



UNIVERSITY OF GHANA

COLLEGE OF EDUCATION

SCHOOL OF INFORMATION AND COMMUNICATION STUDIES

DEPARTMENT OF INFORMATION STUDIES

ASSESSING VIRTUAL REFERENCE SERVICES IN SELECTED UNIVERSITY

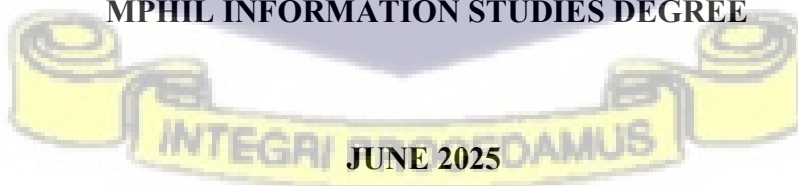
LIBRARIES IN GHANA

BY

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF
MPHIL INFORMATION STUDIES DEGREE



JUNE 2025

DECLARATION

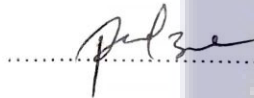
I Bisem Noah Aduah, affirm that, this thesis is my own original work, supervised by Professor Perpetua Dadzie and Dr. Monica Mensah Danquah and has not been submitted either in whole or in part for any research any research purposes anywhere. In the instances where references are made to work of other researchers are duly acknowledge. I am therefore full responsible for any errors and omissions contained in this work.



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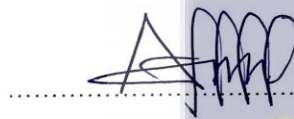
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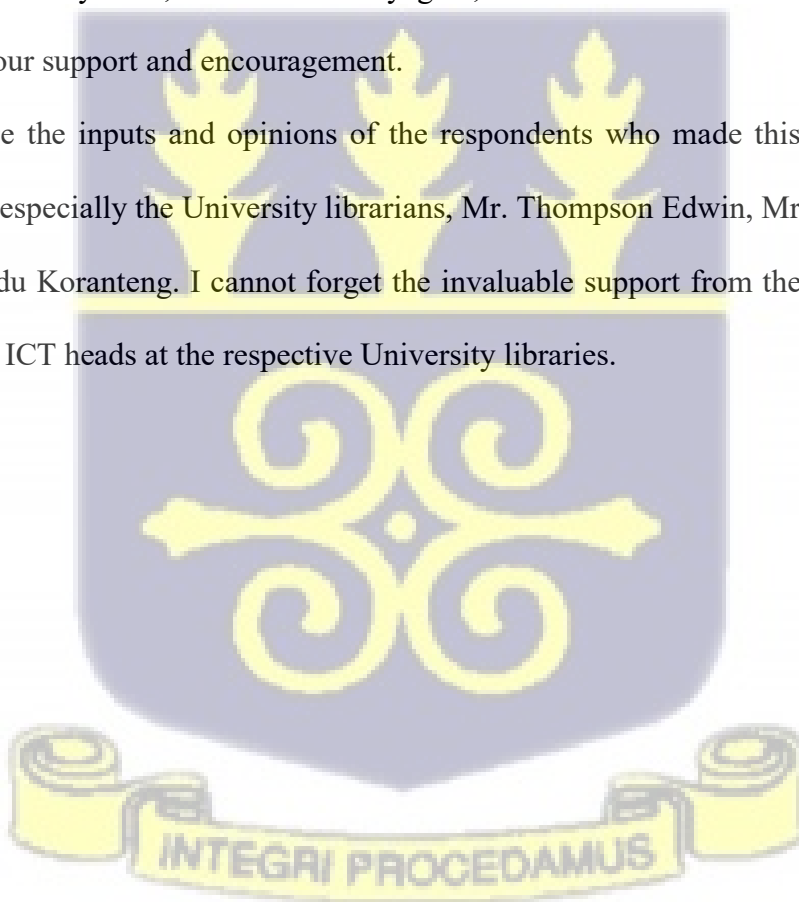
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DEDICATION

This work is dedication to my wife, Mrs. Paulina Ayagma, my mother and mother In-law Mrs. Bagomwo Bisem and Mrs. Kamina Ayagma. I also dedicate this work to my children, Bisem Ebenezer, Bisem Blessing, and Bisem Pascal.



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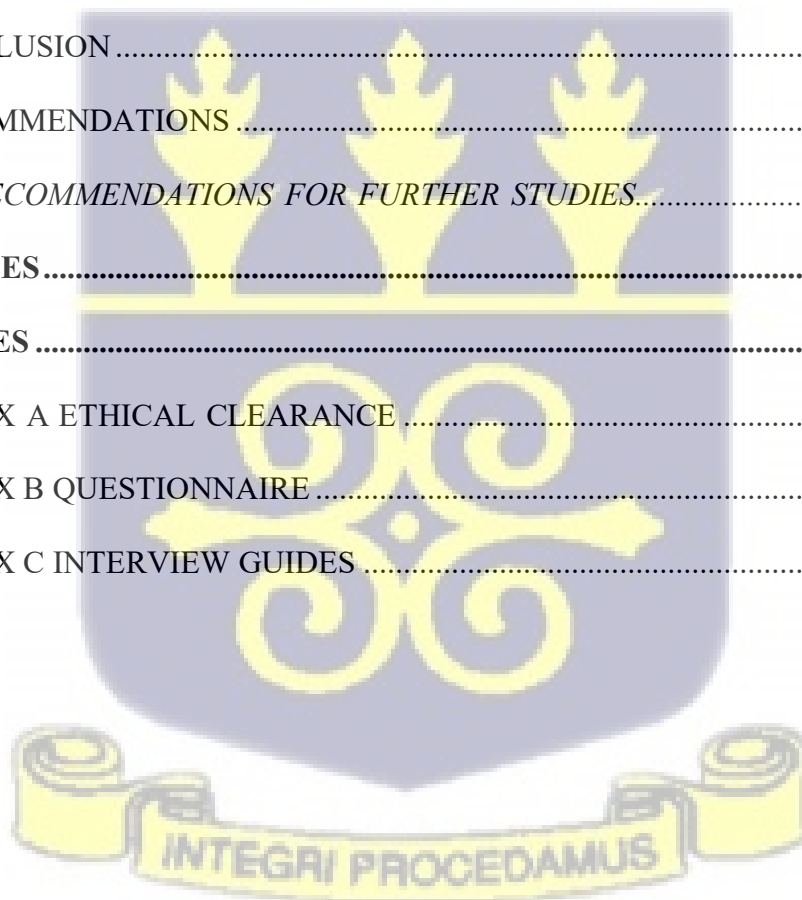
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ACRONYMS AND ABBREVIATIONS

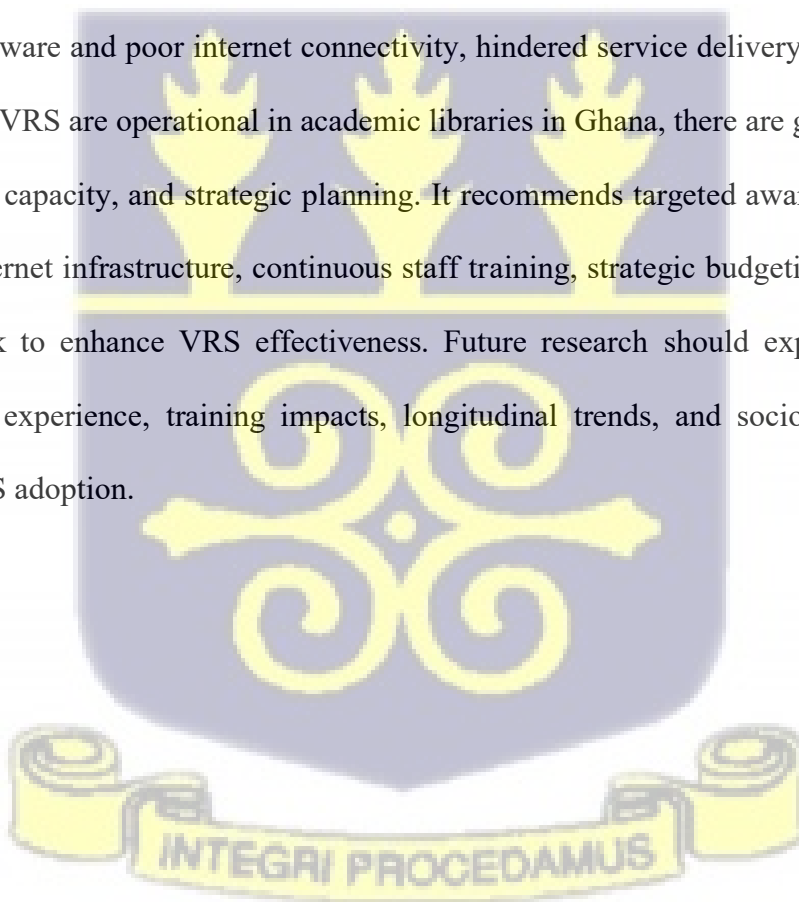
VRS	Virtual Reference Services
ICT	Information and Communication Technology
UDS	University for Development Studies
SDD	Simon Diedong Dombo



ABSTRACT

The integration of Virtual Reference Services (VRS) is becoming increasingly significant in academic libraries as they adapt to meet the evolving information needs of academic library users in a digital environment. However, in Ghana, the utilization and overall effectiveness of VRS remain underexplored. Despite the global shift toward virtual service delivery, there is limited understanding of how academic libraries in Ghana are implementing these virtual reference services (such as emailing systems, article request live chat services like “Ask the Librarian,” and instant messaging) to serve the graduate students information needs and how users perceive and engage with them. This study addresses this gap by assessing the awareness, accessibility, reliability, responsiveness, staff competence, management support, infrastructure, and challenges related to VRS in selected academic libraries in Ghana. The study was conducted in three public university libraries: the University for Development Studies (UDS), SDD Dombo University of Business and Integrated Development Studies, and C.K. Tedam University of Technology and Applied Sciences. postgraduate students and library staff members were selected using a combination of sampling techniques. All PhD and MA/MSc students were included due to their small populations, while a proportionate and simple random sampling technique was applied to the larger MPhil student group. A multiple case design was employed which include was employed, using a sample of graduate students and library staff from selected academic libraries in Ghana. Quantitative data were collected through structured questionnaires; qualitative data were gathered via interviews with library staff. The researcher also made an observation on the VRS system. The data were analyzed using descriptive statistics, correlation analysis, and thematic content analysis. The findings revealed that while a slight majority of students were aware of and utilized VRS, a significant portion lacked awareness,

which limited usage. Accessibility was generally viewed as adequate, though connectivity issues and outdated systems posed challenges. A strong positive correlation was found between awareness and utilization, indicating that increased awareness significantly influences service use. Library staff's responsiveness showed varying perceptions among graduate students. The findings reflect a broad spectrum of user experiences with the timeliness of virtual assistance, indicating moderate satisfaction overall, though concerns were raised about delayed responses in some cases. Staff were perceived as competent but in need of further ICT and customer service training. Management showed commitment through training and digital service support, but most libraries lacked a dedicated budget for VRS. Infrastructural deficiencies, especially outdated hardware and poor internet connectivity, hindered service delivery. The study found that although VRS are operational in academic libraries in Ghana, there are gaps in awareness, technological capacity, and strategic planning. It recommends targeted awareness campaigns, improved internet infrastructure, continuous staff training, strategic budgeting, and the use of user feedback to enhance VRS effectiveness. Future research should explore comparative studies, user experience, training impacts, longitudinal trends, and socio-cultural factors affecting VRS adoption.



CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Virtual reference services (VRS) in academic libraries have experienced significant advancements, primarily attributable to the proliferation of digital communication technologies. Virtual reference services (VRS) are increasingly vital in academic libraries, offering users remote access to information. In Ghanaian university libraries, understanding users' awareness and usage of these services is crucial for improving access (Mensah & Bosire, 2022). The quality of VRS depends on its reliability, accessibility, and the level of management support provided (Khan, Shahzad, & Perveen, 2024). For timely service delivery, the responsiveness and competence of library staff and the availability of ICT infrastructure is very crucial. This study assesses these factors in selected Ghanaian university libraries to evaluate the effectiveness of VRS.

