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Designing an Optimized Framework for Effective Usage and Efficient Access of E Resources in the Consortium of Ugandan University Libraries

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Abstract

The 21st Century has experienced an extraordinary explosion of electronic resources (E-resources) which have extremely changed the information-seeking approach of scholars globally. Electronic resources have been identified as the major sources of dissemination in universities, especially for researchers, the traditional sources are available in the four walls of the library, but the E-resources role is not only in the library but also at any time anywhere. These electronic resources have enhanced information retrieval and improved accessibility of quality academic materials. As a result, academic institutions such as universities have invested vast amounts of money to make the best use of these e-resources and currently research shows that, students have made little effort to utilize these resources. The general objective of this research was to design a framework that can enhance the usage and access of e-resources in the consortium of Uganda University Libraries. This was done through the design of a framework for effective usage and efficient access of e-resources in the consortium of Ugandan university libraries, and to validate the acceptability and usability of the developed framework. Mixed method was used entailing of qualitative and quantitative methods. Participants comprised of postgraduate students, Lecturers and library staff. Unified modeling language was used to design the access and usage framework. With the help of Unified Theory of acceptance and use of technology (UTAUT) model designed questionnaire format and hypotheses were used in evaluating the acceptability and usability of the framework. This study will contribute to the theoretical understanding and awareness of electronic learning, access and usage of e-resources by providing a framework for effective access and efficiently usage of electronic resources.

Keywords: Optimized Framework, Usage, Efficient Access of E Resources, University Libraries

INTRODUCTION

In the digital age, the access to digital resources (E-Resources) has revolutionized the landscape of education and research, offering an unprecedented wealth of information and knowledge to scholars, students, and researchers (Corrall and Jolly, 2020). Universities worldwide have embraced this transformation, progressively migrating from traditional print collections to vast and diverse digital repositories. In Uganda, the Consortium of Ugandan University Libraries (CUUL) plays a pivotal role in

enabling access to digital Resources for its member institutions, striving to bridge the gap between the academic community and the vast digital realm of knowledge (Mukungu 2018)

The swift expansion of E-Resources, coupled with the increasing demands for online learning and research, presents both opportunities and challenges for CUUL (Mukungu 2018). While these digital collections promise enhanced accessibility and convenience, they also raise critical questions about their effective utilization and the efficient management of the vast reservoirs of information (Hessen et al. 2023). In this context, the need for a comprehensive framework that addresses the nuances of E-Resource usage and access becomes apparent.

The proposed research, the ”Framework for Effective Usage and Efficient Access of E-Resources in the Consortium of Ugandan University Libraries (AFFEEEC),” aims to explore the diverse dimensions of E-Resource management within CUUL and provide a structured road map to optimize their utilization. By thoroughly exploring the complexities of E-Resource accessibility, usage patterns, and the technological infrastructure underpinning them, this research aims to enhance the educational experiences of students across Ugandan universities.

The framework, once developed, promises to serve as a cornerstone for the enhancement of E-Resource services within CUUL and, by extension, the entire Ugandan higher education community. By fostering a deeper understanding of the complexities of E-Resource management and user behaviors (Lwanga et al., 2020), this framework will enable CUUL to harness the full potential of digital resources, empower academic institutions, and contribute significantly to the advancement of education, research, and knowledge dissemination in Uganda.

This chapter provides the foundation of our research, including the background information, problem statement, study purpose, research objectives, questions, and scope. We highlight the research’s significance, emphasizing the need for its investigation. Additionally, we introduce the conceptual framework that guides our analysis. This comprehensive foundation sets the stage for our exploration of E-Resource utilization and access framework within the Consortium of Ugandan University Libraries.

Background

The expansion of ICT has led to the development of various resources, and worldwide digital libraries (Ankrah et al. 2019). The 21st century has experienced an extra ordinary explosion of digital resources (e-resources) which have extremely changed information searching approach of scholars globally (Ajegbomogun & Fagbola 2015), and (Bonsu et al. 2020). Digital resources have emerged as the primary means of distribution in universities in recent years, particularly for researchers. While traditional materials are accessible within the library’s four walls, electronic resources are useful everywhere, at any time. It is very difficult for a library profession to identify, select collection development and management of electronic resources.

Over the last few decades, libraries have changed in an effort to maintain their essential role in guaranteeing high-quality research and instruction. With the introduction of information and communication technologies like the internet and the web, electronic resources are now commonly used by staff members and students as academic materials. Advancement in technological have brought some changes in the way modern organisations operate, and the library is no exception. It has influenced the way libraries gather, store, organize, retrieve and disseminate information.

The advent of emerging technologies has revolutionized traditional libraries into hybrid libraries that house resources in both print and electronic forms. These libraries aim to address the limitations of both traditional and electronic libraries in order to fulfil the needs of their patron

Library Consortia involve libraries working together through cooperation, coordination and collaboration in order to share information resources. Literature indicates that "Library consortia" has a long history and is not a recent concept, we see in late 1960s there was the development of the Ohio college libraries centre (OCLC) as a regional computer system for 54 Ohio college libraries to share their resources and reduce costs. Consortia promote cost-effectiveness, streamlined processes and equitable access to information resources.

Institutions that are members of a consortium can access sources from other institutions in addition to their own resources. This may make it possible to close the gap between libraries with abundant information resources and those with limited resources. (Moghaddam & Talawar 2009). Libraries can expand their resource offering while reducing costs y leveraging the collective purchasing power of consortia enabling member institutions to access a wider range of sources beyond their own resources. Additionally, consortia purchasing can lead to increased efficiency in resource sharing and document delivery processes among institutions. By pooling resources and negotiating collective agreements, Consortia can provide cost effective access to a broader range of resources for all participating libraries. This collaborative approach fosters a sense of community and cooperation among member institutions, leading to a more robust and interconnected library network.

Resource sharing is widely seen as a significant benefit of Consortia for libraries because now days, the priority is often on user's ability to access resources rather than on a massing collections within individual libraries. By joining a Library Consortium, libraries can enhance their collective resources and gain increased access to electronic materials at a reasonable price (Chisita et al. 2017).

In Uganda, the Ugandan university libraries formed the Corsortium of Uganda University Liraries (CUUL) 2001 whose membership includes degree awarding institutions and the current membership of CUUL is 46 universities and other institutions. The main aim of the establishment was to form a forum for holding conferences, seminars, workshops and courses on networking, resource sharing, and modern trends as they pursue their responsibility of providing quality information resources for supporting learning, teaching, research and innovations in their universities (Namuleme & Kanzira 2015)

The Consortium namely CUUL - The libraries of the Consortium of Ugandan Universities have access to electronic resources that cover every major topic area taught at Ugandan universities. A vast range of resources are included in it, such as electronic journals, bibliographic databases, reviews written by academic societies, university presses, institutional publishers, and commercial publishers. Once more, access to a greater variety of electronic resources at a significantly reduced cost is made possible via consortium-based subscriptions to electronic resources. (Di Salvo et al. 2015). Information specialists in academic libraries in Uganda have worked to achieve significant advancements since the introduction of electronic resources. These advancements include helping users access a wide variety of digital information, introducing both domestic and foreign abstract and full text databases, and facilitating users' complete access to and utilization of human knowledge.

According to (Bonsu et al. 2020) Global access to electronic resources has been made possible by ICT development; at the same time, the amount of material offered has expanded due to greater user numbers and faster electronic document delivery systems. Additionally, it has given students fresh and fascinating ways to discover knowledge about study topics and their areas of specialization. Subscribing to online databases that are accessible over the internet is one of the best ways to provide access to electronic resources in university libraries. The cost of printed library resources is significantly higher than that of electronic databases like Emerald, Elsevier, and JSTOR. This is corroborated by (Gakibayo et al. 2013),

who noticed that significant number of university libraries made substantial investment in acquiring electronic resources through subscription.

According to (Mtega et al. 2014). The results showed that only 45 of users use e-resources from popular agricultural databases. This is because of various factors restricting access, such as inadequate institutional ICT infrastructure, limited funding, and low information literacy levels. 86 of students regularly use only freely available e-resources. Users are aware that e-resources are available, but many need to understand their full potential.

According to (Joshua & King 2020) lack of sufficient internet access, training and awareness campaigns contribute to the under utilisation of e-resources. Electronic resources are always available, include hyperlinks to other resources (such inter library loans), contain a wealth of information, and offer a variety of search tools to make finding material easier. They offer versatile characteristics, do not deteriorate with time, and are ultimately cost-effective. They are also simple to cite, upload, save, archive, distribute, and update.

Electronic resources are becoming a more essential part of libraries' efforts to build their collection .Electronic resources can be accessed via computer whether it be a personal computer, main frame or hand held mobile device. Electronic resources be accessed either online or offline (Akuffo & Budu 2019) as such, the electronic library department within an academic library is a key division that provides access to electronic information resource.

The term "digital resources" refers to a very broad range of electronic products, including commercially available resources that deliver collections of data in text, numerical, graphical, or time-based formats, as well as documents in digital formats that are made available to library users via computer-based information retrieval systems. According to (Miyanda et al. 2021) slow internet connection, power outages, license limitations, expensive infrastructure, maintenance, viruses, subscription problems, and poor information search abilities are the primary obstacles that prevent university of Karachi students from using e-resources to their full potential. He goes on to discuss how the library's inadequate budget impacts its ability to provide and acquire resources .

Even with the stated goals, providing ERs to users still faces substantial obstacles. Increasing the usage of electronic resources and enhancing user interaction with ERs offered by university libraries is one continuous challenge. Making ERs available does not ensure successful usage and interaction, according to (Ye et al. 2018) and (Singh 2020)

Problem Statement

Limited awareness, access and Use of electronic resources by Uganda's academic community pose a significant challenge to the education system, a problem that has the full realization of the potential advantages of electronic resources for research, teaching, and learning, but students haven't really tried to use and access them despite their availability (Ntaga 2022)

Access to online resources is still low where over 75% of Consortium of Uganda universities Libraries (CUUL) members have 40% usage and access to electronic resources while some have not been utilized at all in these universities, the libraries subscribe to a number of electronic information resources that include databases and full-text electronic journals (CUUL Report, 2021). This issue is because of library users not aware of these resources whether they exist (Muzvondiwa & Marutha 2021) recommend an advancement made possible by the usage of cutting-edge technologies like electronic billboards and social media to address the issue of awareness which this research will achieve by developing a framework for efficient use and effective access with an integration of social network platform

The current frameworks for electronic resources show that there are still gaps in creating effective awareness of the benefits to academic databases and electronic resources university library patrons, especially students.

