS that is supposed to be provided 24/7. To that end, Anna & Srirahayu (2020) have

underlined the need for the provision of adequate infrastructure such as internet link and uninterrupted power as important components for successful VRS implementation and use in academic libraries.

iii. Recommendations

Based on the findings of this review, the following recommendations are put forward for policy makers and practitioners' attention.

1. For academic libraries in developing countries to be able to provide effective and optimal reference services of the 21st century standard, a technology stimulus is very pertinent. This is in line with the argument of Bare (2019:1824), who points out that, ''the future of reference services will be based on digital collections and communication links through web''. Therefore, academic libraries in the developing countries must be equipped with adequate and relevant communication technology tools to enable them compete in this new environment where real time (synchronous VRS) is pertinent. Thus, all stakeholders (Library's Management, Reference Services Staff and Members of the University Library Committee) should be involved in the process of the implementation of the VRS by sensitizing the institutional administrators on the importance of the service and the need to invest into it.

Given that communication technology tools implementation and use for virtual reference services is capital intensive, it requires substantial budgetary provisions, which are not readily available in most developing countries. There is therefore, the need for the academic libraries to partner with telecom services providers and government ICT agencies for technical support and assistance in staff training and the provision of equipment.

2. For academic libraries to be able to implement and use the virtual reference services, the reference services staff must be highly skilled and versatile in the ICT. In this regard, appropriate trainings on digital technology skills both in-house and through seminars, workshops, mentoring, train the trainer, conferences and further education are absolutely imperative. Jain (2013) suggests that the 21st century academic libraries and librarians need to build a new roadmap by continuous learning of new technologies, skills and competencies. These will enable the reference services staff to be able to participate favourably in the new technology driven milieu. Furthermore, there is the need for all governments in developing countries to invest profoundly in technology and infrastructure by prioritizing investment in computers, fibre internet, and broadband, access to tools, electricity generation and creating digital skills. This will drive developing countries, as well as the academic libraries to take their rightful place in the emerging real time reference services, where communication technology tools are envisaged to play a pivotal role.

7. Conclusion

In this review, the paper has presented a broad exposition of virtual reference services communication technology tools and the challenges of implementing and using them in virtual reference services in academic libraries in the developing countries. Firstly, the paper has presented a brief discussion on e-mail, voice over internet protocol (VoIP), instant messaging and social media technologies. Secondly, the review has identified numerous challenges inhibiting VRS implementation and used in academic libraries in developing countries. The paper has further identified that real time interaction has risen to great prominence in recent years, especially with the rise of social networks, with its emphasis on user-generated content, and virtual technologies.

The implementation of Information and Communication Technology (ICT) can support and promote virtual information services delivery. Therefore, the implementation and the use of communication technology tools will play a critical role in the work of reference librarians and it will equally address the problems of reference services in academic libraries in the COVID-19 era as well.

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