Globally, virtual reference service advancements in academic libraries' have led to significant development in every sphere of library operations. This has created a paradigm shift in the transformation of knowledge sharing in the academic library user community. According to Lv (2020), with computer assistance, the virtual environment has become the taste for millions of individuals, library professionals, and its user community in the information age. The demand for virtual environments in academic libraries continues to soar, and research has reported that millions of researchers seek assistance through virtual platforms to meet their information needs (Gray, 2000). The prospect of VRS is great, and its usage is expected to gain even more acceptance in the future. Considering the huge improvements VRS has brought to the library

user, which ensured immediate and borderless access to information Asiedu et al. (2022), citing Mwiinga (2020), reported that digital reference services are the panacea and best approach to realizing the

information needs of library users. They added that the advent and use of virtual reference services were successful ventures for most academic libraries and researchers.

Virtual reference services can be referred to as electronic means of assistance for remote users to retrieve real-time information from the library using computers and other internet-based technologies. Price (2018) defined VRS as services initiated electronically in real-time, where users employ computers or other internet-based technology to communicate with reference staff without necessarily being physically present in the library. Since user information needs are core to librarians, they pursue all calibers of tools digitally to provide virtual reference services that better meet patrons' informational needs (Yang & Dalal, 2015). Virtual Reference Services can be offered through various platforms, such as telephone, email, live chat, video conferencing, texting, and more recently live AI chatbots and social media platforms like Twitter (now known as X). These platforms can be categorized into synchronous, such as through live chat, or asynchronous, such as through email or a web form.

Library reference services professional guidelines outline measures that contribute to providing effective reference services. These offer user instructions, guidance, or direct support to facilitate their informational access to various forms of knowledge in academic library. The guidelines include strategies that involve ensuring access, being responsive to user needs, designing services thoughtfully, employing critical thinking, maintaining a strong knowledge base, staying informed about the environment, applying knowledge effectively, promoting

active learning, being aware of marketing strategies, conducting assessments, engaging in effective communication and outreach, conducting evaluations, and fostering collaboration (Withorn et al., 2021). The effectiveness of academic library VRS also runs on the wheels of awareness, usage, reliability, accessibility, responsiveness, expertise of staff, and the level of management support provided (Khan, Shahzad, & Perveen, 2024). In an increasingly digital environment, library user expects prompt and efficient responses to their inquiries in virtual academic library settings where access to information must be prioritized for research and learning (Abdul Rahman & Mohezar, 2020). However, the ability of reference staff to deliver prompt service is influenced by both their technical expertise and the adequacy of the ICT infrastructure support for the virtual academic library institutions. Inadequate ICT support, delays in response times, inaccessibility, unreliability, lack of awareness, and limited knowledge in technology can hinder the effectiveness of VRS, reducing user satisfaction and trust in the services (Adjei, 2024).

In the digital age, academic libraries have increasingly embraced virtual reference services (VRS) to meet the evolving information needs of their users. VRS, which provides remote assistance through digital platforms, has emerged as an essential tool in enhancing user access to information and improving library service delivery (Igwe & Sulyman, 2022). In the case of Ghanaian academic libraries, VRS presents both an opportunity and a challenge. On one hand, it can bridge the gap between librarians and users, especially in geographically dispersed institutions; on the other hand, issues related to the reliability, accessibility, and institutional support for these services raise concerns about their effectiveness in meeting users' information needs. The reliability of VRS is critical, as it determines the consistency with which users can

access accurate information. If VRS platforms frequently experience downtime or delays in response times, users may lose confidence in the service (Naik, 2024). Moreover, accessibility plays a significant role in determining how inclusive VRS can be. In Ghana, where digital infrastructure may be uneven across regions, users in rural areas could face more challenges in accessing VRS than their urban counterparts (Kumi-Yeboah, Kim, & Armah, 2023). Generally, management support is a life wire, as it underpins the sustainability and continuous improvement of academic library VRS. Management support is crucial when it comes to the VRS in academic library, adequate staffing, adequate resource allocation, and ensuring ongoing training for VRS to remain responsive to user needs (Si, 2019). Without strong support from management, VRS may struggle to keep pace with technological advancements and user expectations, as resources are required to keep the system running effectively and efficiently. Academic libraries worldwide provide excellent service to their users through virtual reference services. As virtual reference services trend in academic libraries, libraries must be accessible to the information age patrons regardless of location and provide efficient, accurate, and effective services that meet user demands. However, academic library users must be aware that, although search engines are abundant for information retrieval, librarians possess the expertise to conduct thorough searches and assess the quality of information, thereby providing users with the most up-to-date, pertinent, and reliable information. The librarian's competence enables them to conduct a thorough evaluation that will ultimately assist users in fulfilling their information requirements (Skøtt, 2022). Accessing this service is nearly as effortless as searching on a search engine, particularly when utilizing texting or social media applications, which frequently yield superior outcomes.

Libraries will perpetually adjust to changes, and as emerging technologies are being created, forthcoming reference services may appear distinct from the current state. The understanding is that academic library user demands are no longer passive and require a proactive approach to meet their information needs effectively. It is unsurprising that, the Ghanaian academic library is exploring this trending area of the virtual environment, digging out the opportunities therein to manage academic library operations with the view of enhancing better service delivery. Previous studies by Amofah-Serwaa (2018) indicated a strong preference for traditional reference services in three academic libraries in Ghana even though users acknowledged the importance of both conventional and digital reference services. However, there was a clear increase in the utilization of digital reference services during quizzes, mid-semester examinations, interim assessments, and end-of-semester examinations. Also, it was noted that the majority of respondents primarily used digital reference services when they were not on campus, with mobile phones being the most commonly used digital device for accessing these services. This implies that virtual referencing is a cutting-edge solution at the peak of users' information needs as well as bridging the gap that exists between the conventional library and the information user. Asiedu et al., (2022) also examined students' preference for virtual reference services in the Ghanaian public university libraries. The study findings indicated that students have a strong preference for using these services when they require assistance from the library. Moreover, the results also suggested that students did not face any notable difficulties when utilizing their preferred reference service model. It appears that not much effort has been put into evaluating the effectiveness of academic library virtual reference services in the Ghanaian context. The objective of this study therefore, is to assess the

effectiveness of virtual reference services through its awareness, usage, accessibility, reliability and responsiveness in academic libraries in Ghana.

1.2 STATEMENT OF THE PROBLEM

Integration of virtual reference services is growing in modern academic library management systems (Wang, 2023). The level at which this digital space is growing in the field of research, especially in academic libraries providing information needs, the challenges, and the opportunities, are yet to be fully explored in the academic libraries in Ghana.

However, some areas of VRS have not been sufficiently explored in Ghana. This include the need to assess and evaluate the quality of virtual reference services (emailing, article request or web form, chat services such as Ask the Librarian, instant messaging) for the seamless use of library resources in the academic libraries individually or as a consortium (CARLIGH). This research will ascertain the degree to which these virtual reference services meet library user information needs. To fully understand and assess the concept of virtual reference service effectiveness, the library user views and utilization of the service are very essential. That is, how the service is perceived by the user. Research has shown that digital exclusion occurs in many different ways, it could be a lack of adequate knowledge and skills, or insufficient motivation to use technology (Casselden, 2023). The extent to which services are being utilized or not, and user reasons for preferences are necessary. Their comments will help the researcher to single out areas for improvement.

The academic libraries in Ghana could be facing some degree of challenges in implementing as well as maintaining the virtual reference services. At the same time, more opportunities may exist for expanding its services. It is therefore worth identifying these challenges and

opportunities to help maximize virtual reference services delivery in Ghanaian academic libraries.

1.3 THE PURPOSE/AIM OF THE STUDY

The study's purpose is to investigate the quality of virtual reference services (**emailing, chat, phone call, webform among others**) in meeting user information needs in Ghanaian academic libraries.

1.4 OBJECTIVES

1. To assess awareness and usage of VRS quality by postgraduate students in selected academic libraries Ghana.
2. To examine the quality of VRS reliability for effective library services in selected academic libraries Ghana.
3. To assess the quality of VRS accessibility in selected academic libraries Ghana.
4. To evaluate the quality of VRS responsiveness in meeting users' information needs selected academic libraries in Ghana.
5. To examine VRS staff competence in providing user information needs in selected academic libraries in Ghana.
6. To assess management support of VRS quality in selected academic libraries in Ghana.
7. To evaluate infrastructural support and resource allocation in providing quality virtual reference services in selected academic libraries in Ghana.
8. To identify challenges associated with quality virtual reference services in academic libraries in Ghana.

1.5 DEFINITION OF TERMS OF THE STUDY

This section covers the most important terms of the study. In this study, virtual reference services (VRS) are library services offered online via email, chat, web form, phone, texts, or videoconferencing to assist users in accessing information resources (Yang, & Dalal, 2015). These are briefly outlined below.

Email-based reference services

Email reference services are virtual reference service that enables library users to interact with librarians via email for their information requirements.

Web form virtual reference services

Web form virtual reference services are online services that allow library users to directly communicate with librarians from different locations using electronic web forms.

Chat-based reference services.

Chat reference services refer to online virtual reference services (Ask a Service, ask a Librarian, chat a Librarian) that enable library patrons to communicate with librarians in real- time through chat software.

Text messaging reference services

Text messaging services entail offering reference services online to users through text messages to aid their academic information requirements.

FAQs services

These are library resources deployed via the internet in academic libraries to meet user information needs. They assist online library users retrieved brief instant information.

Phone virtual reference services

The phone services are used in academic libraries to assist remote patrons with their information needs using phone calls or SMS chat.

Video conferencing reference services

This is a form of virtual reference services that enable librarians to engage with users in real time through video conferencing tools, such as Skype.

1.6 THEORETICAL PERSPECTIVE OR CONCEPTUAL FRAMEWORK

A theory is described as a set of related constructions, definitions, and propositions that give a systematic view of events by establishing a relation among variables to explain and predict phenomena (Yamauchi et al. 2017). The integration of virtual reference services is growing in modern academic library management systems (Wang, 2023). The level at which this digital space is growing in the field of research, especially in academic libraries, providing information needs, challenges, and opportunities, is yet to be fully explored in the academic libraries in Ghana. The need to assess and evaluate the effectiveness of the VRS platforms (**emailing, web forms, mobile phone, and chat services such as Ask the Librarian**) used to provide assistance and access to the digital library resource users, regardless of location, necessitates this study. This research will ascertain the degree to which VRS meets library user information needs. Research has shown that digital exclusion occurs in many different ways, it could be a lack of adequate knowledge and skills, or insufficient motivation to use technology (Casselden, 2023). Library services quality can be studied using various models. These include SERVQUAL, LibQUAL+, Gap Theory, and Expectation-Confirmation Theory and General

Digital Reference Model. Amongst the above theories the SERVQUAL and the General Digital Reference Model were considered for the study.

SERVQUAL MODEL

SERVQUAL (Services Quality) is a diagnostic tool develop originally for business settings but later adapted for library services through LibQUAL+. It helps evaluate how well users' expectations are meet by comparing the expected services with the perceived services performance. TheSERQUAL Model situate well for this study because is one of the most widely used models in assessing services quality in libraries, particularly focusing on the gap between user expectations and perceptions. The model is made of five key dimensions. These include

Tangibles, Reliability, Responsiveness, Assurance, Empathy.