It is further revealed that library users who are familiar with online resources are not aware of the resources provided by the university. As a result, students lack knowledge about sources of electronic resources, internet, and academic databases, web searching tools and techniques which greatly and negatively affect the utilisation of these e-resources (Roman et al. 2020). According to (Iroroeavwo Edwin & Benjamin 2020) study reveals that over 60 % online information resources have not been used extensively by undergraduate students at Kabale University, Ugandan and found that majority of the students made little or no use of electronic re-sources provided by the university library despite the high cost of these resources. Therefore this research investigated the awareness issue in effective access and use of electronic resources and addressed the gaps in the existing frameworks for access and use of e-resources by developing a framework

General Objective

To optimise Electronic resource utilisation in Ugandan university consortium by developing an efficient access and usage framework

Specific Objectives

1. To conduct a cross-sectional study to evaluate how E-resources are utilized examine access patterns and identify barriers and challenges to their usage within the consortium of Uganda university libraries
2. To determine the necessary prerequisites for creating an optimized framework that will improve the accessibility and utilisation of e-resources in the consortium of Uganda university libraries.
3. To design and develop an optimised framework aimed at improving the accessibility and utilisation of e-resources within the consortium of Uganda university libraries
4. To establish the acceptability and usability of the developed framework designed to enhance the access and usage of e –resources within the consortium of Uganda university libraries

Conceptual Framework

The parameters and variables that will be used in this research will be derived from literature and existing frameworks as shown in the figure below:

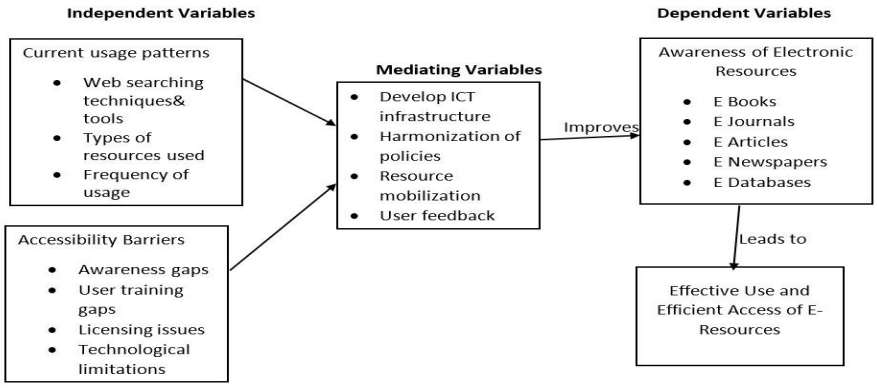


Figure 1.1: Conceptual Framework adapted and modified from Bontu, Liew and Chawner 2022

Current usage patterns such as Web searching tools, types of resources used and frequency of use and Accessibility barriers such as awareness gaps, user training gaps, licensing issues, technological

limitations (independent variables) with support from ICT infrastructure development such as internet infrastructure, Resource mobilization, Harmonization of policies and user feedback regarding electronic resources (mediating variables), these create awareness of library electronic resources which include electronic books, journals, databases, newspapers, articles (Dependent variables) that lead to effective use and efficient access of electronic resources as the outcome variable

LITERATURE REVIEW

This chapter provides past and present literature that has been developed over the years concerning access and usage of electronic resources to enhance institutions and organizations' access and use of these materials and resources. In the past recent years, a few frameworks have been used in promoting access and usage, especially by academic institutions as more is done into policies than frameworks leaving more needed research in the area.

Definitions

Digital resources are a very broad term which means any electronic product that delivers collections of data be it in text, numerical, graphical, or time based, as a commercially available resource and a kind of documents in digital formats which are made available to library users through a computer-based information retrieval system.

Electronic resources represent an increasingly important component of the collection buildin activities of Libraries. An electronic resource refers to those materials that require Computer access whether through a personal computer, mainframe or hand-held mobile device. They may either be accessed remotely via the internet or locally (Akuffo & Budu 2019) as such, one major department of an academic library is the electronic library department which offers electronic information resource.

Information resources available in libraries are limited, but those available through the web are enormous. Today the library's e-resources include e-journals, e-books, e-reference works, scholarly database, e-conference proceedings, e-thesis/dissertations etc (Ajala 2019).

A library consortium is a cooperative organization of libraries created for the purpose of sharing resources and reciprocity, and restricted by commonly recognized agreements and contracts. It is a kind of cooperation among libraries which come together to share e-resources due to limited budget and rising the cost of e–resources. (Fang, 2017). Scholarly publishing is the information marketplace in which academic libraries function, and major shifts in traditional publishing and pricing models are in process. Library consortia have long been viewed as a means of increasing purchasing power and reducing costs (Turner 2016).

Information and Communication Technologies (ICT) are Hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services(Ministry of ICT, 2018). Application of ICT in libraries has helped librarians and information specialists, and researchers to improve their information products and services through enhanced search outcomes in terms of specificity's of document retrieval, provision/dissemination and use of requisite information retrieved or generated(LISBDNETWORK, 2019).

The history of ICT and Academic Libraries

The 21st century has shaped by sweeping changes in communication and information technologies. The emergence and use of information technology in this century is the most significant development affecting scholarly communication (Yamin 2019). Today application of computers to information processing has

brought several products and services to the scenes. Consequently, the academic community has undergone tremendous changes during these years, assuming new dimensions influenced by technology-driven applications. Libraries have witnessed a great metamorphosis in both in their collection development and in their service structures. Thus Libraries are using technology to improve the management of scholarly information to strengthen and speed access to scholarly information not held locally, thus, to appreciate the determinants of IT adoption and their theoretical models that have addressed IT adoption (Mubofu 2019)

It has to however be known that a number of models in IS adoption have been used in an effort to develop an understanding of how and why technologies can be used in predicting the level of adoption for a given entity to streamline information communications technology (ICT) in its operations in order to enhance efficiency and effectiveness (Kaushik et al. 2022)

Access and Use of electronic resources in Universities

Electronic resources (e-Resources) are now generally perceived as powerful sources of information and are regarded as indispensable scholarly reference source. With easy access, e-Resources provide synthesized information sources with regularly updated information and hyperlinks to offsite contents providing latest information and thinking on a subject (Bwalya & Ssebbale 2017)

Globally libraries are spending substantial amounts of money subscribing to e-Resources whose information content is peer-reviewed, comparatively good quality, authentic, and authoritative as scholars and researchers expect it to be. E-Resources which mainly include e-Journals, e-Books, full text databases, Internet, and OPACs (online accessible library resources) are used for purposes of teaching, learning, research, dissertation/theses writing and many other information needs in academic institutions (LISBDNETWORK, 2019).

In Uganda CUUL members subscribe to a number of e-Journals but like in many developing countries, these are not adequately utilized due to underdeveloped Information and Communication technology (ICT) infrastructure, low financial and human resources capacities, among other reasons (Namuleme 2015).

Types of e-resources in Libraries:

Electronic Books and Texts

E-books and texts are all about mobility and information flow where contents of the Ebook are an electronic representation of the book that are no longer bound to the physical book (Chaudhary 2019). The Library provides access to a variety of electronic books, as well as the other printed works (such as essays, poems, or historical documents). Some of these electronic books and texts are part of large, searchable databases. Most of our main collections for electronic books and texts can be located through the Library's Electronic Resources page. However, many more individual titles may be located using the Library Catalog(LISBDNETWORK, 2019).

Electronic Journals

Electronic journals consists of full-text and bibliographic databases where full- text databases contain the whole content of an article such as citation information, text, illustrations, diagrams and tables. Bibliographic databases only contain citation information of an article, such as author's name, journal title, publication date and page numbers. E-journals are either fee based or open source and some e-journals are moderately open access. Open access journals are scholarly journals that are available to the reader through the Internet without fiscal or any other barrier (Nicholas et al. 2015)

Library catalogs

Most libraries now provide access to their catalogs from their web sites. The library catalogue is a form of bibliographic database that describes information resources available in a specific library, or in a library network or, increasingly, on the Internet, and helps users to identify, select and locate either specific known resources for example, works by a known author or resources that contain information on a specified subject. The Library provides links to these catalogs under the "Catalogs" section on its web site (Chen, 2019).

Reference Sources:

Many dictionaries, almanacs, encyclopedias, and other reference sources are now available online in full-text. You can locate these resources through the Library's Database Finder, the Library Catalog, or through many of the Library's Research Guides by Subject (Turner 2016)

Statistical Sources:

The Library has access to a variety of subscription databases which provide economic data or statistics. You can locate these resources through the Library's Database Finder, the Library Catalog, or through many of the Library's Research Guides by Subject. However, the challenge has been that there are many statistical sources available in print which cannot be found online (Holland 2021)

Image Databases (Art, Maps, Medical, etc.):

Some databases include graphics or images, such as photos, paintings or maps. You can use the Database Finder page to locate these. The Art Subject Guide also provides extensive information about locating images(LISBDNETWORK, 2019).

ETDs:

An ETD is an electronic document that describes the scholarly works or research of a researcher. Graduate theses and dissertations over the years have greatly contributed to its scientific work, education, research and writing. Although it is not a new idea, the concept of electronic theses and dissertations worldwide have greatly increased that college and university campuses, faculties, administrators, graduate students, and librarians realize the value of making information more accessible.

On-line Conference Proceedings:

Learned societies have felt the need to share knowledge and ideas created at one place by others working in different places. For this purpose, conferences, meetings, symposia, workshops etc. are conducted. The outcome of these conferences is provided in the form of proceedings in digital form i.e. CD – ROM. These are posted on the conference organizers" websites for the access of all professionals in the world (Shah & Chircu 2018).

Frameworks for access and Usage of electronic resources

With the development in the access and use of electronic resources, the necessity of E-resource framework has emerged and a number of these have been designed to suit the current digital library information and resource access and use. Framework refers to a platform for developing software application (Christensen 2013), various frameworks have been designed to support the development of e-resource software and systems. Such frameworks include Framework for e-Learning Resources Sharing (FeLRS), Framework for improving usage of library services and resources in the private higher education in South Africa, framework on the Utilization of e-Resources among College Students.

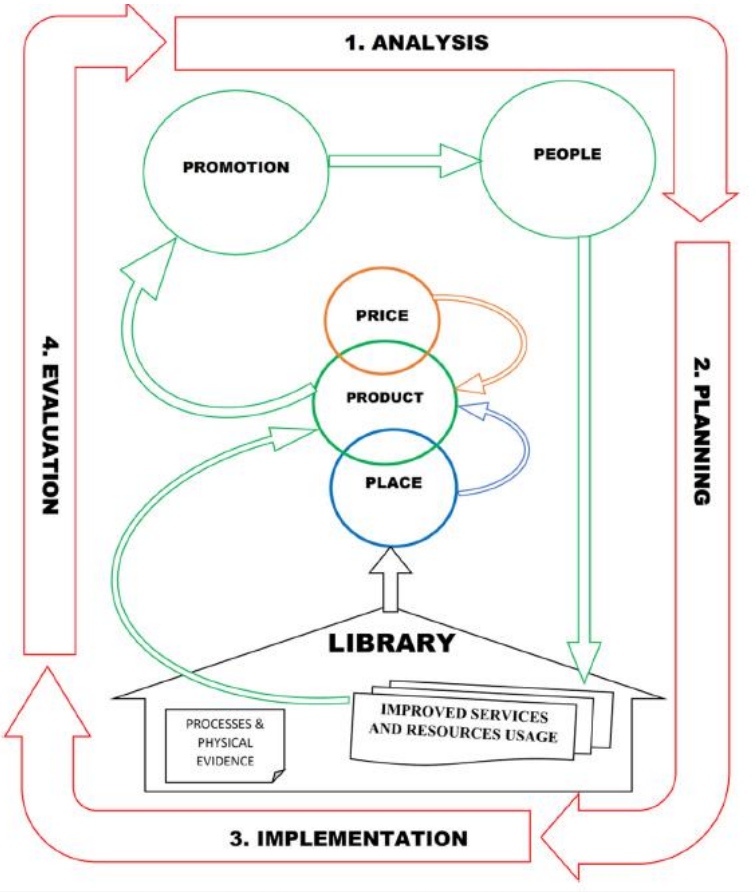
Framework for improving usage of library services and resources in the private higher education in South Africa

(Muzvondiwa & Marutha 2021) developed a framework for library marketing practices that aimed at

improving services and resources usage as a benchmark for libraries in a private higher education institution in South Africa. Their study was based on training using marketing strategy, planning and analysis for creating awareness of library services and resources. Using a multi-method study, questionnaires were administered to collect data from both staff and students at the private higher education institution concerned.

It was found out that the institution lacked key marketing tools, such as a marketing policy for the library, and that it also failed to take advantage of new platforms such as social media and other available computer software and technologies. This resulted into its users being unaware of certain important services and resources rendered by the library. The research concluded that if marketing is not properly applied, libraries can turn into the unused institution, render useless or unused services, no matter how good their available services and resources are.

Therefore, the framework that will aim at ensuring that institutions marketing strategies take advantage of the latest technology, including social media so that students can easily access and utilize the available library e-resources and services.



Therefore, this study a framework that will aim at ensuring that institutions marketing strategies take advantage of the latest technology, including social media so that students can easily access and utilize the available library e-resources and services.

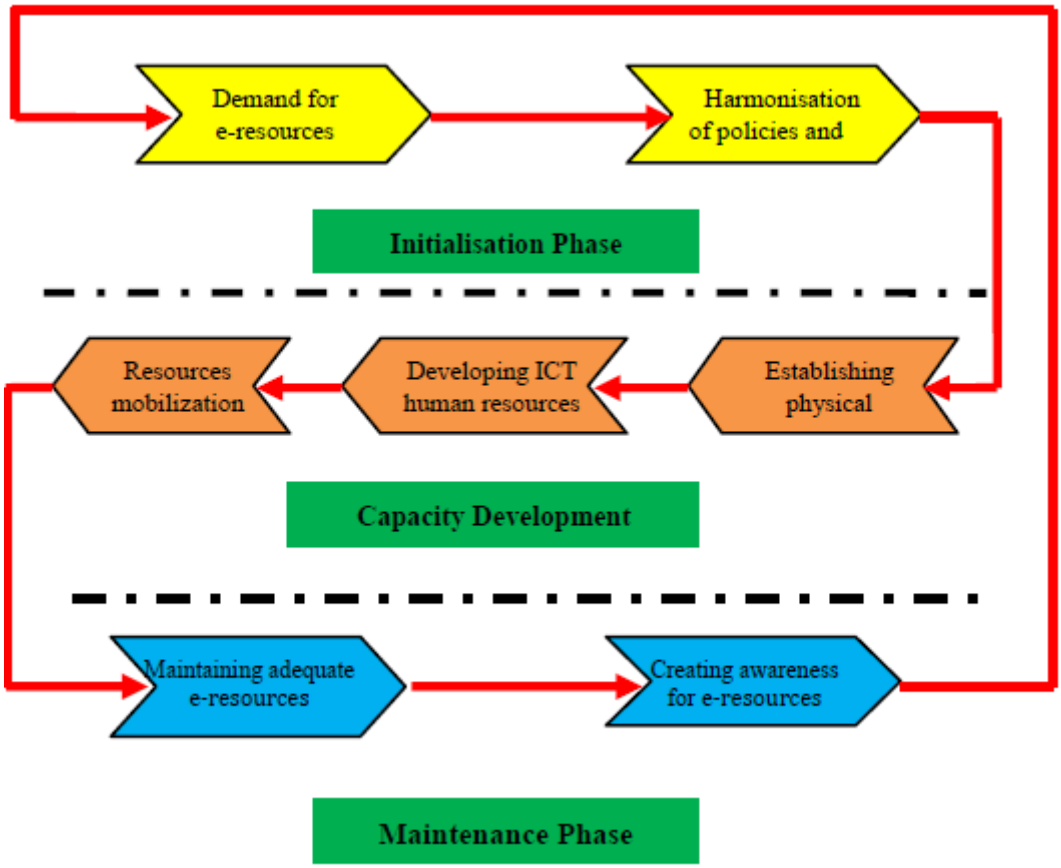
A Framework for e-Learning Resources Sharing (FeLRS).

A study was undertaken to explore the feasibility of sharing electronic educational resources within higher education. This study was carried out from 5 universities in East Africa (Burundi, Kenya, Rwanda, Tanzania and Uganda) and developed a Framework for e-Learning Resources Sharing (FeLRS) that was expected to maximize the utilization of available e-learning resources for academic and research purposes.

The resultant framework showed the relationships between the various processes that led to e-learning resources sharing and these main processes included establishing demand for e-resources, harmonization of policies and processes, resources mobilization, developing ICT human resources capacity, establishing physical infrastructure, maintaining adequate e-resources, and creating awareness for e-resources.

The study recommended that it would be essential that all universities have access to at least a common base of collaborative technologies such as web access and e-mail and that more advanced collaboration technologies should be introduced and systematically deployed at the universities for improved e-learning and resource sharing (Muzvondiwa & Marutha 2022).

The proposed framework will introduce a platform for e-resource sharing using collaborative technologies such as web access and e-mail which will act as a common access base for collaborations among students in universities with in the Consortium of Ugandan University Libraries.



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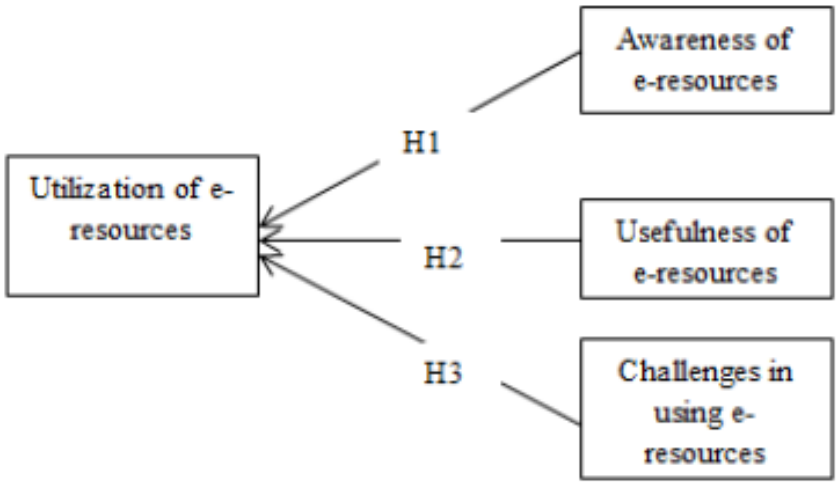
A framework on the Utilization of e-Resources among College Students.

According (Roman et al. 2020), a study that examined the factors that affect the utilization of the Gale electronic resources was carried out among college students. His study adopted a quantitative research method using questionnaires that were randomly distributed to a total of 201 3rd year and 4th-year students.

The factors identified, Awareness, Usefulness and Challenges which were derived from related studies. The collected data were analyzed using SmartPLS. The Hypothetical framework developed was as

presented: H1: Student Awareness had a significant influence on the utilization of the Gale e-resources. H2: usefulness of the Gale e-resources had a significant influence on the utilization of the technology, H3: Challenges encountered in accessing e-resources had a significant influence on the utilization of the Gale e-resources.

The results revealed that Awareness, Usefulness and Challenges in Accessing the Gale e-database have a significant impact on its Utilization and confirmed that lack of awareness and technical knowledge hindered the students to use the e-resources resulting in a low level of utilization. Findings also found out that library users are familiar with online resources but are not aware of the online and electronic resources provided at the university library. The study recommended that further research on the ways to improve awareness should be undertaken and provision of orientations and training will be helpful in spreading awareness.



Therefore the framework focuses on enhancing awareness of students about the available e-resources and services by incorporating in awareness trainings, orientations and seminars for postgraduate students and faculty members in different locations related to use and awareness of library's e-resources. The study included responses from postgraduates, faculty members and library staff in different locations that is students of one public university and one private university.

Information literacy skills and use of e-resources by undergraduate students in Nigeria using kuhlthau's model of information search process (ISP) This research aimed to assess the information literacy skills and the utilization of electronic information resources among undergraduate students in Nigeria, employing Kuhlthau's Model of Information Search Process (ISP). The study's findings underscore the crucial role of information literacy in effectively utilizing e-resources, offering significant implications for both theory and practice. Specifically, the study concludes that there exists a sufficient understanding of information literacy programs that educate undergraduates on search terminologies. The research employed Kuhlthau's ISP Model to reveal that the confidence levels of undergraduate students tend to increase only among a minority, while the majority experience heightened uncertainty. This uncertainty arose from encountering inconsistent information, which necessitated interpretation and construction due to a lack of adequate information literacy skills. Overall, the study found that Kuhlthau's ISP Model effectively described the information search process from the user's perspective, highlighting the role of uncertainty stemming from insufficient skills or limited information construction, thereby initiating the information-seeking process (ABDULLAHI 2021).

The proposed framework will provide training and ongoing support to both undergraduate and graduate students on how to navigate and utilize E-resources effectively. This could include workshops, tutorials, and access to librarians or information specialists who can assist with search strategies. By incorporating these elements into the OFFEEEC framework, CUUL can systematically enhance E-resource access and usage among undergraduate and post graduate.

A Summary of the existing frameworks

Existing framework	Strength	Gaps
Framework for improving usage of library services and resources in the private higher education in South Africa (Muzvondiwa & Marutha 2022) .	The framework aimed at improving library marketing practices to improve services and resources usage as a benchmark for libraries in a private higher education institution in South Africa. This study was based on training using marketing strategy, planning and analysis for creating awareness of library services and resources.	• Did not take advantage of the latest technologies particularly social media in its library marketing strategy.
A Framework for e-Learning Resources Sharing (FeLRS) (Ayoo & Lubega 2014)	The framework was developed to explore the feasibility of sharing electronic educational resources within higher education to maximize the utilization of available e-learning resources for academic and research purposes.	•The framework did not include collaborative technologies such as web access and e-mail for resource sharing. •The framework did not provide experimental evaluations of the results.
A framework on the Utilization of e-Resources among College Students (Roman et al. 2020)	The framework examined the factors that affect the utilization of the Gale electronic resources among college students i.e. 3rd year and 4th-year students. The results revealed that Awareness, Usefulness and Challenges in Accessing the Gale e-database have a significant impact on its Utilization and confirmed that lack of awareness and technical knowledge hindered the students to use the e-resources resulting in a low level of utilization.	•The framework only focused only on the 3rd year and 4th year students. •It did not include awareness trainings, orientations and seminars regarding use and awareness of library's e-resource
Information literacy skills and use of	This research aimed to assess the information literacy skills and the utilization of electronic information resources among undergraduate	•The model did not provide training and ongoing support to both undergraduate and graduate students

eresources by undergraduate students in Nigeria using kuhlthau's model of information search process (ISP) (ABDULLAHI 2021)	students in Nigeria, employing Kuhlthau's Model of Information Search Process (ISP). It was revealed that the confidence levels of undergraduate students tended to increase only among a minority, while the majority experience heightened uncertainty due to a lack of adequate information literacy skills.	on how to navigate and utilize Eresources effectively.

Conclusion

In conclusion, this literature review has highlighted the gaps within existing frameworks aimed at improving library services and resource utilization within educational institutions. These gaps include limited utilization of latest technologies, lack of collaborative tools, no training and ongoing support to both undergraduate and graduate students on how to navigate and utilize E-resources effectively, narrow target audiences, and absence of experimental evaluations.