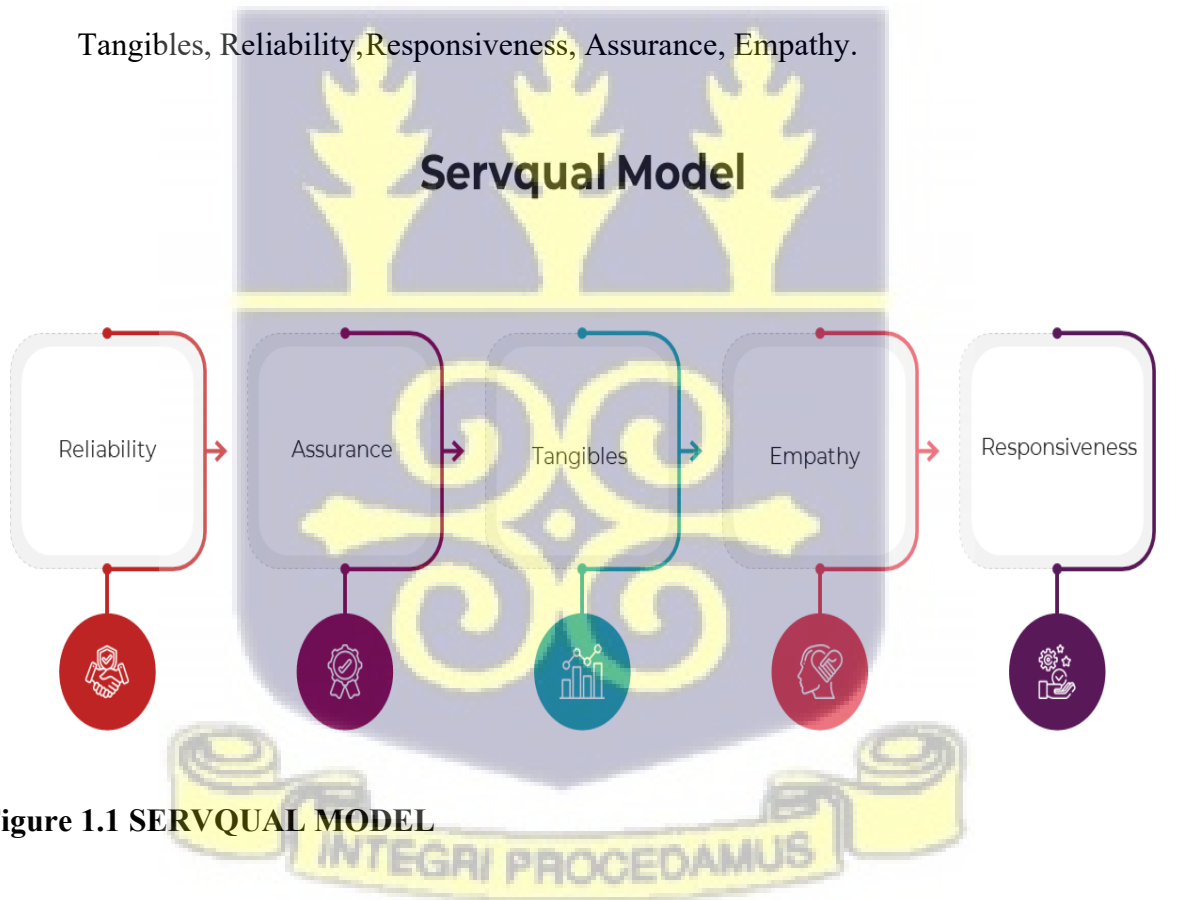


Figure 1.1 SERVQUAL MODEL

1.6.1 THE COMPONENTS OF THE SERVQUAL MODEL.

Tangibles: This construct of SERVQUAL include the physical facilities, equipment, and appearance of personnel. Virtual reference services have evolved to encompass the management of electronic resources with the advent of digital technologies. Traditional library reference services have transition to the new virtual reference services to deliver reference services online. tangibles are considered the strongest predictor of quality service. Technology has brought about improved work performance and expectations are high among users as they look forward to better services with the use of virtual reference services. With the physical facilities equipment and use of technology, reference service will experience paradigms shift of superior effectiveness in academic libraries.

Reliability: Ability to perform promised services dependably and accurately. the degree of trustworthiness of service a certain system or piece of technology. VRS system will be rapidly adopted if its dependable and accurate to help achieve the goal of a user. Services that are dependable tells more about its reliability and quality to satisfy its users.

Responsiveness: refers to the extent of willingness to help users and provide prompt service. Responsiveness is especially significant in meeting user information needs.

Assurance: Knowledge and courtesy of staff, and their ability to inspire trust and confidence. It described the extent to which an individual believes in knowledge and ability of staff in providing library services effectively. The skills and competencies required by virtual reference staff in selected academic libraries in Ghana in the digital era is crucial to provide trusted user information.

Empathy component is very clear caring and individualized attention in providing and

understanding user information needs, and personalized support. The information shows in clear evidence that, regardless of its intricacy, the SERVQUAL is still very applicable in today's world, particularly when assessing library service quality. This well-defined reason made the theory a choice of the researcher for investigation of the study.

Virtual reference services are essential and well-accepted services in many institutions and academic libraries are no exception. Academic libraries in Ghana are experiencing a paradigm shift from conventional reference services to automated virtual reference services which resulted in the use of Library Management System (LMS). This is an improved system to the traditional reference system that manages library virtual reference services efficiently while enabling access to information effectively.

The SERVQUAL aims to assess the quality and effectiveness of virtual reference services in selected academic libraries in Ghana and how this service improves access to information efficiently.

1.6.2 SOME LIMITATIONS OF SERVQUAL MODEL

The following are some of the model limitations. These include;

First and foremost, contextual rigidity SERVQUAL was originally developed for commercial services, so its dimensions may not fully capture the unique aspects of academic library services, such as scholarly support or digital resource access. Also, overemphasis on expectations is another limiting factor of the model, relies heavily on comparing user expectations with perceptions, which can be subjective and influenced by factors like prior experience or cultural background. Lastly, static measurement SERVQUAL typically uses surveys at a single point in time, making it difficult to track changes in service quality or user

satisfaction.

SERVQUAL AS A MODEL CONSIDERED FOR THE STUDY RELATES TO THE RESEARCH OBJECTIVES AS FOLLOWS:

To assess the awareness and usage of virtual reference services in selected academic libraries in Ghana. SERVQUAL will help to ascertain how postgraduate students are made aware of the availability of the services and their usage. It will help explore the impact of the factors such as tangibles, reliability, responsiveness, assurance and empathy of current virtual reference services. SERVQUAL evaluate services quality to reflect its mandate of providing virtual reference services to users in the academic library. It is expected that providing quality virtual reference services effectively, user information needs will be met satisfactorily.

To examine the reliability of virtual reference services in selected academic libraries in Ghana, SERVQUAL, as it relates to reliability can help in evaluating respondents' perceptions of the virtual reference service reliability in the digital information era. Individual will adopt a dependable system because they expect it to enhance their performance.

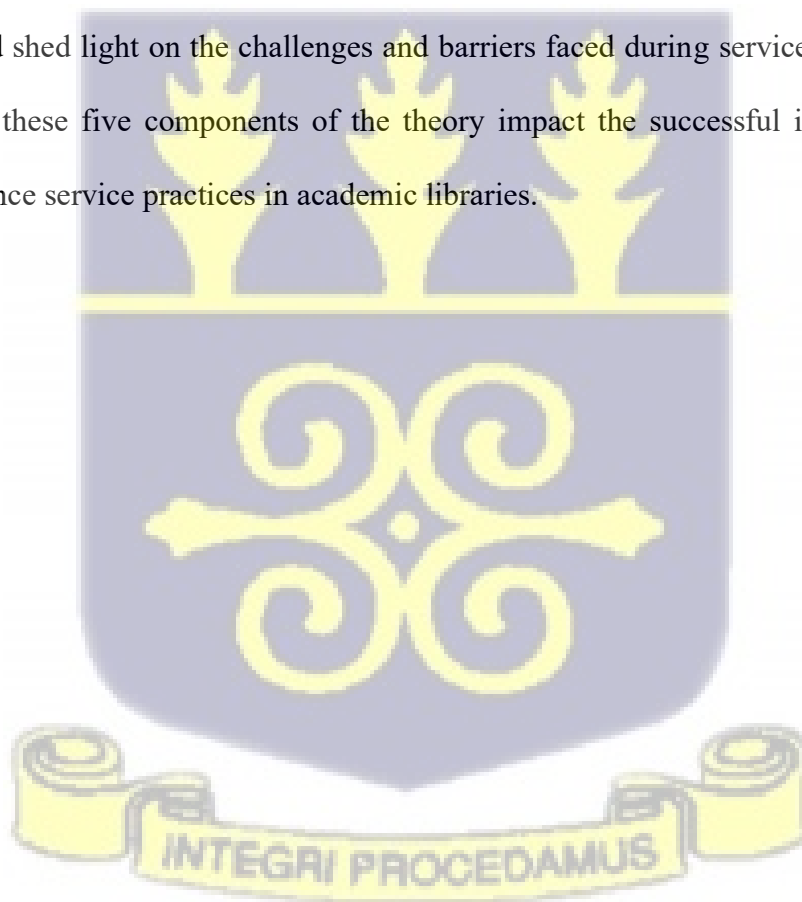
To examine the accessibility of VRS in providing virtual reference services to library users: assurance and tangibles, as a component of SERVQUAL, helps individual respondents to evaluate VRS system promise of access and use. If the services do not inspire trust of access or use, service quality will be compromised.

To evaluate the responsiveness of VRS staff's timely user information delivery: the responsiveness and empathy components help to evaluate the responsiveness of the system. A responsive VRS minimizes the effort needed by users. In much the same way, a fast and responsive system makes users achieve better outcomes, thus enhancing service quality.

To assess management support of VRS in academic libraries in Ghana: SERVQUAL will help guide this study on exploring the factors influencing management support in providing quality VRS. It will help investigate how tangibles, reliability, responsiveness, assurance and empathy impact the adoption and implementation of recommended changes by library management.

To evaluate the ICT infrastructural support of VRS: Tangibles as a component of **SERVQUAL**, ascertains how ICT provides adequate infrastructural support for quality VRS. Adoption increases if there are strong technical support systems to ensure access and use.

To examine challenges and barriers faced by VRS in academic libraries in Ghana: **SERVQUAL** will help identify factors that will influence service quality and usage of VRS and practices, and shed light on the challenges and barriers faced during service provision. It will explore how these five components of the theory impact the successful implementation of virtual reference service practices in academic libraries.



1.6.3 MAPPING OF OBJECTIVES WITH THEORIES

The SERVQUAL model is deployed to match the research objectives below.

Table 1:1 study objective linked to theoretical framework

Objectives	Theory dimensions
To assess awareness and usage of VRS quality by postgraduate students in selected academic libraries Ghana	SERVQUAL influences awareness of VRS through signage and availability in it tangible components, in creating user awareness and knowledge of VRS. SERVQUAL assurance, reliability empathy, responsiveness component helps respondents evaluate the benefits of VRS for its usage.
To examine the quality of VRS reliability for effective library services in selected academic libraries Ghana	SERVQUAL component of reliability can inform the assessment of the VRS quality. Individuals will adopt a dependable system because they expect it to enhance their performance.
To assess the quality of VRS accessibility in selected academic libraries Ghana.	SERVQUAL tangibles, reliability and assurance component helps individual respondents to evaluate the system's ease of access and use. If the system is difficult to access or use, adoption may be lower

To evaluate the quality of VRS responsiveness in meeting users' information needs selected academic libraries in Ghana.	Responsiveness and tangibles components help to evaluate a responsive system. A responsive VRS minimizes the effort needed by users. Again, a fast and responsive system makes
	users achieve better outcomes, thus enhancing performance.
To examine quality of VRS staff competence in providing user information needs in selected academic libraries in Ghana.	Assurance components of SERVQUAL can help users evaluate VRS system since high staff competence in reference service can lead to meeting user expectations.
To assess quality of management support of VRS quality in selected academic libraries in Ghana.	Tangibles component considers how influential other factors are in affecting VRS adoption. It can examine the impact of management support on VRS adoption.
To evaluate ICT infrastructural support and resource allocation in providing quality VRS in selected academic libraries in Ghana.	Tangibles helps respondents ascertain how ICT supports VRS adoption or stifles access and use. Adoption increases if there are strong technical support systems to ensure reliability.



To examine challenges and barriers faced in providing VRS in academic libraries in Ghana.	SERVQUAL will help identify factors that will influence the acceptance and usage of VRS technologies and practices, and shed light on the challenges and barriers faced during the transition. It will explore how these four components of the theory impact the successful implementation of
	virtual reference service practices in academic libraries

1.7 SCOPE OF THE STUDY

Selected academic libraries for this study include University for Development Studies, C. K. Tedam University of Technology and Applied Sciences and S. D. Dombo University of Integrated Business and Development Studies. The focus of the study was to assess the effectiveness of virtual reference services in the selected academic libraries. The study involved users of the system, specifically postgraduate students, head university librarians, heads of reference staff, and heads of ICT of the respective libraries in Ghana.

1.8 JUSTIFICATION OF THE STUDY

This study will have significant implications at several levels. It acknowledges the fact that virtual reference services have brought a paradigm shift in academic libraries, where libraries are able to provide reference services to their users irrespective of location.

This study provides first-hand information on assessing virtual reference services in academic

libraries in Ghana.

It is significant as it contributes to the understanding of current trends on the topic of VRS, challenges, and opportunities in managing and organizing information resources.

The study findings will constitute a local and international document for policymakers, library management, and professionals.

1.9 SIGNIFICANCE OF THE STUDY

The compelling reasons this study hopes to achieve is to enhance virtual reference services delivery in Ghanaian academic institutions as follows:

First and foremost, this research can be a tool for policy development and strategic decision-making for stakeholders in Ghanaian academic libraries.

Moreover, librarians will benefit from evidence-based insights to enhance service provision and resource allocation the academic library.

Furthermore, addressing the challenges identified in this study can lead to capacity building, training opportunities, and strengthening the skills and expertise of library staff in Ghana.

Lastly, inadequate comprehensive research on the effectiveness of virtual reference services in Ghanaian public academic libraries signifies a notable gap in the existing literature. This study filled that void by contributing empirical data and analysis specific to this context.