To address these shortcomings, the proposed framework for effective usage and efficient access of e-resources within the Consortium of Ugandan University Libraries (CUUL) aims to leverage modern technologies, foster collaboration among students, faculty members and library staff, and ensure inclusivity across all student demographics. The proposed framework intends to create awareness of electronic resources through web searching tools, overcome accessibility barriers through ICT infrastructure development, and enhance utilization by providing adequate training and support to users. By implementing this comprehensive framework, CUUL member institutions can optimize their digital resources to improve academic experiences, and foster research excellence. Through the identified innovative strategies above, the proposed framework seeks to enhance access and utilization of e-resources, ultimately contributing to the advancement of education and research within Ugandan universities

The Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model commonly used to explain the adoption of information systems innovation. The UTAUT model according to (Venkatesh et al. 2003) is a combination of the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behaviour (TPB), the combined TAM and TPB, the model of Personal Computer Utilization, the Innovation Diffusion Theory and the Social Cognitive Theory.

The combination gives the model an influential force in explaining the behavioural intention of users in the adoption of an innovation. Behavioural intention to adopt an innovation is explained by four constructs namely; performance expectancy, effort expectancy, social factors and facilitating conditions. Where Performance Expectancy is the degree to which individuals believe that the use of the technologies will be advantageous and this is similar to the perceived usefulness of the technologies.

Effort Expectancy refers to the ease of use of the technologies. Social Factors are the extent to which users believe that their colleagues should use the technologies. And the Facilitating Conditions are the perceived existence of organizational and technical infrastructure required for the support of the technologies

(Venkatesh et al. 2003). The model also includes four moderating variables namely; age, gender, education and voluntariness of use.

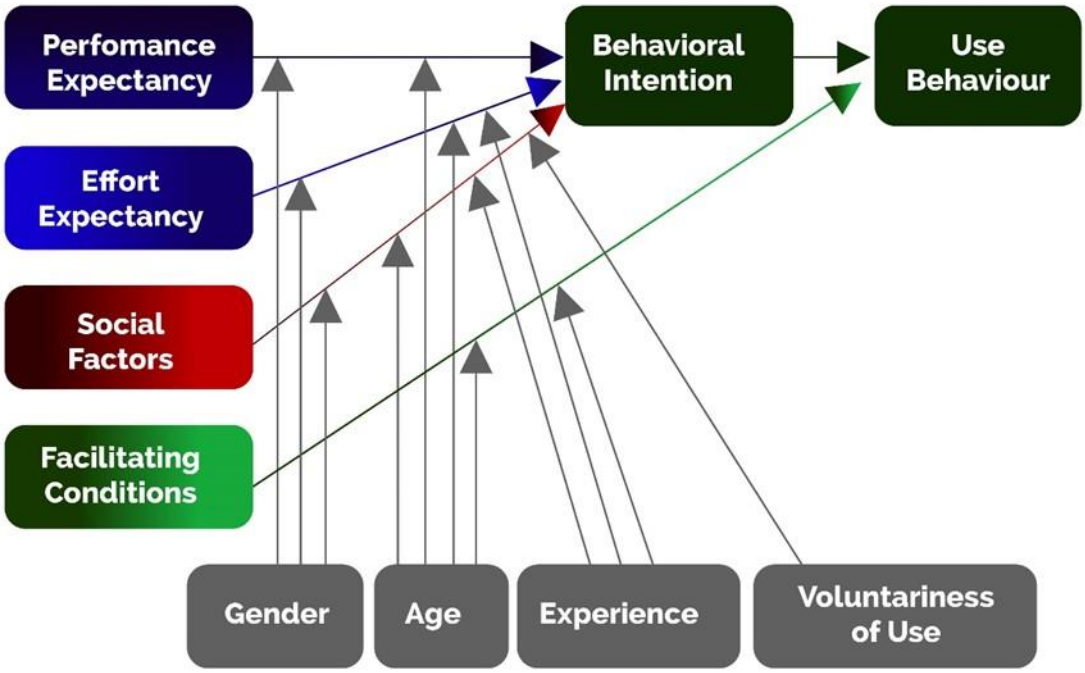


Figure 2.1: The Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The model has been widely used by many scholars and many others in evaluating the use and adoption of IS innovation. These studies largely agreed that users' attitude to take on innovation is influenced by performance expectancy, effort expectancy, social factors and facilitating which are dependent on one's age, gender, experience and voluntariness. Like any other theory, UTAUT also has its limitations (Bwalya & Ssebbale 2017) , urged that the moderating constructs such as voluntariness may not be applicable, for instance, if the adoption of IS has been instructed by an Organisation for all employees. This model was used in the evaluation of the framework to be designed.

Performance expectancy is defined as the extent to which an individual believes that using a framework will help him/her achieve what he wants. This construct was used to assess whether Library staff believe that using the developed framework helps them improve their performance in providing services to its users. In this case, performance means that the Library staff gets the details about the needs of the user on time, and easily use the social media platforms to notify the users.

Effort expectancy is defined as the degree of ease associated with the use of the framework. This construct shall be used to assess how easy it is for the library staff to use the developed framework to enhance the access and usage of E- resources.

Social influence is the extent to which an individual perceives how important others believe that they should use the developed framework. In this, the researcher will assess whether the Library staff expect others such as members of the consortium, to appreciate their usage of a developed framework in enhancing access and usage of E- resources.

Facilitating conditions can be defined as the extent to which an individual believes that an organizational and technical infrastructure exists to support use of the developed framework. This construct will be aimed

at assessing whether the study participants have all that is required to use the framework that is designed to improve usage and access of E -resources

METHODOLOGY

Research Design

This study was informed by a cross-sectional exploratory case study research design and the CRISP-DM methodology was used to assess utilization patterns, access, usage barriers, and challenges of e-resources within the consortium of Uganda university libraries, as well as to develop and validate the framework. CRISP-DM methodology was used because it is flexible and efficiently versatile to the forever changeable requirements of the project as well as the client (Choudhury 2020).By combining qualitative and quantitative techniques, the study aimed at triangulating data for enhanced insights, as commonly practiced in social sciences (Sekaran & Bougie 2016)

Quantitative data from surveys offer statistical insights into the prevalence of certain perceptions, while qualitative data from interviews provided context, depth, and richer descriptions. This approach enabled a thorough grasp of the research problem by utilizing diverse yet complementary data sources, thereby addressing the limitations of solely relying on one method (Creswell et al. 2003)

Methodology phases

Cross-Industry Standard Process for Data Mining or CRISP-DM is an open standard process framework model aimed at the development and implementation of solutions with the objective of achieving success in analytical and predictive projects. The process of CRISP-DM is into:

- Business Understanding.
- Data Understanding.
- Data Preparation.
- Designing
- Testing.

The stated steps above were followed in the design and development of the framework for effective usage and efficient access of e-resources in the Consortium of Uganda university libraries as shown in the figure below:

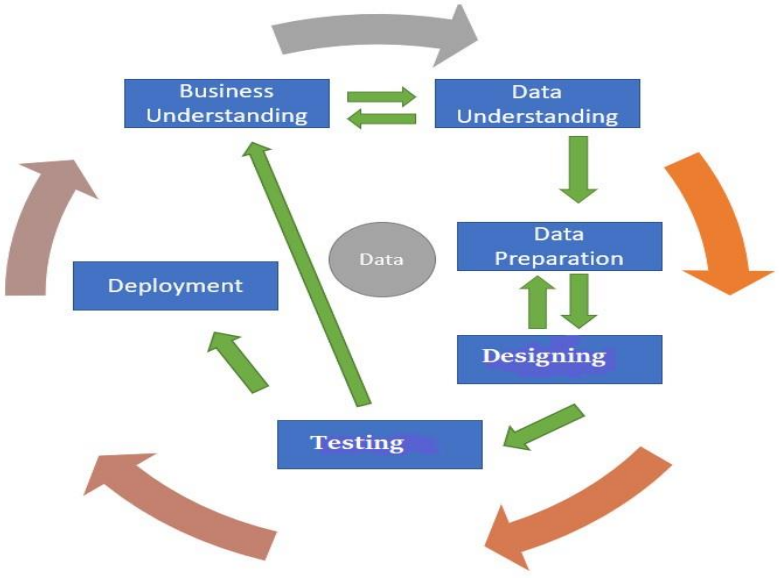


Figure 3.1: Showing CRISP-DM methodology

(Peffers et al. 2018)

The CRISP-DM executes in a not-strict manner (moves back and forth between different phases). The arrows pointing to the requirement between phases are also important with each other phase; the outer circle represents the cyclic properties of the framework. (Wijaya 2021)

Business Understanding

This is the first stage in the development life cycle of the data of the framework which focuses on understanding the objectives of the project and requirements from the perspective of the universities in Uganda. The major objective of this study is to enhance the utilization of e-resources by developing a framework for effective usage and efficient access of e-resources in the Consortium of Uganda university libraries.

Requirements were gathered using both quantitative and qualitative along with literature review approaches. This stage was used to find out responses about the current problems faced in accessing e-resources within the consortium of Uganda university libraries. When gathering requirements in this stage, the researcher built on the advantages from the loopholes of the existing frameworks, models, technologies and techniques from the reviewed literature which helped in understanding the problem and components for the framework design as stated in objective one.

Objective one:

To carry out a cross-sectional study aimed at assessing the utilization patterns, access and usage barriers and challenges of e-resources within the consortium of Uganda university libraries

Researchquestion1. What are the utilization patterns, access and usage barriers and challenges of e-resources within the consortium of Uganda university libraries?

To achieve this objective, a cross-sectional study was conducted to assess the utilization patterns, access barriers, and usage challenges of e-resources within the consortium of Ugandan university libraries. This study employed a mixed-methods approach, utilizing both quantitative and qualitative data alongside a comprehensive literature review. The literature review will involve analyzing past and current information from written books, articles, and journals. This analysis aimed at identifying research gaps and generate ideas to address them. This stage enabled the researcher to gain a deeper understanding of the specific barriers and challenges faced in utilizing, accessing, and using e-resources within the Ugandan university library consortium.

3.2.3 Objective two:

To find out the requirements needed to develop an optimized framework that will enhance access and usage of e-resources in the consortium of Uganda university libraries?

Researchquestion2. What requirements are needed to develop an optimized framework that will enhance access and usage of e-resources in the consortium of Uganda university libraries?

In the requirements gathering stage, the researcher delved into the identified limitations of existing e-library frameworks, models, technologies, and techniques gleaned from the literature review. This deep analysis provided valuable insights into the core of the accessibility and usage challenges faced by the Ugandan university library consortium. This was in line with the second research question which will compare a few e-library frameworks to the consortium of Uganda university libraries' policy and procedures in the accessibility and usage of e-resources This comparative analysis yielded a refined set of requirements, ensuring the new framework can effectively overcome the identified obstacles and conceptualize access and usage optimization in a comprehensive manner. These insights were

instrumental in defining the essential components and functionalities needed for the optimized framework. This section matches stage one (business understanding) of the framework development life cycle

Selection and criteria for study area

The Consortium of Ugandan University Libraries (CUUL) brings together various Universities across Uganda, aiming to improve access to scholarly resources and foster collaboration in research and learning Mukungu (2018)

Criteria for Choosing study Universities within CUUL

In order to ensure a well-rounded representation in our research within the Consortium of Ugandan University Libraries (CUUL), considering a few key factors when selecting universities. Firstly, we prioritized universities located in the western region of Uganda to capture diverse perspectives unique to that area. It's important to note that while we focus on this region, our findings are applicable to the broader CUUL population. Additionally, we aimed for a mix of public and private universities to reflect the different organizational structures and funding mechanisms within CUUL. Lastly, we gave preference to universities with a strong emphasis on research and academic excellence, as they provided valuable insights from institutions deeply involved in scholarly activities.