1.10 ORGANIZATION OF STUDY

The study was organized into six chapters.

Chapter One contains the introduction, background of the study, statement of the problem, purpose of the study, objective of the study, and scope of the study. This chapter also includes the significance of the study, the theoretical framework, and the organization of the chapters.

Chapter two focuses on the literature review on virtual reference services in academic libraries, the current trends in academic libraries from Ghana, African, and global point of view. The concept of VRS, overview of VRS, technologies of virtual reference services, awareness and use of virtual reference services, reliability and accessibility of VRS, responsiveness of VRS, staff competence of VRS, management support and resource allocation, and challenges faced by VRS in academic libraries in Ghana.

Chapter three provides a clear methodology of the study procedures that have been adopted for the data collection. Research design, population, sample size, sampling technique, instrumentation, data collection mode of data analysis and presentation of results and discussions, problems encountered, and ethical consideration.

Chapter four focuses on data analysis and results presentations.

Chapter five provides a discussion of the research findings.

Chapter six presents the summary of findings, conclusions, and recommendations.



CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The literature review analysed the scholarly research conducted on virtual reference services in academic libraries worldwide, with a particular emphasis on Ghana. The topics covered include virtual reference services in academic libraries, the technologies utilized for Virtual Reference Services, awareness and utilization of virtual reference, accessibility, reliability, responsiveness, management support, resources allocation, infrastructural support and challenges of virtual reference services in academic libraries.

2.2 THE CONCEPT OF VIRTUAL REFERENCE SERVICES

Virtual reference services are online services that enable library users to interact with reference staff for their information needs without the need to physically be present at the library. These services facilitate users in submitting inquiries and receiving responses via the Internet. This means that VRS provides enhanced standard reference service delivery as long as users are connected to the internet. Virtual reference services aim to provide personalized assistance, curate reference materials, assist users in finding reliable sources of information, and promote reference materials and resources (Cassell & Hiremath, 2023). A digital reference transaction commonly encompasses the user, interface, electronic resources, and information professional. User information satisfaction is better achieved when transactional procedures are effectively adhered to for seamless and effective information access. Virtual Reference Service enhances traditional reference services by enabling users to submit queries and receive answers via the Internet and other electronic platforms (Cassell & Hiremath, 2023). However, virtual reference

services are not without challenges. Issues of poor internet connectivity, technical obstacles, cost, inadequate staff training, user expectations, and their preferences are some notable challenges (Lambaria & Clark, 2023). Libraries and librarians need to understand the bottlenecks of virtual reference services and their implementation to improve a smooth library service delivery that meets users' information needs.

With virtual reference services, one can access information online from the library regardless of location, thereby supporting the academic work of graduate students. Academic libraries, which use virtual technologies to offer virtual reference services to patrons, represent a notable advancement in the library (Moyo, 2013). The technology has greatly impacted the reorganization of library functions, professional growth, library service delivery, and a paradigm shift in user access to information.

Virtual reference services signify a transition to digital and online platforms that connect a network of specialized knowledge to handle user inquiries, in contrast to conventional reference services (Panda, 2023). The VRS concept has been transformed into a tangible reality in academic libraries, fulfilling various important purposes such as managing a range of reference materials, aiding users in finding information, and supporting public relations and professional growth, leading the way in technological progress. This rapid technological progress is anticipated to increase the demand for VRS in academic libraries, offering improved support to users and enhancing library services all around. Standardization of VRS should be in line with comparable institutions in developed nations as technology advances, there should be a continuous development of VRS, and establishing optimal methods and guidelines for its implementation.

2.3 OVERVIEW OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

Library services are crucial services in the contemporary academic library setting. Virtual reference service was developed in academic libraries to meet the growing information resources demands (Runyon & Steffy, 2021). This novel approach sought to enhance conventional library services by offering virtual reference support to users in search of academic information regardless of time and location. Digital reference services utilize technology (**emails, chat, webform, video, SMS, among others**) to provide users with immediate support and direction in navigating the extensive array of digital information resources accessible on the internet. Academic libraries have improved the research experience for students, faculty, and researchers by incorporating digital tools and resources into their reference services to meet user information needs (Hamad, Al-Fadel, & Shehata, 2023). Leveraging digital technologies makes accessing scholarly electronic resources (academic journals, databases, e-books) and other digital materials for research and learning seamless for users than using the conventional approach. Unlike the traditional approach, virtual reference services provide immediate research assistance and help users develop information literacy skills by teaching effective online information search and evaluation (Mupaikwa, 2024). However, studies by Ross, Nilsen, and Radford (2019) indicated that virtual reference services are for complicated and special inquiries where conventional methods are inadequate. The issues of technical obstacles and unfriendly user interface navigations, coupled with a lack of training for system users, and poor internet, can leave a library user with unmet information needs. Almaiah (2022) highlighted the importance of the user-friendliness of the services to

help resolve demanding academic responsibilities of users.

This has been a core reason for librarians in digital reference services to be trained to help users improve critical thinking skills and evaluate the credibility and reliability of digital information (Sanches & Melo, 2022).

The implementation of virtual reference service signifies a substantial shift in the delivery of reference assistance. According to Cox, Pinfield, and Rutter (2019), Virtual reference services are anticipated to become increasingly crucial in academic libraries as technology advances, influencing the future of reference services and user support. Hence, adoption, improvement, and standardization of the services are essential to ensure that they adhere to international best practices, even if they are not always readily available or as successful as they could be. Therefore, regular evaluation and assessments are essential to maintaining the effectiveness, efficiency, and quality of virtual reference services in meeting users' information needs.

A previous study conducted by Xie, Joo, and Matusiak (2021) on user preferences regarding virtual reference services in an academic library, as well as the factors influencing these preferences, discovered that users prefer services that are convenient, easy to use, and provide prompt responses. Additionally, it was revealed that factors such as age, gender, and academic standing influence user preferences for virtual reference services.

2.4 TECHNOLOGIES OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

These are communication channels deployed to carry out virtual reference services in academic libraries across the globe. The study assessment is based on what the respective academic libraries provide for virtual reference services, and the following technologies are considered.

Email services, text services, chat services, phone, web form, and video conference services

2.4.1 EMAIL REFERENCE SERVICES IN ACADEMIC LIBRARIES

Email-based reference services are a form of virtual reference service that enables library users to interact with librarians via email. Email services are commonly available on library websites, which are made accessible anywhere with internet connectivity. Email-based reference services aim to aid library users in conducting research, locating resources, and navigating library systems (Shahzad et al.,2020). The library website provided a basic form for users to submit inquiries via email and guaranteed a response within 24 hours. Academic library email-based reference services have shown that these services are now common in libraries of all sizes. Email-based reference services also remain valuable for users who favor asynchronous communication or have intricate reference inquiries (Mojjada,2025). The convenience and acceptance of email for information sharing in academic libraries is phenomenal and remains the most familiar service for addressing library users' information needs.

Previous studies also indicated that email services are prominent due to their ease of access, convenience, reliability, and ease of use (Asim, Arif, & Rafiq, 2024). Research findings of user preference regarding various communication mediums also demonstrated that email service was the preferred virtual reference service by users, whereas phone, online chat, text messaging, and Skype video had less appeal. The emergence of other communication mediums (phone, online chat, text messaging, and Skype video) deployed to carry out VRS in the academic library in recent times could not outlive library email services, even though email has been the earlier virtual reference service in the academic library (Zareef & Ahmad2021). The service remains relevant as library patrons opt for email as their primary means of communication with

librarians, especially when not on campus, with mobile devices being the most frequently utilized tool for access. This preference may stem from a lack of familiarity with other digital reference service platforms and the perceived immediacy of face-to-face interactions at reference desks. Nevertheless, the research also demonstrated that digital reference services greatly improve the overall library experience, implying that an increase in acceptance is possible if awareness and training are enhanced (Dadzie & Walt, 2015).

However, the study emphasized the significance of interactivity in library reference services, which is explicitly missing in library email reference services, noting its limitation in email-based services because of the absence of personal interaction (Shahzad et al. 2020). A study by Chisita et al. (2022) also identified the bottlenecks of email-based reference services to include occasional delays in response time of library users who are seeking information for their academic assignments.

ADVANTAGES OF EMAIL-BASED REFERENCE SERVICES

Email-based reference services provide numerous benefits that make them a convenient and effective choice for users in need of information (Panda, 2021). Convenience is a key benefit of email-based reference services due to the ease of use. As long as there are internet access library users at all locations including at home, work, or while traveling can send their inquiries to academic library reference staff for research assistance. This accessibility removes the necessity for users to visit a library in person or wait in a queue to communicate with a librarian. Users have the flexibility to submit their inquiries at any time, which is convenient for individuals with hectic schedules (Asim, Arif, & Rafiq, 2024). Email-based reference services also facilitate asynchronous communication between users and librarians. Users can submit

questions at any time, and librarians will respond. Email communication is more convenient for users and librarians because it does not necessitate both parties to be available simultaneously, unlike real-time chat services. Email-based reference services offer the benefit of being able to retain email transcripts for future use. Users can maintain a log of their exchanges with librarians, documenting the inquiries made and the responses given. This feature is beneficial for students engaged in research or individuals looking for information on a specific topic for a prolonged duration. Email-based reference services enable librarians to offer thorough and well-researched responses to user inquiries. Email communication enables librarians to provide thorough responses to users' questions by allowing them the time to carefully construct detailed answers, unlike the limitations imposed by phone or in-person interactions. Email-based reference services provide users with a heightened level of privacy and confidentiality, allowing them to ask sensitive or personal questions via email rather than in person or over the phone. Users can securely and discreetly communicate with librarians, ensuring that their inquiries remain private (Panda, 2021).

DISADVANTAGES OF EMAIL-BASED REFERENCE SERVICES

Email-based reference services are popular methods for users to request assistance from librarians and research specialists. Nevertheless, there are some disadvantages linked to this method of communication. The primary drawbacks of email-based reference services are the delayed response time (Chisita et al. 2022). Email-based reference services depend on asynchronous communication, unlike chat-based or phone-based services. There could be a substantial delay between the user submitting their query and the librarian replying. Users requiring urgent help or time-sensitive questions may find this delay frustrating. The librarian's

response time may be influenced by their workload, availability, and other factors, potentially exacerbating the delay (Gómez-Cruz, M. E., 2019).

Email-based reference services depend entirely on written correspondence. While this facilitates users in articulating their inquiries clearly and accurately, it may also restrict the range of communication. Complex or nuanced queries may be challenging to express clearly via email, which can result in misunderstandings or misinterpretations. Non-verbal cues such as tone of voice, facial expressions, and body language, crucial in in-person communication, are lacking in email-based services. Email reference services can be affected by technical issues that may interrupt the service. Issues with email systems or internet connectivity can hinder users from sending or receiving emails, leading to communication delays or interruptions. Moreover, problems related to email attachments or formatting may lead to confusion and misunderstandings between users and librarians. Emails are also susceptible to interception, hacking, or unauthorized access, which could lead to breaches in confidentiality and privacy. Although email providers and libraries have security measures to safeguard user data, the possibility of a breach cannot be entirely eradicated (Altulaihan et al., 2023).

2.4.2 WEB FORM REFERENCE SERVICE IN ACADEMIC LIBRARIES

Web form virtual reference services are a type of remote reference service that allows library users to directly communicate with librarians from different locations using electronic web forms. This service model provides users with access to the reference desk at any time and from any location, and web form virtual reference services offer convenience to library users (Lateef & Mairaj, 2024). With this service, individuals can receive assistance from librarians without being limited by physical proximity or operating hours. The asynchronous nature of web form

communication allows users to submit detailed queries, resulting in more accurate and personalized responses.