Sampling Method

Based on the outlined criteria, a purposive sampling approach was utilized to select

Mbarara University of Science and Technology (MUST) and Bishop Stuart University (BSU) as representatives for the research study. This selection was based on geographic representation, as both institutions are situated in the western region of Uganda. Additionally, the inclusion of MUST as a public university and BSU as a private university ensures representation from diverse institutional types within the Consortium of Ugandan University Libraries (CUUL). Furthermore, MUST and BSU are recognized for their research-oriented focus and innovative initiatives, making them well-suited candidates to provide valuable insights into electronic resource management and utilization within CUUL.

Study Population

The targeted study population was selected from a total of two universities, one public university I.e. Mbarara University of Science and Technology (MUST) located in Mbarara District and one private university I.e. Bishop Stuart University also located in Mbarara District. This study focused on the faculty of computing and informatics from these two universities, targeting 2nd-year undergraduate students, post graduate students, faculty staff lecturers, and library staff. Focusing on 2nd-year students strikes a balance: they are familiar with information communication skills and university life but still receptive to support, making them ideal for this study (Alyoussef 2023). Postgraduate students are included because they are typically engaged in more in-depth research activities, making them heavy users of electronic resources. Understanding their experiences and challenges with accessing and utilizing these resources can help tailor the framework to better meet their needs

I selected these universities because they are in the same locality and have the same range of statistics in usage of e- resources. Also these universities host both postgraduate and undergraduate and are accredited by NCHE. Currently, MUST offers the following programs to 2nd-year undergraduate students at the selected Faculty of Computing and Informatics: BIT with 25 students and BCS with 12 students. Additionally, MUST has 28 postgraduate students, 15 faculty staff lecturers, and 8 librarians, totaling 84 participants. Meanwhile, BSU offers BIT with 22 students and BCS with 3 students. BSU also has 10 postgraduate students, 9 faculty staff lecturers, and 3 librarians, totaling 47 participants at the selected

Faculty of Computing and Informatics. The overall target population for both MUST and BSU was 131 participants

Sampling technique

The study employed simple random sampling and purposive sampling. Simple random sampling involves selecting subjects of the study at random being guided by the sampling theory that, all subjects of the study population have equal chances of being selected in the sample. These include: postgraduate students and faculty lecturers.

Purposive sampling was applied to the library staff I.e. the university librarians and Assistant Librarians. This involved hand picking cases from desired groups. Purposive sampling technique was used for selection because respondents interviewed were small, specific.

Sample size

A total population of 131 participants, including 2nd-year undergraduate students, postgraduate students, faculty staff from the Faculty of Computing and Informatics, and library staff at both MUST and BSU, was selected to provide data for this research study. Therefore, the sample size of 117 participants was computed using the Krejcie and Morgan (1970) sample size determination formula using the model expression of:

$$S = \frac{X^2 * N * P * (1-P)}{d^2 * (N-1) + X^2 * P * (1-P)}$$

S = Sample size,

X^2 = *tablevalueofchisquarefor*1*degreeoffreedomatthedesiredconfidencelevel*(3.841),

N = *populationsize*,

P = *thepopulationproportion*(*assumedtobe*0.50*sincethiswouldprovidethemaximumsamplesize*)

d = *theaccuracy/tolerableerrorexpressedasaproportion*(0.05 = 5 Hence, the sample size for this study is 117 participants.

The Category of Respondents

Institution	Category	population (N)	Sample (S)	Sampling Technique
MUST	BIT2	25	24	Simple random Sampling
	BCS2	12	10	
	Postgraduates	28	24	
	Faculty Staff	15	14	
	Librarians	04	04	Purposive Sampling
BSU	BIT2	22	19	Simple random Sampling
	BCS2	3	3	
	Postgraduates	10	10	
	Faculty Staff	9	9	
	Librarians	3	3	Purposive Sampling
	TOTAL	**131**	**117**	

Inclusion and Exclusion Criteria.

Only respondents that consented to participate in the study were included and only postgraduate students in the informatics and computing faculties, undergraduates, library staff in the two universities were included in the study. Postgraduate students in other faculties other than the informatics and Computing

faculty, undergraduate students 1st and 3rd years and those that were not consented to participate in the study were excluded.

Data Collection Methods

A cross sectional research design with qualitative and quantitative approaches was employed to collect data from which requirements needed for this study was drawn.

The following data collection tools were used: questionnaires and interviews.

Questionnaire

(Sekaran 2003) defines questionnaire survey as a reformulated set of questions about the variables under study. This study solicited data using survey method involving use of self-administered questionnaires (SAQs) and interview.The questionnaire was used because it allows busy respondents to fill it at their convenient time. It also allows respondents to express their views and opinions without fear of being victimized (Ranganathan & Caduff 2023). These approaches enabled the researcher to cover a large population quickly and at a reasonable cost.

Interview Method

The researcher obtained information from the respondents through verbal conversation (face to face interaction) with respondents. Interview used on respondents because they allow for detailed exploration by giving participants the space to share thoughts, experiences and insights freely , offering researchers a deeper understanding of the topic at hand (Gill & Baillie 2018) . With the predetermined questions to be asked of the respondents, interviews helped the researcher to adapt the questions, clarify doubts of the respondents by ensuring that responses are properly understood through repeating and rephrasing the questions. Each interview lasted around 20 minutes. The research questions for this study served as the basis for the interview question guidelines. With their permission, the participants were recorded because it makes it easier for the researcher to evaluate and accurately assess the responses. The recordings were transcribed, then the data was analyzed to find themes and trends. The purpose of interviews was to supplement the questionnaire but also to ascertain the opinions of respondents on effective usage and accessibility of e-library resources in the consortium of Uganda university libraries.

Data Preparation

In this phase, the researcher prepared the data for the designing phase. This included data processing, data cleaning and data analysis as indicated below.

Data Cleaning

The data cleaning process demands were carefully put into consideration, as it significantly affects the final statistical results. (Field 2005) recommends that data should be cleaned in order to; 1) Find out if the responses indicated in questionnaires have been entered correctly. 2) Check if missing values existed and decide on how to deal with them and 3) Check for and deal with outliers.

Data Processing

Throughout field work, the data was entered into the computer and subjected to a thorough cleaning before analysis and hypothesis testing. The data analysis was performed using STATA and SPSS and specifically for data screening in terms of missing value analysis. The process of analyzing the data continues throughout the fieldwork. Field notes and audios will be taken at the field site and following each interview session. At the end of each day, the notes and audios were checked to ensure consistency and accuracy

Data Analysis

Two statistical software packages were utilized to analyse data collected. Specifically STATA was used for quantitative data analysis and SPSS for qualitative data analysis.

Quantitative Data

Data was analyzed using STATA to generate statistics including Pearson's correlation coefficient and regression in the form of tables and percentages. According to (Dey & Bhandari 2023), the correlation coefficient always takes a value between -1 and 1. Data from questionnaires was presented in form of frequency tables, pie charts and bar graphs. The information analyzed assisted the researcher to check and measure correctness of responses obtained from the instruments.

Qualitative Data

Qualitative data is descriptive and was analyzed using Atlas-ti and was presented in accordance with the objectives of the study which helped to supplement findings from quantitative data. The collected audio data and notes from the interviews was transcribed, coded and organized in themes that helped the researcher to attain a general and meaningful information about the problem.

Designing Phase

In this fourth stage of the development life cycle, the framework was designed by developing an artifact of the framework.

3.2.5 Objective three:

To develop an optimised framework that will enhance access and usage of e-resources in the consortium of Uganda university libraries.

Research question 3: What are the components of the optimised framework for enhancing access and usage of e- resources in the consortium of Uganda university libraries?

To achieve this objective, the framework for enhancing access and usage of e- resources in the consortium of Uganda university libraries will be designed and developed using the requirements derived from literature review and the data collected from the study population (Objective one). The user-centered design approach was used as the standard for the design. The information gathered from the data collected from the selected sample was used to design the framework. Designing of the framework was facilitated by use of the UML (Unified Modelling Language) notation. UML is a systems engineering technique that helps at the design level to synthesize requirements into an operating system.

Software tools for framework development.

Java was used to make the desired user interfaces for it is very secure compared to other programming languages. MySQL was used to query the database because it supports relational database systems whose advantages include the ability to provide faster access to data than flat files and random access to data. PhpMyAdmin was used to provide an interface with MySQL. PhpMyAdmin provides ease for the use and manipulation of MySQL.

Testing Phase

After the design and development phase, a prototype of the framework was released for interactions and testing. The framework was tested using parameters specified from requirement phase to determine whether the framework enhances access and usage of eresources in the consortium of Uganda university libraries. The following techniques was used to test the designed framework on enhancing access and usage of e-resources in the consortium of Ugandan University libraries.

Checking against the Requirements Specification

In the Systems Analysis, the framework was analyzed and together with the requirement synthesis, a checklist of targets will be drawn up for the new framework. This list is called the Requirements Specification (Igcse, 2019). The systems analyst used this document to check the new system by going through the requirements one-by-one to check if they have been met.

Check the Users' Responses

The developed framework was deployed in a given operation environment for the users to interact with and the Unified Theory of Acceptance and Use of Technology (UTAUT) Model was used to evaluate the developed model's acceptance, usefulness and usability as discussed in the next phase.

Deployment Phase

In this sixth and the last stage of the CRISP-DM development life cycle, the tested framework was rolled out for users to interact with. This involves making the framework available to users, providing training and support, and collecting feedback. The goal of deployment is to ensure that the framework is used effectively and meets the needs of users.

3.2.6 Objective four:

To establish the acceptability and usability of the developed framework that will enhances the access and usage of e-resources in the consortium of Uganda university libraries.

Research question 3: *What is the acceptability and usability of the developed framework for enhancing access and usage of e-resources in the consortium of Ugandan University libraries?*

To achieve this objective, the tested framework was rolled out for users to interact with after which a Likert scale questionnaire was developed to establish the respondents' acceptance of the framework and its usefulness in enhancing access and usage of e-resources in the consortium of Ugandan University libraries. A Likert scale questionnaire which is considered a universal and easy to understand method (Weijters et al. 2021) was used to provide a systematic way to collect data, analyze information and report results over a period of time, this approach helped in the validation process of the framework to establish its acceptability and usefulness in enhancing access and usage of e-library resources, all of which was in fulfillment of the third research objective. The questionnaire was used to gather responses from participants (of sample size 90) using random sampling technique to establish the frameworks usefulness, acceptability and usability.

Sampling technique and study site

Sampling technique and study site

The researcher used random sampling to select participants for the frameworks acceptability and usability evaluation process. The participants comprised of 2nd year undergraduate students and postgraduate students in the faculty of informatics and computing, faculty staff, and library staff from two universities: Mbarara University of Science and Technology (MUST) in Mbarara District, and Bishop Stuart University in Mbarara

District.

Sample size

A total of 90 participants were randomly recruited to participate in the study, including 2nd-year undergraduate students, postgraduate students, faculty staff from the Faculty of Computing and Informatics, and library staff at both MUST and BSU. The selection of 90 participants to be part of this survey with 30 from each institution was guided

(Morgan n.d.) formula

This formula is based on the total population of previously enrolled participants, which is 117, resulting in a sample size of 90 participants. The total number is representative to give the investigator the kind of information required .

Inclusion and Exclusion criteria Inclusion

Faculty of informatics and computing,2nd year students, Postgraduate students , Faculty staff lecturers and Library staff willing and able to give consent.

Exclusion

Not in the Faculty of computing and Informatics at MUST and BSU, not 2nd year students, staff in other faculties and those not willing and unable to give consent.