These web-based virtual reference services improve the accessibility and flexibility of library assistance by overcoming geographical constraints and time limitations (Panda, 2021). This increased accessibility is particularly beneficial for individuals with mobility limitations, those in isolated regions, or users with busy schedules who cannot visit the library during its regular operating hours. Users can now receive expert guidance and support without having to physically visit the library or adhere to specific operating hours. Through a web form, library users have unrestricted access to the expertise and knowledge of professional librarians. Librarians can provide personalized suggestions, assist with research, offer citation advice, and provide various forms of assistance through the online platform. This ensures that users receive accurate and reliable resource information to effectively meet research needs. Librarians who are used to interacting with patrons face-to-face may find it challenging to answer unclear questions without a reference interview (Shahzad et al., 2020). However, the web form provides more comprehensive information compared to email submissions. This data can be used to improve, enhance, or expand the email service (Papay & Colas, 2023). Users are required to provide specific information on the form and will receive prompt and precise responses after submission. The form is easily accessible on the Library Homepage or the reference page. This valuable tool helps librarians accurately identify the information needs of patrons, allowing them to provide personalized assistance tailored to each user's specific requirements (Oluwabiyi, 2017). The web form for Virtual Reference Services (VRS) requires a valid email address, information about the nature of the inquiry, consulted sources, intended use of the

information, user's location, a name for personalized interaction, desired information date, and required resources for a complete transaction

ADVANTAGES OF WEB FORMS VIRTUAL REFERENCE SERVICES

Web forms offer users the convenience of accessing the reference desk from any location and at any time, providing flexibility for seeking assistance regardless of the library's operating hours. Anonymity is essential, especially for users who may feel hesitant or embarrassed to visit the physical reference desk. By submitting queries through a web form, users can ask questions anonymously, creating a more comfortable environment for seeking assistance. The user-friendly interface of web forms is designed to appeal to individuals who may be reluctant to seek assistance in person. With their intuitive design, web forms streamline the process of submitting queries and encourage increased interaction with library services. Web forms enable librarians to develop new skills or adapt traditional reference skills to align with modern communication methods (Igwe & Sulyman, 2022). Interacting with users on online platforms can help librarians improve their digital literacy and communication skills, ultimately leading to better service for patrons. Furthermore, the organized layout of a web form inquiry offers the librarian more comprehensive information compared to conventional email submissions, which is advantageous for both the library and the user. Web forms improve the visibility of library services and provide a more personalized experience than an email link, ultimately boosting the promotion of library services (Deodato, 2018). The advantages highlight the importance of web forms for virtual reference services in academic libraries by enhancing accessibility, user experience, and the skills of library staff.

DISADVANTAGES OF WEB FORM VRS

One of the inherent challenges of web form reference services lies in the delayed response time. Unlike live chat or in-person interactions, users might experience lengthy waiting periods, sometimes stretching for hours or even days, before hearing back from a librarian (Kaufmann & Miller, 2020). This can be especially vexing for students or researchers dealing with looming deadlines. Gao, et al., (2013) highlight the asynchronous nature of web forms as a restricting factor in delivering immediate support, which is frequently anticipated in academic environments.

Moreover, web forms may prove to be less engaging for users. The absence of real-time interaction can hinder librarians from asking follow-up questions or immediately clarifying the user's query (Cahill, 2009). These incomplete or misunderstood questions, lead to prolonged back-and-forth communication which could dissuade users from seeking additional assistance, thereby diminishing the overall effectiveness of the library's reference services.

2.4.3 LIVE CHAT VIRTUAL REFERENCES SERVICES IN ACADEMIC LIBRARIES

The term "chat-based reference services" refers to a type of virtual reference service that enables library patrons to communicate with librarians in real time through the use of chat software. Some of these include Chat a librarian, ask a librarian, and consult a librarian. These services are accessible from any location with an internet connection regardless of time, and they are typically found on the websites of libraries. According to the findings of a study that was carried out by Wharton and Mann in the year 2020, the objective of conversation-based reference

services is to offer users of libraries support that is both prompt and convenient to assist in conducting research, locating resources, or navigating library systems. Previous studies were carried out by Mawhinney (2020) on the user preferences for virtual reference services in an academic library. The findings reveal that the participants strongly favored live chat and were highly valued for this service. Hence, it is therefore essential for libraries to provide live chat services and to allot sufficient funds and resources for these services. Rao (2023) also, examined virtual reference services provided in various ways, such as telephone, email, live chat, video conferencing, and texting. The study found that chat-based reference services are a popular and effective method for virtual reference services. According to Bachynska et al. (2024), the competencies of librarians in providing VRS proved to be top- notch. However, Wharton and Mann (2020) have identified the need for better training and support for librarians providing chat-based reference services. The evolving nature of library services due to changes brought by the Internet and its importance of addressing gaps in academic librarians' knowledge, skills, and competencies is essential (Atanda, Owolabi & Uguala, 2020). A systematic review found that chat-based reference services effectively meet users' information needs and can improve user satisfaction (Rao, 2023). The conveniences and speed associated with chat-based services in academic libraries are worth appreciating, however, users express concerns about their lack of personal interaction and the potential technical issues (Barış, 2021).

ADVANTAGES OF LIVE CHAT-BASED REFERENCE SERVICES.

The chat service is convenient as it allows users to access it from any location with an internet connection. Chat-based reference services offer prompt responses to users' inquiries, allowing them to ask questions without revealing their identity, which can be advantageous when

discussing sensitive or personal subjects. Chat transcripts can be archived for future consultation.

DISADVANTAGES OF CHAT-BASED REFERENCE SERVICES

Chat-based reference services lack the same degree of personal interaction as face-to-face reference services. Chat-based reference services depend on written communication, which might be less efficient for intricate or subtle inquiries. Additionally, malfunctions in the chat software or issues with internet connectivity have the potential to interrupt the service (Julian & Ruhs, 2022).

2.2.4 FREQUENTLY ASKED QUESTIONS SERVICES IN ACADEMIC LIBRARIES

These services are a useful resource for virtual reference services deployment in academic libraries. They assist online library users in virtually retrieving the information they require, regardless of location. FAQs enhance the efficiency, accuracy, comprehensiveness, and sustainability of virtual reference services (Salubi, Ondari-Okemwa, & Nekhwevha, 2018). They compile and display responses to frequently asked user inquiries, providing instant information access and catering to various learning preferences. FAQs can be tailored to suit the particular requirements of a school community. FAQs may face technical issues, copyright restrictions, and questions regarding the accuracy and trustworthiness of the information presented. Academic libraries can optimize virtual reference services by weighing the advantages and disadvantages of FAQs to make well-informed decisions and address potential challenges effectively. Librarians develop FAQs as a repository of information to provide users with ready-made answers to common inquiries. Reference librarians with expertise promptly address questions that do not match pre-prepared responses. New questions that are not familiar

are answered and included in the system for future consultations. Yang and Dalal (2015) observed that FAQs are a common choice for virtual reference services for most libraries, offering patrons quick a vast amount of information.

ADVANTAGES OF FAQs AS VIRTUAL REFERENCE SERVICES

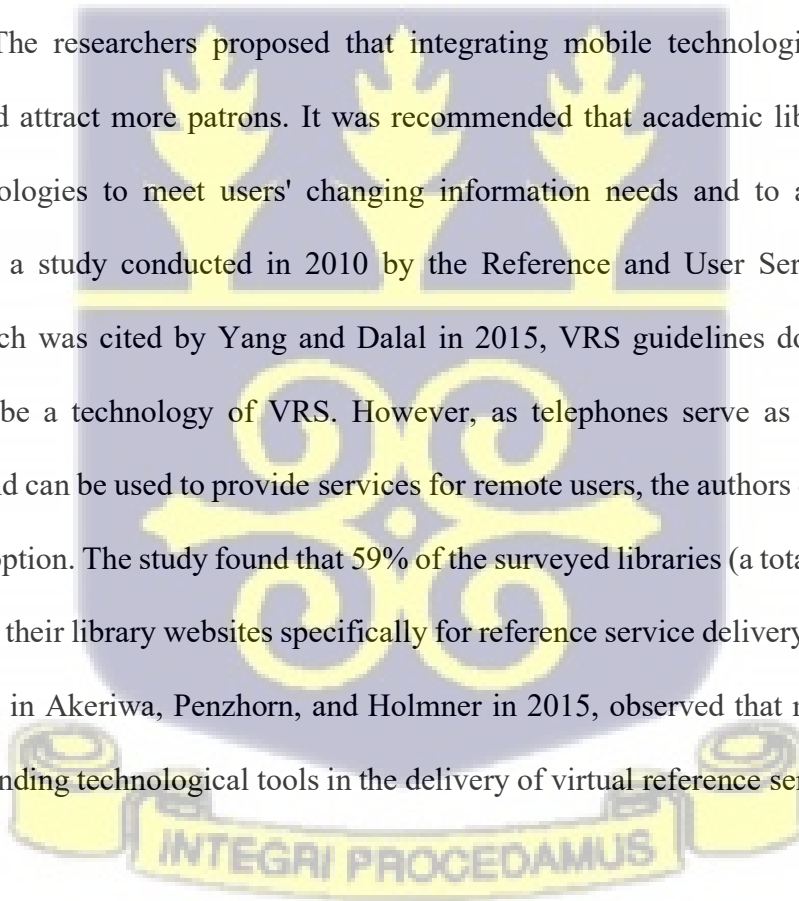
FAQs are available 24/7, facilitating just-in-time learning and providing instant access to information. FAQs can be updated quickly to respond to immediate needs and provide up-to-date information. FAQs' easy accessibility is one of its crucial features with internet connectivity, allowing people from all over the world to access information. FAQs can be presented in various formats, catering to different learning preferences. FAQs also guide students to relevant resources, allowing them to spend more time thinking about information rather than searching for it. FAQs can be tailored to match the research topics, age, and reading levels of students (Yang and Dalal, 2015).

DISADVANTAGES OF FAQs AS VIRTUAL REFERENCE SERVICES

FAQs may not be able to share certain works over different periods, as they are subject to copyright laws. FAQs rely on an internet connection, which may not be available to all users. FAQs can also be prone to technical issues, such as server outages or data loss. Not all resources may be available in digital format, limiting the breadth of materials accessible through a digital library. The online space can be prone to misinformation and plagiarism, raising concerns about the authenticity and reliability of digital sources. By understanding these advantages and disadvantages, libraries can make informed decisions and maximize the benefits of virtual reference services while being mindful of potential challenges.

2.4.5 TELEPHONE/MOBILE PHONE REFERENCES SERVICES IN ACADEMIC LIBRARIES

Phone virtual reference services are remote methods used in academic libraries to assist patrons with their reference needs using the phone. Due to technological progress and the use of digital resources, the importance of these services has greatly increased. Telephone-based services are a prevalent form of virtual reference service in academic libraries. An investigation conducted recently by Hamad, Farajat, and Hamarsha (2018) examined the accessibility and presentation of virtual reference services (VRS) systems in academic libraries and found that students in the region possess a significant level of awareness concerning library services based on mobile technology. The researchers proposed that integrating mobile technologies into academic libraries could attract more patrons. It was recommended that academic libraries incorporate mobile technologies to meet users' changing information needs and to assist researchers. According to a study conducted in 2010 by the Reference and User Services Association (RUSA), which was cited by Yang and Dalal in 2015, VRS guidelines do not consider the telephone to be a technology of VRS. However, as telephones serve as a communication technology and can be used to provide services for remote users, the authors decided to include it as a viable option. The study found that 59% of the surveyed libraries (a total of 215) included telephones on their library websites specifically for reference service delivery. Hrinarayana and Raju, as cited in Akeriwa, Penzhorn, and Holmner in 2015, observed that mobile phones are among the trending technological tools in the delivery of virtual reference services in academic libraries.



ADVANTAGES OF TELEPHONE VIRTUAL REFERENCE SERVICES

Telephone VRS offers real-time interaction, meaning users can get immediate assistance with their inquiries. A study by Yi, Hwang, and Kim (2022) found that using Telephone VRS in libraries significantly reduced response time compared to other communication methods. The video interpreter can relay the user's questions and responses in real-time, making it interactive, efficient, and effective for the librarian and the user. Also, telephone VRS allows for personalized communication existence in the interactions of users and librarians. The use of video enables visual cues such as facial expressions and body language, making the reference experience more engaging and tailored. This is especially beneficial for users who may need extra assistance due to their hearing loss. Telephone VRS is highly advantageous for users who may not have reliable internet access or prefer verbal communication. While online chat and email reference services have become popular, they may not be accessible to all patrons due to technological limitations or personal preferences. Telephone VRS provides an alternative communication mode that can be accessed from any telephone, making library services more inclusive and accessible.

By providing equal access to library resources and services, Telephone VRS empowers users to seek information and knowledge on their terms. This, in turn, leads to increased literacy rates, improved academic performance, and a more informed society.

DISADVANTAGES OF TELEPHONE VIRTUAL REFERENCE SERVICES

Challenges associated with telephone virtual reference services compared to other asynchronous VRS methods, such as email or chat, handling multiple queries simultaneously is a major obstacle. Additionally, telephone VRS poses a risk of miscommunication or

misunderstanding due to its verbal nature, which could be minimized in written communication. Furthermore, maintaining a telephone VRS may require higher costs and resource allocation than certain digital VRS methods.

In summary, telephone VRS offers immediate and personalized assistance, making it particularly suitable for users without reliable internet access. However, it also presents challenges in multitasking, potential miscommunication, and resource intensiveness. Therefore, academic libraries should carefully consider these factors when determining the most effective mix of VRS methods to meet the needs of their users.

2.4.6 VIDEO CONFERENCE REFERENCE SERVICE IN ACADEMIC LIBRARIES

Video conferencing reference services are a form of virtual reference service that enables librarians to engage with users in real time through video conferencing tools, such as Skype. This service facilitates face-to-face communication between the librarian and the user, thereby closely simulating an in-person interaction. Video conferencing reference services offer several advantages, including the ability to visually demonstrate instructional moments during the transaction and cater to the needs of visually oriented learners. However, this service initially reaches only a limited segment of the community. Academic libraries utilize video conferencing as a means to offer virtual reference services, showcasing various methods of assisting with video conferencing. The article also examines the present condition of virtual reference services in academic libraries, with a focus on both conventional and video conferencing techniques employed for providing reference services. Furthermore, it presents a pragmatic methodology for creating and executing a preliminary virtual research consultation service to guarantee fair and equal availability of library resources (Mohr et al., 2022).

2.5 AWARENESS OF VRS CREATION AND USAGE OF IN ACADEMIC LIBRARIES

This section reviews the literature on awareness and usage of virtual reference services in academic libraries in Ghana and across the globe.

2.5.1 AWARENESS VRS CREATION IN ACADEMIC LIBRARIES

As traditional library reference services systems transition to virtual reference services is essential to academic libraries in the information age. Studies have indicated that awareness creation of digital reference services in academic libraries is crucial, despite the continued preference for traditional reference services in some institutions (Makinde et al., 2024). However, a study by Bentil, et al. (2021) identified a lack of awareness as a key hindrance to the adoption of e-resources in the Ghanaian academic libraries. Research conducted by Mubarik and Naghavi (2021), found that despite the widespread use of digital resources, a considerable number of users remain unfamiliar with virtual reference services. The success of virtual reference services technologies in deploying reference services in academic libraries is pivotal in creating user awareness. The rise in usage and acceptance of a system is first created by creating users' awareness. Research conducted by Qobose and Mologanyi (2015) cited in Owusu-Ansah et al. (2021), assessed students' knowledge and understanding of digital reference services at the University of Botswana Library. The findings indicated that around 74% of the students expressed a strong agreement regarding their awareness of these services, whereas the remaining 26% expressed disagreement. This reported high awareness was due to the proactive promotion of digital reference services at the University of Botswana Library. These services were showcased at library exhibitions, significant campus events like

Information Literacy Week and through presentations at faculty and departmental meetings.

Previous studies reported that users do recognize the presence of VRS but do not actively participate because of a lack of comprehension or perceived significance (Ocran & Afful-Arthur, 2022). This is a gap librarians must consider and ensure that effective orientation sessions, as well as other successful platforms for introducing library services to academic library users, are fully enforced (Beile, 2020). However, Kotori and Magaya (2024) lamented the decreased inclusion in literacy education courses that reflect concerns regarding the insufficient utilization of crucial training programs. Integrating information literacy education is crucial to the creation of user awareness about the library services and usage. Wu and Dong (2018) emphatically stated that insufficient knowledge of virtual reference services hinders effective utilization. Librarians should possess a comprehensive comprehension of the preferred methodologies that library patrons employ to solicit assistance and make them known to users. Academic libraries have the distinguished need to promote and raise awareness about their digital reference services among users (Serwaa, Dadzie, & Owusu-Ansah, 2022). Raising awareness through promotion will guarantee library electronic resource access and usage. It will be practically impossible for a user to adopt or use a technology to access research information when he does not know the said technology. Libraries and librarians can utilize diverse tactics to enhance awareness of digital reference services.

Prior studies indicate that the rise in usage requires enhanced marketing and infrastructure support for greater adoption of VRS (Hamad, Farajat, & Hamarsha, 2018). This suggests that marketing and infrastructure support for virtual reference services to create awareness and adoption in the information age cannot be underestimated. It is an effective tool to encourage

the use of digital reference services. However, academic libraries make access to their library resources difficult when a significant proportion of resources are hidden on their homepages, resulting in users' difficulty finding the service (Yoon, Hulscher, & Dols, 2016). This does not encourage service visibility and awareness to the user community. The marketing strategies would improve the visibility and promotion of digital reference services to users (Qobose & Mologanyi, 2015) cited in Owusu-Ansah et al. (2021).

Academic libraries need to consistently utilize efficient marketing strategies to promote their digital reference service. The mere inclusion of a hyperlink to digital reference services on the library's website is insufficient. Supporting and promoting these services is equally vital to incorporating them into library instruction and displaying posters. Promoting services among staff is a marketing strategy for sustaining digital reference services. Librarians should actively collaborate with academic staff and researchers to encourage the utilization of digital reference services (Martzoukou, 2021).

Academic libraries must prioritize raising awareness and promoting digital reference services to their user community, because of the numerous benefits these services offer. Continual marketing and outreach endeavors are crucial to ensure that users are well-informed and capable of utilizing digital resources. This can be achieved through various marketing strategies, including social media, email, newsletters, library websites, and word-of-mouth marketing (Mawhinney, 2020). Research has shown that, despite students using the library and its website frequently, users were generally unaware of the digital or virtual reference services available to them (Alphonse & Mwantimwa, 2019). Comprehensive marketing approach through various channels, such as university library websites, electronic bulletin boards, e-mail, pop-ups, screen

savers, as well as traditional paper-based products like banners, flyers, and brochures, would help in making customers aware of the services

2.5.2 UTILIZATION OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

Academic libraries worldwide have adopted different technologies of virtual reference services, such as online chat, email consultations, and Ask-A services. Utilization of library VRS simply refers to the retrieval of needed information through the library's online staff for academic and research purposes. These services are designed to meet the varied needs of users who are becoming more reliant on digital platforms for information access. Previous studies by Akuffo and Budu (2019) pointed out poor internet connectivity as a hindrance to the use of virtual academic resources. Coetzer and Mapulanga (2021) also highlighted that inadequate internet connectivity can discourage students from making use of online library services. Dedicated internet connectivity for virtual reference service delivery in academic libraries is essential in the virtual reference services era. When internet services are truncated, users will be unable to meet their deadlines. A previous study by Kotoroi and Magaya (2024) opined that library services are not widely used due to users' perceived irrelevance. However, utilization of virtual reference services in academic libraries has become increasingly significant than Kotoroi and Magaya reported, which has been driven by technological advancements and changing user information demands. This study in the Ghanaian academic libraries also revealed that although both traditional and digital reference services were considered valuable. The utilization of digital reference services experienced a substantial surge during high-demand periods, such as during examinations (Serwaa & Dadzie, 2022).

The era of COVID-19 pandemic which required the use of remote access to library resources and services also saw a substantial rise in the utilization of digital reference services (Alphonse & Mwantimwa, 2019). A study by Abubakar, (2023) has shown that libraries have experienced positive outcomes from implementing virtual reference services. The study has indicated that online chat services have improved user engagement and satisfaction, enabling libraries to expand their reach to broader demographics. However, Mubarak and Naghavi (2021), opined that despite the widespread use of digital resources, one of the challenges is that a considerable portion of users remain unknown or show no interest in virtual services, which contributes to a low utilization of the service. Owusu-Ansah et al. (2018) noted that users need better education on virtual reference services if academic libraries want to chat well in the digital information era. The ALA professional guidelines outline various strategies that contribute to the effective usage of virtual reference services by users in academic libraries. These strategies include ensuring access, being responsive to user needs, designing services thoughtfully, employing critical thinking, maintaining a strong knowledge base, staying informed about the environment, applying knowledge effectively, promoting active learning, being aware of marketing strategies, conducting assessments, engaging in effective communication and outreach, conducting evaluations, and fostering collaboration. Plan and targeted communication and active engagement is very essential for increasing awareness and utilization of services (Wang & Si, 2024).

Previous research concluded that, robust digital infrastructure and the active promotion of virtual services in the academic library were credited for virtual reference services high engagement (Wang & Si, 2024). Maximizing the benefits of virtual reference services will

require continuous investment in technology, user education, and digital infrastructure in the academic library.

However, Adarkwah (2021) highlights that virtual reference is bedeviled by persistent limited internet access in remote areas of Ghana as well cost of data, which worsens the difficulties in accessing and using academic library informational resources. This research is very explicit to suggesting that, with a robust technological infrastructure, virtual reference services in academic libraries will be seamless for users. Even though Neumeyer et al., (2020) research also emphasised the economic obstacles that students face in utilising digital resources, however, a well-established system might be a panacea to the high cost of using virtual reference services in academic libraries.

Banleman et al. (2023) also catalogued some of the drawbacks faced by the effective utilization. His research also indicated the impediments the Ghanaian academic library faces in delivering virtual reference services, which include insufficient ICT infrastructure, limited internet accessibility, and inadequate training for librarians. The findings also revealed that, virtual reference services usage is on the rise in academic libraries, which has significant consequences for user involvement and the delivery of library services despite ongoing challenges, especially in developing countries such as Ghana. Despite the challenges his research pontificates, there is a bright future for virtual reference services in academic libraries in Ghana.

Globally, virtual reference services in academic libraries are experiencing significant growth as adoption and utilization in developed nations are on the rise. This certainly rests upon the shoulders of their digital technological infrastructural investment in the academic libraries of developed nations. However, developing countries seem to lag where most academic libraries

do not offer real-time virtual reference services (Mawhinney, 2020; Nicol & Crook, 2012; Shaw & Spink, 2009). Although low usage is a primary reason and challenge, virtual reference services have been shown to achieve high levels of user satisfaction (Xu & Du, 2019). The taste for virtual reference services keeps soaring higher as academic library users indicate a high preference for the services (Alotaibi, Johnson, & Rowley, 2023) cited in Masenya & Mashabela (2025). It is very clear that, as user information seeking behaviour gravitates towards the virtual space for information in the academic library, when the digital infrastructure of the academic library is enhanced, virtual reference services will experience another dimension of growth.

2.6 RELIABILITY OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

The reliability of virtual reference services in an academic library is the unwavering and trustworthy nature of the information services rendered to users. Academic library information reliability hinges on the precision of the information given, the turnaround of the library staff response, service accessibility, and the overall contentment of the user (Holland & Sinha, Eds., 2024). Dependable VRS guarantees that users consistently receive precise and timely information, thereby improving the credibility and effectiveness of the library's services. VRS enables users to seek reliable assistance from librarians regardless of their location, making the wealth of academic resources more accessible to students, faculty, and researchers who may not be able to visit the library in person.

Pregowska et al. (2021) emphasize that VRS plays a crucial role in bridging the gap between the library and its users, especially in distance education contexts. The study found that students enrolled in online programs or those residing in remote areas greatly benefit from library

services virtually, thereby leveling the playing field for all users. These academic library services should not just be accessible but must be a dependable service that library users can rely upon. Khan et al. (2023) reported a significant number of users who expressed a high level of contentment with virtual reference services, attributing their satisfaction to the quick and effective communication in resolving their information needs. It is therefore worth prioritizing extending service hours to enhance user satisfaction and engagement with the service. User contentment and satisfaction are key factors that can influence academic library user adoption of VRS to justify service reliability.

Unreliable internet is a significant obstacle for African universities in accessing digital library services, which the Ghanaian library is not in exemption. Reliability of VRS hinges on the availability of dependable internet service; poor internet service is a bane to virtual reference services' core mandate.

However, Kaishe-Mulungu et al. (2024) examined the virtual reference services and revealed that, few participants expressed their contentment with the service, while the majority expressed reservations due to technical challenges and inadequate, well-trained librarians making virtual reference services unreliable to academic library users. Academic library users expect the information age virtual reference services technology to offer real-time assistance and personalized support that enhances user experience, making it easier for individuals to find the information they need.

According to Salmans and Barba (2023), the immediacy and interactivity of VRS contribute to higher levels of user satisfaction compared to traditional reference services. The study found that users appreciate the convenience of instant communication with librarians, which allows them

to resolve queries quickly and efficiently. Exploring the impact of VRS on user engagement, they noted that its ability to interact with librarians through multiple digital channels encourage users to seek help more frequently and justifying the services' dependability. Kitzie, Connaway, and Radford (2021) also reported that the flexibility of VRS has fostered a more dynamic relationship between users and the library staff, leading to increased utilization and trust in finding library resources for research and learning.