Data collection

This study utilized a questionnaire comprising a reformulated set of questions based on a Likert scale to gather data from 90 participants, including 30 from MUST and 30 from BSU, to gain insight into the acceptability and usability of the developed framework. This approach allowed the researcher to efficiently cover a large population at a reasonable cost. The questionnaire will last for about 15-20 minutes.

Data Analysis

The kind of data that was collected for this research was quantitative in nature. The data was entered into STATA for analysis. The researcher used descriptive statistics, tables and graphical representation to analyse the data and generate frequencies, percentages and cumulative percentages that will be then represented in charts and graphs.

Ethical consideration

The researcher prioritized ethical considerations to safeguard the rights and well-being of all involved. That means obtaining informed consent from participants, explaining the purpose and potential implications of the study clearly. We'll also ensure confidentiality by keeping all information provided by participants secure and anonymous. Importantly, participants had the freedom to withdraw from the study at any point without facing any repercussions. Throughout the research process, we adhered to ethical guidelines established by the Research Ethics Committee (REC) Board to ensure the integrity and fairness of the study

Limitations of the study

Two notable limitations of this study are the constraints of time and resources, which could affect the thoroughness of data collection and analysis. Additionally, challenges related to fluctuating internet connectivity and technological infrastructure within certain universities may impact the accuracy and reliability of the data obtained. These limitations should be taken into account when interpreting the findings and drawing conclusions from the research.

PRESENTATION, ANALYSIS, ANDINTERPRETATIONOF RESULTS

Chapter Overview

This chapter presents the analysis, findings, and interpretation of the study conducted at the two selected universities in the consortium of Uganda universities: one public institution Mbarara University of Science and Technology (MUST) and one private university that is Bishop Stuart University. The research covered Library staff, faculty staff, undergraduate and postgraduate students in the faculty of informatics and computing.

The purpose of this study was to enhance the utilization of e-resources by developing an optimized framework for effective usage and efficient access of e-resources in the Consortium of Uganda university libraries. The objectives of the study were to:

1. To carry out a cross-sectional study aimed at assessing the utilization patterns, accessand usage barriers and challenges of e-resources within the consortium of Uganda university libraries
2. To find out the requirements needed to develop an optimized framework that willenhance access and usage of e-resources in the consortium of Uganda university libraries?
3. To develop an optimised framework that will enhance access and usage of e-resourcesin the consortium of Uganda university libraries
4. To establish the acceptability and usability of the developed framework that will en-hance access and usage of e-resources in the consortium of Uganda university libraries

Results for Objective One

Objective 1: To carry out a cross-sectional study aimed at assessing the utilization patterns, access and usage barriers and challenges of e-resources within the consortium of Uganda university libraries

The researcher reviewed current utilization patterns, access and usage barriers and challenges of e-resources within the consortium of Uganda university libraries to establish essential requirements for the design and development of the OFFEEEC Framework. This was achieved by examining the knowledge, skill and experience in using web searching tools and social media platforms to access electronic resources and databases for effective access and efficient use of these resources.

Results and Analysis from the Literature Review

The researcher reviewed various existing frameworks to examine the loopholes within the frameworks to improve access and usage of e- resources. The existing frameworks and their corresponding drawbacks were summarized in a tabular form as shown below:

No.	Existing Frameworks	Drawbacks	Requirement
1	Framework for improving usage of library services and resources in the private higher education in South Africa	Did not take advantage of the latest technologies particularly social media in its library marketing strategy	Leverage social media and other modern technologies to improve awareness and promote access and utilization of e-resources across institutions.
2	A Framework for e-Learning Resources Sharing	Did not include collaborative technologies such as web access and email for resource sharing. No experimental evaluations of results	• Incorporate collaborative tools (web access, email) to facilitate resource sharing • Implement an evaluation and reporting module to ensure practical applicability of e-resources.

3	A framework on the Utilization of e-Resources among College Students	Focused only on 3rd and 4th-year students; Did not include awareness training, orientations, and seminars	• Broaden the scope to include all students both undergradu-ate and post graduate. • Provide regular awareness programs, orientations, and workshops to increase access and effective use of e-resources.

Table 4.1: Summary of literature review

After reviewing the drawbacks of existing frameworks, the researcher identified several key requirements for improving access and utilization of e-resources within the Consortium of Uganda University Libraries. These include integrating social media and modern technology into resource promotion, incorporating collaborative tools for easier resource sharing, Implement an evaluation and reporting module to ensure effectiveness and practical applicability of e-resources, and expanding awareness programs to reach a wider range of students.

Results and Analysis From Data Collected

The researcher collected feedback from 117 participants across Mbarara University of Science and Technology (MUST) and Bishop Stuart University (BSU) using a combination of random and purposive sampling methods. The primary data collection method was a questionnaire designed to assess the utilization and access of e-resources within the Consortium of Uganda University Libraries, while identifying challenges and requirements for developing a framework.

The participants at MUST include 24 second-year BIT students, 10 second-year BCS students, 24 postgraduate students, 14 faculty staff, and 4 librarians. At BSU, the sample included 19 second-year BIT students, 3 second-year BCS students, 10 postgraduate students, 9 faculty staff, and 3 librarians. Additionally, interviews were conducted with one University librarian from each university to gain deeper insights into the current state of eresource management and challenges faced in their institutions. In total, 117 respondents provided valuable input for the study, as summarized in the response table below.

Response table

Institution	Category	Targeted Sample	Actual Sample	Percentage
MUST	BIT2 BCS2 POST Faculty Staff Librarians	24 10 24 14 4	24 10 24 14 4	100% 100% 100% 100% 100%
BSU	BIT2 BCS2	19 3 10	19 3 10	100% 100% 100%

	POST			
	Faculty Staff	9	9	100%
	Librarians	3	3	100%
	Total	**117**	**117**	100%

Table 4.2: Showing the respondents response rates

The response rate was 100%. With a high response rate, the researcher feels confident that the findings of the study are representative of the actual population and can be generalized to the other farmers who did not participate in the study (Sekaran, 2013).

Respondents Demographic Results

This subsection presents the demographic characteristics of the respondents in terms of gender, age and education level.

Distribution of gender for all study respondents

The majority of respondents were male, accounting for 59% (69 respondents) of the total, while females comprised 41% (48 respondents). The total number of respondents in the study was 117. This shows a higher representation of male respondents compared to female respondents as shown in the table below

Gender	**Frequency**	**Percentage**
Females	48	41
Males	69	59
Total	117	100

Table 4.3: Showing distribution of gender

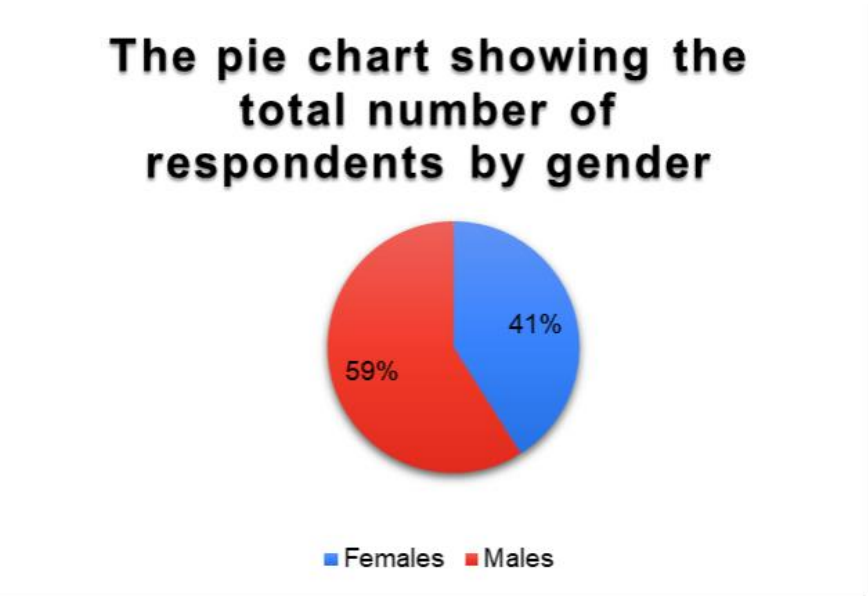


Figure 4.1: Showing distribution of gender

Respondents' gender Per university

The largest percentage of respondents were male, with 63% (26 respondents) at BSU and 57% (43 respondents) at MUST , while females made up 43% (33 respondents) at MUST and 37% (15 respondents) at BSU as shown in table below.

Gender	MUST		BSU	
	Freq	%age	Freq	%age
Female	33	43	15	37
Male	43	57	26	63
Total	**76**	**100**	**41**	**100**

Table 4.4: Showing the number of respondents by gender at both MUST and BSU

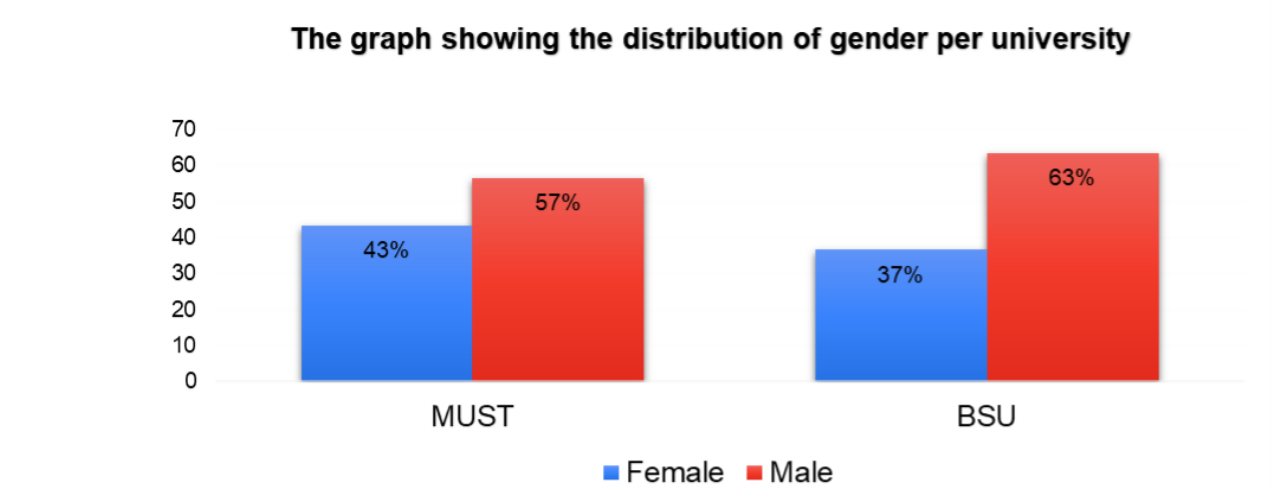


Figure 4.2: Showing the number of respondents by gender at both MUST and BSU

The gender distribution at both MUST and BSU shows a higher representation of male respondents. At MUST, 57% of the respondents were male (43 participants), while 43% were female (33 participants). Similarly, at BSU, males made up 63% (26 participants) and females 37% (15 participants). This distribution highlights a strong participation from both genders, with slightly more male respondents contributing to the study.

Age of the respondents

The table below presents the age distribution of respondents including students, faculty staff and librarians from MUST and BSU. The largest group of respondents falls within the 18-24 age range, comprising 27 respondents (36%) from MUST and 13 respondents (32%) from BSU, for a total of 40 respondents. In the 25-30 age range, both MUST and

BSU had 12 respondents each, accounting for 16% and 29% respectively, adding up to 24 respondents in total. A significant portion of the respondents falls within the 31-40 age group, with 26 respondents (34%) from MUST and 12 respondents (29%) from BSU, making a total of 38 respondents. The smallest group of respondents is in the 41+ age category, with 11 respondents (14%) from MUST and 4 respondents (10%) from BSU, totaling 15 respondents. Overall, the largest representation is from the younger age group of 18-24, while the smallest comes from the 41+ age group.