Academic libraries in developed countries typically have access to cutting-edge technology, strong infrastructure, and highly skilled personnel, and these factors enhance the dependability of virtual reference services (VRS). Libraries in these jurisdictions frequently utilize advanced systems to monitor and handle virtual reference queries, guaranteeing reliable and excellent service to users (de Leon, Flores, & Alomo, 2024). The study emphasizes that academic libraries in developed nations, like the United States and the United Kingdom, utilize integrated library systems (ILS) to facilitate instantaneous monitoring of virtual reference inquiries. This technology enables libraries to uphold a superior level of dependability by promptly and accurately resolving all user inquiries. Shonhe (2020) examined the significance of continuous professional development (CPD) for librarians in developed nations. Consistent training on emerging technologies and effective reference management techniques enhances the dependability of VRS. Librarians who have received thorough training are better equipped to provide reliable and precise information, thereby improving the dependability of virtual reference services. Tella (2023) investigated the incorporation of artificial intelligence (AI) into virtual reference services in developed nations. He noted that AI-driven chatbots can manage routine inquiries, guaranteeing prompt responses for users. The ability of the system to

incorporate these integrations has led to an exponential decrease in response time and thoroughly improved the precision of the information provided, thereby improving the dependability of the service. Khan et al. (2023) found that the majority of students were satisfied with virtual reference services, citing responsive communication and efficient problem-solving as key factors.

Comparatively, in less developed countries like Ghana, academic libraries frequently encounter obstacles such as restricted technology access, insufficient funding, and a scarcity of well-trained personnel, leading to unfulfilled system responsibilities. These unmet challenges hurt the reliability of VRS. According to Kumah et al (2021), academic libraries in Ghana encounter so many obstacles that impede the effectiveness of virtual reference services' dependability. These include unreliable internet connections and limited access to up-to-date technologies. The study revealed that VRS in Ghanaian academic libraries is often compromised by frequent periods of inactivity and sluggish response times, which undermine its reliability. The digital era library user is very keen on the promises of virtual reference service, and a little compromise might jeopardise the trust in the system.

The multiple tasks that might be loaded on a few trained library professionals in Ghana to manage academic library virtual reference services, together with traditional referencing, can compromise and result in delays in addressing inquiries and the accuracy of the information provided (Atta-Obeng & Dadzie, 2020). Virtual services reliability in the academic library is a key factor that can influence services adoption and acceptance by the academic library user. If VRS succeeds and serves the needs of the library user in the information age, a robust technological infrastructure must be put in place to guarantee service reliability.

2.7 ACCESSIBILITY OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

Accessibility of VRS is the state in which an academic library user can be provided the service when needed. This enables academic library users to judiciously use the electronic library resources. Virtual reference service has resolved the geographical location that the traditional library has placed on the user who seeks information far away from the physical library. And these services are gradually becoming increasingly available in academic libraries, which allows users to expand their knowledge in keyword searches, brainstorm ideas, and fill their knowledge gaps. Research findings confirmed that a significant portion of students find VRS accessible (Ogunbodede & Wiche, 2022). However, Ayongo and Obande (2024) reported that regular access to virtual reference services is ineffective due to poor digital infrastructure and poor internet connectivity. Virtual reference services' accessibility highly depends on the availability of standard digital infrastructure and dedicated internet services to ensure that user expectations of the service are duly met. Research conducted by Lateef and Mairaj (2023) reported that VRS accessibility brings users up to speed in their research endeavours as they can access services remotely at any time, providing a time-saving option for users who may choose to conduct online research from the academic library. Academic libraries need to prioritize VRS accessibility by ensuring that the digital infrastructure needs are met for users to conveniently access VRS to use library resources, just as they would in person.

The issue of inadequate support and lack of awareness has affected a significant number of library service user; however, the study recognized the fact that, majority of the students have

seamless access to the virtual references (Nemati & Babalhavaeji 2013). Inability to virtually access scholarly information assistance through a library system that is known to deliver these services to users can result in research frustrations, delay research time schedules, can affect services adoption negatively (Kiwelu, Mwesigwa, & Karungi, 2024). Previous research by Akuffo and Budu (2019) also realized that some challenges that bedevil VRS accessibility is the poor internet connectivity in academic libraries. Accessibility of virtual reference services was drastically improved in academic libraries during the COVID-19 pandemic. There was a rise in usage as library staff provide remote access to library resources through the virtual platforms (Radford, Costello, & Montague, 2022)

How users discover available VRS is of concern to improve service accessibility in the academic library. Service placement is essential to service utilization and accessibility. According to Cummings et al. (2007), libraries that place VRS among a dropped list of library services do not attract high usage due to the invisible nature of the services. To enhance usage, certain libraries employ proactive icons positioned on database portals, whereas others utilize pop-up windows to inquire if patrons require assistance.

According to Yang and Dalal (2015), live chat virtual reference services are most efficient when they are located on the library's main webpage. This can be done by providing a chat box or a pop-up link, allowing users to engage in real-time conversations with either a librarian or a reference services staff from a collaborative or consortium. The library homepage should provide distinct links for accessing chat and email services, along with dedicated web pages for seeking assistance. Chat is a convenient feature that can be accessed on the library website and catalogue with minimal effort (Mawhinney, 2020).

According to Maesaroh et al. (2024), different distinctive communication categorical domains are potential patterns that enhance the Virtual Reference Services' accessibility. These include the range of virtual services offered on the website, the efficiency of locating the virtual reference Services on the library website, the number of links required to navigate to the virtual reference service page, and the number of clicks needed to access the chat feature.

The study discovered a greater number of academic libraries in the Middle East that provide email as a virtual reference service. This email service offers users the choice to either acquire an email address from the library for communication purposes or complete an inquiry form, which will receive a response via email within a specified timeframe. This was followed by a live chat on university libraries in the Middle East that provide it as a virtual reference service. Almost all academic libraries use email services for virtual reference services delivery, and this could be the fact that email was the first virtual reference services technology introduced in the academic library.

The time required to find and use the services is another aspect of accessibility in this context. A study revealed that 30% of the websites analyzed could be navigated to find the email virtual reference service within one minute or less, whereas 40% of them required two minutes. 12.5% of users allocated three to four minutes to search for the email Virtual Reference Service, while an additional 12.5% dedicated five to six minutes to exploration. Only 5% of websites were able to confirm the availability of the library's email-based Virtual Reference Service within a search timeframe of seven to ten minutes. Among the 14 academic libraries that provided live chat as a reference service, 46.6% were accessible within one minute, 40% within two minutes, and 6.6% fell into both the three to four-minute and seven-to-ten-minute time intervals. The

time spent to access the virtual references services was reasonably excellent and generally majority of users could locate the services between one to three minutes. This could be attributed to promotion of services and organizing workshops to create user awareness.

Another considerable factor was the total count of hyperlinks that link the homepage to the digital reference services page. The result shows that, 52% of the library websites in the Middle East examined allowed users to access the Virtual Reference Service page using only one link. 17.5% of users necessitated three or four links to navigate to the Virtual Reference Service page on the library's website, whereas 30% were able to reach it with only two links. The fewer the links to the virtual reference services, the better for library users because it is frustrating spending a lot of time going through several links to find virtual assistance. So many links to the VRS page can discourage most users from accessing such services and may end up not meeting their information needs in the library.

Ayiah and Kumah (2011), cited in Ahenkorah-Marfo and Akussah (2016), found that the University of Education, Winneba has a website specifically for its library. Unfortunately, the website does not provide any digital reference services. However, Ahenkorah-Marfo (2015) discovered that librarians in universities in Ghana are progressively adopting social media as a digital tool for providing reference services. He carefully examined the websites of several universities in Ghana, such as the University of Ghana, Kwame Nkrumah University of Science and Technology Library (KNUST), the University of Cape Coast, Valley View University, Ghana Technology University College, and Ashesi University College. He verified that these universities possessed websites connected to at least two social media platforms, which served as tools for digital reference services. These virtual reference services introduced in universities

in Ghana will complement traditional reference services, giving users more options and a different experience that could elevate their satisfaction with library services. If virtual reference services are to thrive in Ghana, digital technological infrastructure in academic libraries must be improved to ensure user access to the services.

Xie and Matusiak's (2021) study highlight the importance of VRS accessibility adjusting to the changing information-seeking preferences and communication behaviour of library users. It is imperative to increase the visibility and adoption of VRS. However, this must not ignore service accessibility, especially among individuals who currently utilize it. Optimizing the quality of VRS by prioritizing and enhancing service accuracy, clarification of queries, and fostering more robust user relationships. To improve the effectiveness of library VRS, one of the crucial factors is the service accessibility. It is imperative to develop evidence-based strategies for increasing services accessibility.

2.8 RESPONSIVENESS OF VIRTUAL REFERENCE SERVICES DELIVERY IN ACADEMIC LIBRARIES.

Despite these challenges, the demand for VRS is growing as students and researchers increasingly rely on digital platforms to access information. Studies highlight that while many users benefit from these services, responsiveness can vary significantly, with some users experiencing delays or difficulties in obtaining timely information and this can be detrimental to a researcher accessing academic library services (Sanches & Melo 2022).

Globally, there has been a push towards improving the responsiveness of VRS by incorporating advanced technologies such as AI-driven chatbots, expanding the use of social media platforms for library services, and enhancing the digital skills of librarians. These innovations aim to

bridge the gap between users' expectations and the actual performance of VRS, ensuring that information needs are met more efficiently and effectively. Libraries are expanding their use of social media platforms like Facebook, Twitter, and Instagram to connect with users more effectively. These platforms offer real-time communication channels where users can seek help and receive immediate responses, thereby bridging the gap between traditional reference services and modern digital demands. The COVID-19 pandemic was a global case that has accelerated most library services to online through various technological integrations. As a result, there has been a renewed focus on ensuring that VRSs are not only accessible but also responsive to the evolving needs of the academic library user community (Abubakar, 2021). In developed countries, VRS has shown significant success in providing real-time, user-centred interactions that effectively meet academic user demands (Makinde et al., 2024). However, in developing countries like Ghana, the implementation of VRS has faced several challenges, including limited technological infrastructure, insufficient training for library staff, and inadequate internet connectivity (Barsha & Munshi, 2023). The findings of Mahinde et al. (2024) and Barsha and Munshi (2023) reveal that the responsiveness of virtual reference services requires a robust technological infrastructure implementation, well-trained library staff, and dedicated intensive service. Developed countries are far advanced in the delivery of timely reference services than developing countries due to the inadequacy or limited infrastructure challenges. A modern technological environment is needed to enhance virtual reference service provision to ensure inquiries from users are addressed promptly. In the developed countries where AI and Robots are deployed for services, delays do not occur in their digital reference services.

Similarly, Owolabi et al. (2024) have observed that prompt responses are essential for maintaining user satisfaction in academic environments. Delays disrupt the immediacy users expect, thereby impacting the overall reliability of the service badly. However, these advancements are not without challenges, particularly in developing countries in Ghana, where technological infrastructure may be limited, as Akuffo and Budu (2019) stated clearly the poor nature of the internet, which affects the efficiency of VRS delivery. But, as libraries continue to innovate and adopt new technologies, to can improve VRS responsiveness and enhance the overall user experience (Barsha & Munshi, 2023). Research revealed that many libraries fall short when it comes to delivering prompt reference services (Sinhbababu & Kumar, 2023). Slow response times and a lack of effort to assure users that their queries will be addressed are, unfortunately, common.

In the Ghanaian context, technological improvement is needed to ensure that VRS can fully support the academic library user community. This includes investing in better digital infrastructure, providing continuous training for library staff, and adopting new technologies that can enhance the responsiveness and reliability of virtual reference services.

2.9 STAFF COMPETENCE IN PROVIDING VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES.

The quality of assistance for academic library users who need virtual reference services from library professionals is a significant aspect of service delivery. When reference staff cannot provide adequate support, users' information needs may go unfulfilled, resulting in underutilization of services. Lateef and Mairaj (2023) stress the significance of specialized training and skill acquisition for effectively delivering assistance to user queries, which is

essential and appropriate. Research by Bachynska et al. (2024) reported that staff knowledge was generally rated as high, but still highlighted specific areas that require improvement. In a similar context, users may lack the necessary skills to search, locate, or retrieve satisfactory information to meet their research needs, it is up to proactive reference staff to prioritize this responsibility. Bandyopadhyay and Boyd-Byrnes (2016) also concluded that ongoing professional development is crucial for ensuring the effectiveness of digital reference services. However, Dempsey (2021) found a higher rate of dissatisfaction among participants who gave negative ratings to the staff for their expertise in delivering reference services. This reaffirms that, if reference staff are not trained or lack the knowledge to provide virtual reference services, relevant assistance may be denied. Research has highlighted the importance of personal, timely, and quality assistance to facilitate users' information needs, which is the primary role of reference librarians (Owolabi et al., 2024). Virtual reference services (VRS) have been implemented to increase real-time interaction between library users and the libraries, to enhance service and the satisfaction of the user (Hamad, Al-Fadel, & Shehata, 2023). The implementation of VRS is associated with challenges such as cost, staffing, funding, and technological infrastructure, which can impact the quality of the service (Adarkwah, 2021). Therefore, academic libraries need to address these challenges and ensure that VRS meets the high expectations of their users.