Age Range	**MUST**		**BSU**		
	Freq	**%age**	**Freq**	**%age**	**Total Freq**
18-24	27	36	13	32	**40**
25-30	12	16	12	29	**24**
31-40	26	34	12	29	**38**

41+	11	14	4	10	**15**
Total	**76**	**100**	**41**	**100**	**117**

Table 4.5: Showing the age distribution of respondents

Age distribution of respondents by gender

The table below shows the gender and age distribution of respondents at MUST and BSU. At MUST, the 18-24 age group is well-represented, with 16% (12 females) and 20% (15 males). Similarly, at BSU, the 18-24 age group accounts for 12% (5 females) and 20% (8 males).

In the 25-30 age range, 5% of females (4) and 11% of males (8) are from MUST, while BSU has an equal representation for both genders at 10% (4 females) and 20% (8 males). The 31-40 age category is notable, with 20% of females (15) and 14% of males (11) at MUST,

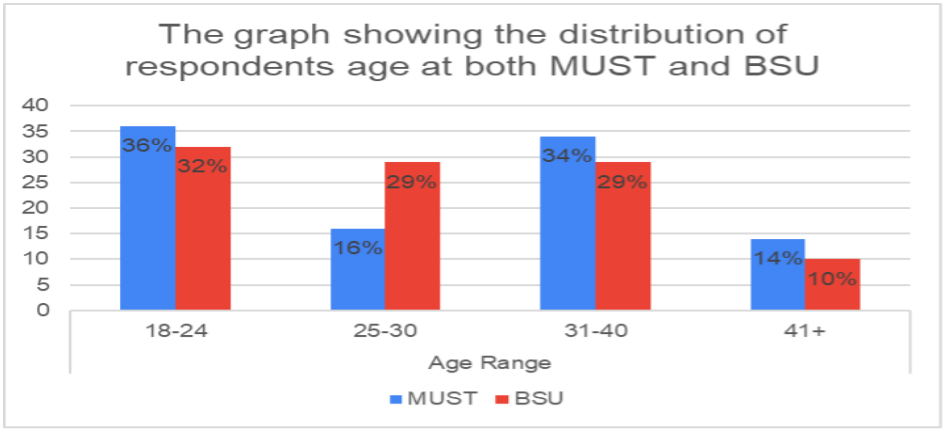


Figure 4.3: Showing the age distribution of the respondents

compared to 15% for both genders (6 females and 6 males) at BSU. The smallest group is the 41+ category, where MUST has 3% (2 females) and 12% (9 males), while BSU has no females but 10% (4 males).

	MUST				**BSU**			
	Female		**Male**		**Female**		**Male**	
Age category	**Freq**	**%age**	**Freq**	**%age**	**Freq**	**%age**	**Freq**	**%age**
18-24	12	16	15	20	5	12	8	20
25-30	4	5	8	11	4	10	8	20
31-40	15	20	11	14	6	15	6	15
41+	2	3	9	12	0	0	4	10

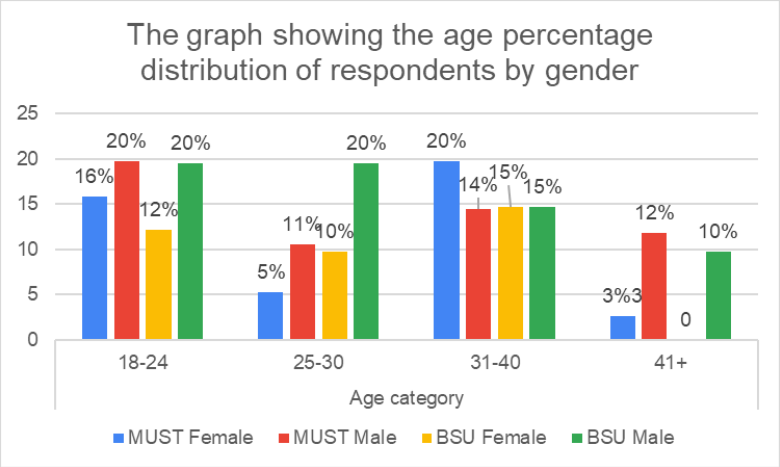


Figure 4.4: Showing age percentage distribution by gender

The analysis above shows that the majority of respondents at both MUST and BSU are younger, with most falling within the 18-24 age range. This suggests that a large portion of participants are undergraduate students. There are also a fair number of respondents in the 25-30 and 31-40 age ranges, likely representing postgraduate students and faculty, especially at MUST. However, the 41+ age group is sparsely represented, particularly among females, indicating fewer older or senior staff members participated in the study.

The gender distribution from both MUST and BSU shows a noticeable imbalance, with male respondents outnumbering females in most age categories at both institutions. At MUST, males make up a larger proportion of respondents across all age groups. In the 41+ age category, the gender gap is most prominent, with males representing 12%, while only 3% of females are from this age group. Similarly, at BSU, the gender distribution also shows a higher number of male respondents, though the gap is not as wide as at MUST. In the 41+ age category, the disparity becomes clearer, as 10% are male, and there are no females in this group.

These figures highlight the under-representation of female respondents, especially in the older age categories (31-40 and 41+), across both institutions. The gender distribution suggests that male respondents are more engaged or more accessible for this study, particularly at MUST, where males dominate every age category. This trend may reflect broader institutional or societal factors, such as gender disparities in access to higher education or the workforce, especially in fields related to computing and informatics.

Student Category respondents

The table below outlines the distribution of respondents by student category at the two universities: MUST and BSU . At MUST, there are 58 respondents, which makes up 64% of the total student category sample across both institutions. Within this group, BCS2 accounts for 19 respondents, representing 21% of the overall sample; BIT2 includes 17 respondents, or 19%; and the Postgraduate category has 22 respondents, constituting 24% of the overall sample.

In comparison, BSU has a total of 32 respondents, making up 36% of the total student category sample. The distribution here shows that BCS2 has only 4 respondents, which is a mere 4% of the overall sample. BIT2 has 17 respondents, representing 19%, while the Postgraduate category includes 11 respondents, accounting for 12%.

	MUST		BSU	
Student category	**Freq**	**%age**	**Freq**	**%age**
BCS2	19	21	4	4
BIT2	17	19	17	19
Postgraduate	22	24	11	12
Total	**58**	**64**	**32**	**36**

Table 4.7: Showing students category

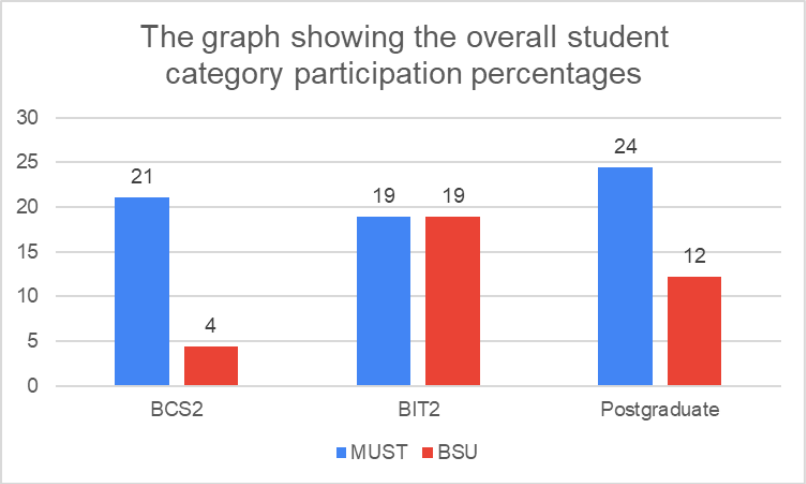


Figure 4.5: Showing student category

This contrast indicated that MUST has a significantly higher number and percentage of respondents in all categories compared to BSU, especially in the BCS2 and Postgraduate categories, where BSU's representation is notably low. The percentages are calculated based on the overall student category sample across both institutions, highlighting the comparative participation of each university in this study. This variation in student categories between the two institutions is due to different demographic factors influenced enrolment.

Usage of E- library resources by students

The table below presents data on e-resource usage at both MUST and BSU. At MUST, 69% of the respondents (40 participants) indicated that they use e-resources, while 31% (18 participants) do not. Similarly, at BSU, 66% of the respondents (21 participants) reported using e-resources, whereas 34% (11 participants) indicated that they do not.

E-Resource Usage	**MUST**		**BSU**	
	Freq	**%age**	**Freq**	**%age**
YES	40	69	21	66
NO	18	31	11	34
Total	58	100	32	100

Table 4.8: Showing the usage of e-library resources

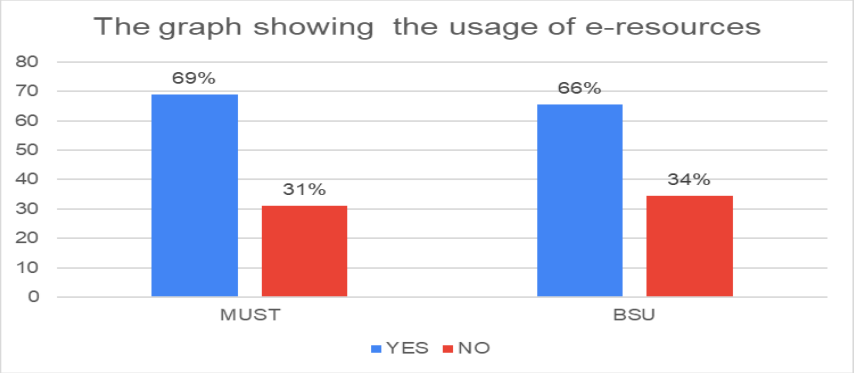


Figure 4.6: Showing the usage of e-resources

This data shows that the majority of respondents at both institutions are utilizing e-resources, though a significant portion at both MUST and BSU still do not engage with e-resources. This highlights a need to understand the barriers to e-resource usage among the nonusers.

Frequency of e- library resource Usage by students

The table below provides data on the frequency of e-resource usage among respondents at both MUST and BSU. At MUST, only 10% (6 respondents) reported using e-resources daily, 14% (8 respondents) weekly, and 16% (9 respondents) monthly. A notable 29% (17 respondents) said they rarely use e-resources, and 31% (18 respondents) indicated that they never use them.

At BSU, 6% (2 respondents) use e-resources daily, 13% (4 respondents) weekly, and 9% (3 respondents) monthly. A larger portion, 38% (12 respondents), rarely use e-resources, while 34% (11 respondents) never use them.

Frequency	**MUST**		**BSU**	
	Freq	**%age**	**Freq**	**%age**
Daily	6	10	2	6
Weekly	8	14	4	13
Monthly	9	16	3	9
Rarely	17	29	12	38
Never	18	31	11	34
Total	58	100	32	100

Table 4.9: Showing the frequency of e-library resources usage

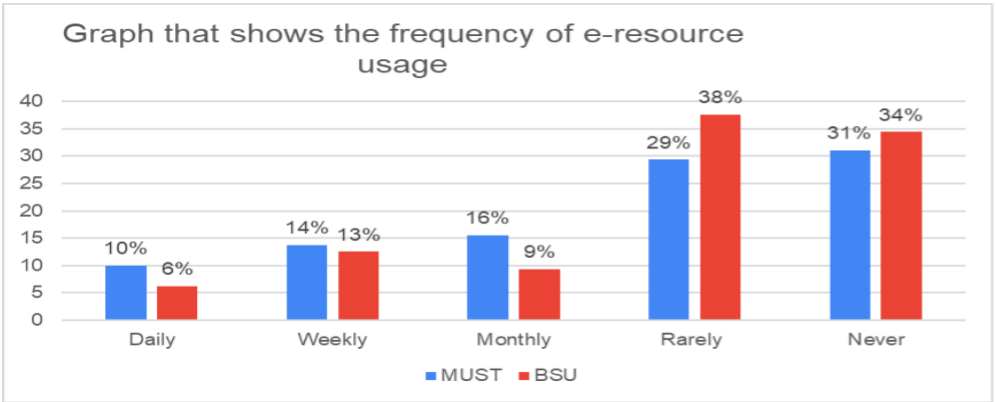


Figure 4.7: Showing the frequency of e resource usage by students

The data suggests that at both institutions, a significant number of respondents either rarely or never use e-resources, indicating potential gaps in accessibility or awareness that need to be addressed to increase regular usage.

Student training in e-resource usage

The table below outlines the training in e-resource usage received by students at MUST and BSU. At MUST, 48% (28 students) reported receiving training in e-resource usage, while 52% (30 students) had not. At BSU, a smaller percentage, 38% (12 students), had received training, with the majority, 63% (20 students), indicating they had not received any training.

Student Training	**MUST**		**BSU**	
	Freq	%age	Freq	%age
YES	28	48	12	38
NO	30	52	20	63
Total	58	100	32	100

Table 4.10: Showing the number of students that received training

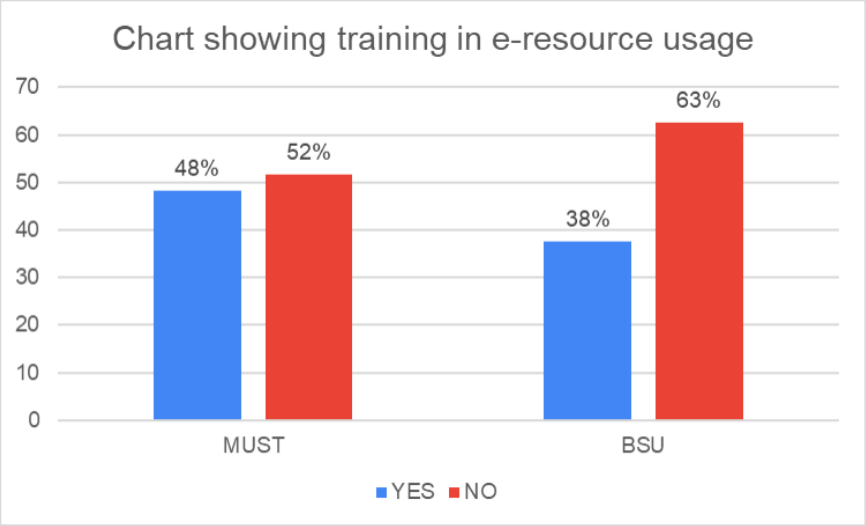


Figure 4.8: Showing the number of students that received training

These findings suggest that a notable portion of students at both institutions lacks formal training in e-resource usage, which may impact their ability to effectively utilize these resources. Increasing access to such training could potentially improve e-resource engagement and proficiency among students.

Staff training in E- resources

The table below provides insights into staff training in e-resource usage at MUST and BSU.

At MUST, a majority of staff, 57% (8 individuals), reported having received training, while 43% (6 individuals) had not. At BSU, the percentage of staff who had received training was lower, with only 33% (3 individuals) having undergone training, whereas 67% (6 individuals) indicated they had not received any.

Staff Training	MUST		BSU	
	Freq	%age	Freq	%age
YES	8	57	3	33
NO	6	43	6	67
Total	14	100	9	100

Table 4.11: Showing training of staff members in eresource usage

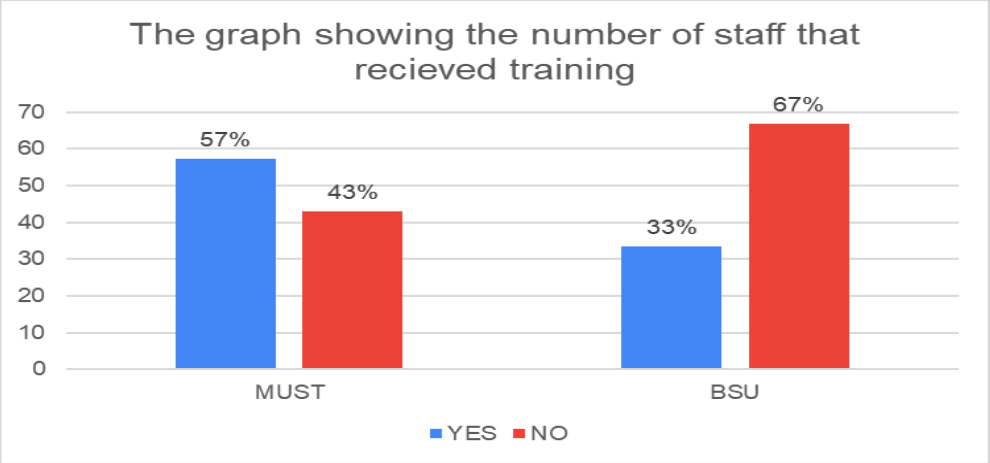


Figure 4.9: Showing training of staff members in e-resource usage

These results suggest that although some staff members at both institutions are trained in e-resource usage, there remains a substantial portion who lack this training. Increasing staff training efforts could further enhance resource utilization and support for student engagement with e-resources.

Conducting Training by Librarians to both students and staff in e-resource usage The table below provides information on the frequency with which librarians at MUST and BSU conduct training sessions in e-resource usage for both students and staff. At MUST, half of the librarians (50%, or 2 individuals) conduct training occasionally, while 25% (1 librarian) do so regularly and 25% (1 librarian) rarely. At BSU, training is slightly less frequent, with 67% (2 librarians) conducting sessions occasionally and 33% (1 librarian) doing so rarely; none of the librarians at BSU conduct training regularly.

Training	MUST		BSU	
	Freq	%age	Freq	%age
Regularly	1	25	0	0
Rarely	1	25	1	33
Occasionally	2	50	2	67
Never	0	0	0	0
Total	**4**	**100**	**3**	**100**

Table 4.12: Showing the frequency of conducting trainings by librarians

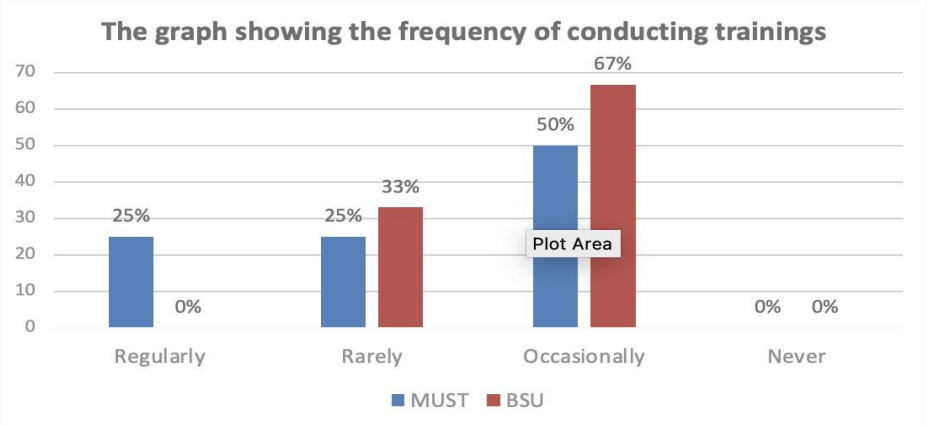


Figure 4.10: Showing the frequency of conducting training

This data suggests that training sessions are available but not consistently or frequently offered at either institution. Increasing regular training opportunities could improve both student and staff proficiency and confidence in using e-resources effectively.

Challenges faced by all respondents

The table below presents the challenges respondents face in accessing and using e-resources. The most frequently cited challenge is insufficient training, reported by 21% of respondents (25 individuals), followed by access issues, noted by 17% (20 individuals). A lack of awareness about e-resources affects 16% (19 respondents), while 15% (18 respondents) cite limited internet connectivity as a barrier. Difficulty in identifying relevant information is a challenge for 14% of respondents (16 individuals), and 13% (15 respondents) have never attempted to use e-resources. Only a small portion, 3% (4 respondents), reported no challenges.

Challenges Faced	**Freq**	**%age**
Limited internet connectivity	18	15
Lack of awareness	19	16
Insufficient Training	25	21
Difficult identifying relevant information	16	14
Access is a problem	20	17
Never tried to use them	15	13
None	4	3
Total	**117**	**100**

Table 4.13: Showing challenges respondents face

The responses suggest that both infrastructure challenges, like internet access, and individual factors, such as training and awareness, are major barriers to effective e-resource usage. Targeted initiatives aimed at boosting training, raising awareness, and improving connectivity could help overcome these obstacles, enhancing overall access to and use of e-resources.

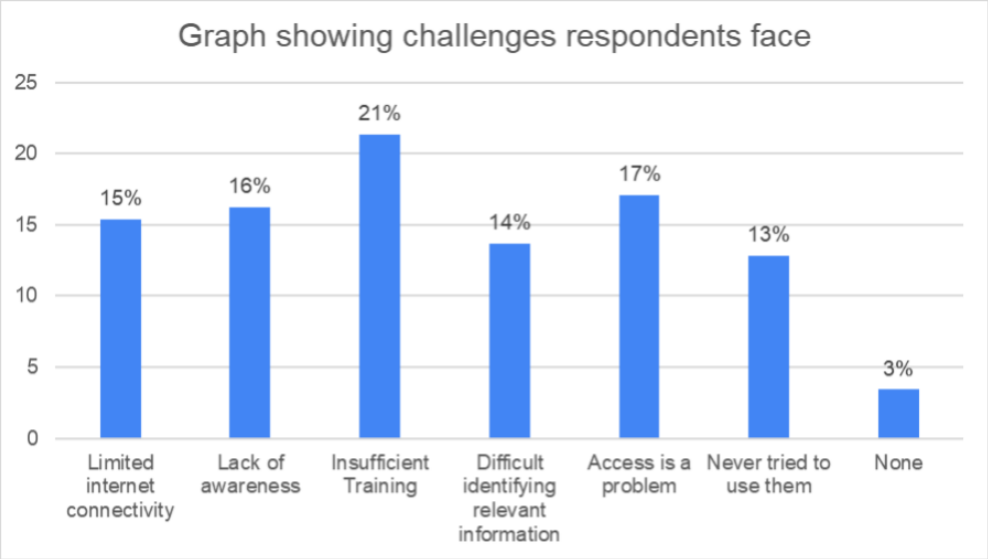


Figure 4.11: Showing challenges respondents face

Suggestions from all respondents for Improving E-Resource Usage

To enhance e-resource usage among students and staff in Uganda's university libraries, several key suggestions emerged from the respondents as listed below.

- Improve awareness campaigns and training for staff and users.
- Increase internet bandwidth and improve speed.
- Organize special training programs for users to enhance their search skills.
- Promote inter-library loan and document delivery options.
- Ensure easy discovery of e-resources through intuitive search interfaces and organized databases.
- Create user-friendly interfaces for e-resources.
- Optimize e-resources for mobile compatibility.
- Provide dedicated library staff for e-resources.
- Foster collaboration with faculty and researchers to integrate electronic resources into curricula and research work flows.
- Develop user education and outreach programs to improve search skills and enhance user experience.

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