According to Khan et al., (2023), user satisfaction in the field of library information sciences is crucial to the success of academic libraries in implementing VRS. The accessibility, reliability, and responsiveness of virtual reference services in academic libraries have become increasingly significant for satisfying library users as libraries transition to the digital era (Hamad, Al-Fadel,

& Fakhouri, 2023). Virtual reference services, such as chat, email, and instant messaging, allow users to receive remote assistance, providing convenient access to library resources and expertise (Konlan et al., 2024). This finding indicates that users generally have high satisfaction with virtual reference services. According to Asim, Arif, and Rafiq (2024), email emerged most favoured due to its dependability and ease of communication in academic settings. However, the continued demand for conventional reference communication channels has limited the use of available digital tools (Garoufali & Garoufallou, 2024).

A survey conducted among academic library users in Ghana revealed that participants highly appreciated the accessibility of reference services and research consultations, considering them essential forms of assistance for their research pursuits. The proficiency of library personnel, including their emotional intelligence and ability to understand user needs, was emphasized as a crucial determinant of user contentment (Hussien & Mokhtar, 2018).

However, obstacles are challenging the delivery of efficient virtual reference services. A survey conducted on academic libraries in Ghana revealed that users recommended expanding library services, including improved online support, to better cater to their diverse requirements. Continual evaluation and adjustment of virtual reference services are necessary to ensure they consistently meet changing user demands.

Academic libraries worldwide have employed various strategies to improve user information demands with virtual reference services. These strategies include: offering extensive training to library personnel to ensure they possess the necessary expertise and understanding to effectively assist users in a virtual setting and providing different virtual reference options to accommodate diverse user preferences and needs (Hussien & Mokhtar, 2018). It is essential to incorporate

virtual reference services with other library resources and services (such as online tutorials and research guides) to achieve a seamless and uninterrupted user experience, and consistently evaluate and scrutinize virtual reference services to identify opportunities for improvement and ensure their ongoing relevance and effectiveness (Konlan et al., 2024).

Effective virtual reference services are crucial for enhancing user satisfaction and experiences in academic libraries. While some progress has been made, continuous efforts are necessary to improve staff competence, quality, and availability of these services, especially in the context of academic libraries in Ghana. Academic libraries can ensure that virtual reference services meet the evolving needs of their users by prioritizing user-centered design, staff training, and continuous improvement. Research in this field mainly centers on evaluating user satisfaction, repeat usage rates, and the success level users attain in their desired outcomes using virtual reference services. Assessing virtual reference services requires assessing user satisfaction by collecting feedback from users regarding their experience with the service. Response time, information quality, and overall satisfaction are considered. Surveys, interviews, and usability testing are frequently employed methods to evaluate user satisfaction and pinpoint areas for enhancement (Sharma, 2023). Recurring usage rates are a vital measure for assessing virtual reference services. Libraries can assess the value and relevance of their service by tracking the frequency of user engagement. High rates of repeated usage may indicate that users perceive the service as advantageous and convenient, while low rates may imply issues such as a lack of awareness or user dissatisfaction. Libraries aim to offer precise and pertinent information to assist users in effectively fulfilling their information requirements. Libraries can assess the impact and effectiveness of their virtual reference services by evaluating users' ability to

achieve their goals through the service (Khan et al., 2023). Research and empirical studies have focused on user satisfaction with virtual reference services in academic libraries. A study was conducted to assess user satisfaction with virtual reference services in academic libraries, and it was obvious that users were satisfied with VRS, as user satisfaction was a vital factor in the assessment and evaluation of library virtual reference services (Ike & Chinedu, 2023).

Amofah-Serwaa (2018) stated that delivering successful reference services necessitates a strategic and efficient allocation of resources to fulfil user requirements. It is important to consider user satisfaction and experience in assessing the effectiveness of virtual reference services. Asiedu et al. (2022) asserted that virtual reference services are the most effective method for meeting user information needs and satisfaction in the information age.

To deliver exceptional library services, ensuring that user information needs are met as well as obtaining favorable feedback, is crucial. Recent research indicates that patrons prefer virtual reference services due to their convenience, speed, efficiency, prompt response in delivering answers, and remote access (Ofori, 2024). There is an inadequate utilization of virtual reference services due to users' preference for self-reliance and lack of awareness about these services (Rafiq, 2024). Users value librarians' positive attitudes and good customer service, but often have difficulty pinpointing their information needs and locating relevant information to address their issues (Akbar et al., 2024). Gómez-Cruz (2019). Accuracy of responses is the primary determinant of user satisfaction with virtual reference services, as users appreciate the service for its speed, convenience, and usefulness.

Librarians must take user service preferences into account when adopting library service, noting that neglecting this aspect could lead to projects failure in library service. Recognizing that

meeting user needs is essential for the success of any service provider. Users highly appreciate effective guidance and assistance in fulfilling their information needs; hence, virtual reference services should be tailored to provide expert support and aid to users (Williams, Saunderson, & Dhoest, 2022).

Adetayo (2023) contends that certain software can efficiently resolve interface issues in reference transactions, resulting in higher user satisfaction and decreased assistance requests. Virtual reference services are digital platforms that enable users to utilize library materials and receive assistance from librarians without being physically present. These services have become popular in academic libraries, providing a convenient and accessible way to access information and receive research assistance. The efficacy of these services relies heavily on the design and functionality of the software and user interface. A well-crafted user interface can improve user satisfaction and increase requests for help (Shah et al. 2024). Users favor virtual reference services that are straightforward with user-friendly interfaces. These functionalities facilitate seamless communication without distractions with librarians, like live chat and video conferencing. This is a significant offering access to library resources via virtual reference services, along with functionalities enabling users to monitor their interactions with librarians and receive notifications regarding research updates.

A previous study by Ghosh et al. (2025) discovered that users favor services that are dependable and prompt, providing top-notch support from well-informed librarians. Users value VRS methods that are fast, easy to use, synchronous, convenient, have certain relational aspects, and are adapted to mobile devices. Virtual reference services offer unique opportunities for evaluation due to the richness of the transcripts and other automatically collected data.

According to Duncan & Gerrard (2011), users appreciate software that is easy to use, compatible with various systems, and equipped with helpful widgets for typing inquiries. Conversely, certain interface designs can be frustrating and discouraging for users, ultimately deterring them from utilizing virtual reference services (Mehta & Wang, 2020). However, Adetayo (2023) contends that some software can effectively avoid interface frustrations during reference transactions, increasing user satisfaction and more invitations for information retrieval assistance.

2.10 MANAGEMENT SUPPORT AND RESOURCE ALLOCATION FOR VRS IN ACADEMIC LIBRARIES.

Management support and resource allocation refer to the needed resources given to the academic library to ensure the efficiency and effectiveness of virtual reference services. Management support is pivotal for the successful implementation and sustainability of virtual reference services (Wang, 2023). Effective leadership fosters an environment conducive to innovation, resource allocation, and staff training. Institutional buy-in, adequate staffing, and ongoing training ensure that VRS remains responsive to user needs (Si, 2019).

Previous studies by Serwaa et al. (2022) stated that library management's strategic planning is essential for effectively integrating digital reference services. Libraries that prioritize digital initiatives tend to allocate resources more efficiently, leading to improved user satisfaction and service delivery.

Management's commitment to ongoing training for library staff is crucial. A study highlighted that librarians often resist adopting new technologies due to inadequate training of the system, which can hinder the effectiveness of VRS delivery and user satisfaction. Continuous

professional development ensures that staff are equipped with the necessary skills to assist users effectively in a digital environment (Nzioka, 2021)

The allocation of financial resources significantly impacts the availability and quality of virtual reference services. Libraries that receive adequate funding can invest in technology infrastructure, such as chat systems, email support, and other digital communication tools, which enhance user interaction (Abdul, & Mohezar, 2020). Limited resources affect the effective delivery of academic virtual reference services.

2.11 ACCESS TO ICT INFRASTRUCTURE FOR VRS IN SELECTED ACADEMIC LIBRARIES

This section considered access to robust infrastructure as a fundamental requirement for delivering effective virtual reference services. This includes both technological infrastructure and physical resources. The availability of reliable internet connectivity and modern computer systems is essential for the operation of VRS. Research indicates that many academic libraries in Ghana have made substantial investments in technology, yet challenges remain regarding consistent internet access (Afrane et al., 2022). The deployment of integrated library systems has improved the organization and accessibility of resources, but disparities in technological capabilities across institutions persist. While digital resources are increasingly prioritized, physical collections remain vital (Amofah-Serwaa 2018). Libraries must balance investments in digital materials (e-books, online databases) with maintaining physical collections to cater to diverse user needs. The findings from studies indicate that libraries with a well-rounded collection of both digital and physical materials can better support their users' academic pursuits.

Many academic libraries face budgetary limitations that affect their ability to procure necessary technologies or hire sufficient staff. A study noted that inadequate funding often leads to challenges in maintaining up-to-date technology for VRS. This limitation can significantly impact service quality and user satisfaction (Martínez-Pérez & Rodríguez-Abitia, 2021).

The capacity building of library staff plays a crucial role in delivering effective virtual reference services. Libraries that invest in hiring skilled personnel and providing them with appropriate training tend to offer better support to users (Hosman et al., 2020). Moreover, collaboration among librarians across institutions can enhance resource sharing and improve service delivery

2.12 CHALLENGES AND BENEFITS OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

To effectively evaluate Virtual Reference Services, the studies should consider the challenges faced by the services and opportunities to enhance library services.

2.12.1 PROSPECTS OF VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

The integration of VRS technology in academic libraries has brought numerous benefits, bridging the gap between users and library information resources. As Slogan (2012) cited in Oluwabiya (2017) noted that, VRS provides assistance and instructions to users, maintains a comprehensive collection of reference resources in both print and electronic forms, and helps users locate the best sources of information. Virtual reference services in academic libraries offer several benefits to users and libraries. The opportunities include VRS's ability to provide personalized information support to remote users, without dependence on their location. Virtual

reference services also increase real-time interaction between library users and the libraries, improving service delivery quality.

Virtual reference services are convenient for users respectively who cannot visit the library physically, such as distance learners, part-time students, and researchers, and high user satisfaction levels, which can improve the reputation of academic libraries and increase user engagement (Oliveira, Carroll, & Greenidge, 2022). In addition, virtual reference services can be cost-effective for academic libraries, as they reduce the need for physical space, staffing, and other resources (Hawkins, 2019).

These benefits highlight the importance of virtual reference services in academic libraries, particularly in the current era of remote learning and research. Virtual reference services can provide personalized information support, increase real-time interaction, and improve user satisfaction, convenience, and cost-effectiveness.



CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The procedural plan and deployment in achieving the research objectives or goals are crucial to every scholarly research. It is empirically essential to outline strategies and processes to embark on research process which include general hypotheses as well as acceptable defined method of data collection, its analysis, and interpretation of data (Creswell & Creswell, 2018). Research methodology serves as the foundation upon which the entire research process is built gearing toward problem solving. Research methodology is a generic term for the processes researchers employ to approach the research work in describing, explaining, and predicting events (Mweshi & Sakyi, 2020).

According to Wiersma and Jurs (2005), research methodology is a theoretical framework that highlights assumptions and the uniqueness of human perspectives. It includes an overview of life, the meaning of knowledge, and an understanding of how people relate to a particular research method. Considering the process, the researcher designed a thorough approach outlining how the study will be conducted. The study methodology, which covers each phase of the process, is therefore demonstrated in the parts that follow. The researcher provides a thorough explanation of the concerns being taken into consideration, along with information on how, where, and when the study will be conducted.

The methodological techniques used in the research are described in this chapter, along with the reasoning behind them. Similarly, this chapter clarifies how the design was applied, how the questionnaires and the interview were conducted, how the data was analyzed, and the

methods that were deployed to achieve it. This chapter considers the research paradigm, research design, case selection, demographics, sampling technique, and sample size. It also covers data analysis, instrumentation, and the data collection process on the method deployed in this study. It covered the research paradigm, research design, research approach, selection of cases and subjects, instrumentation, data collection procedure, and presentation of data and analysis.

3.2 RESEARCH PARADIGM

A paradigm is a set of beliefs, values, tenets, and procedures; in other words, it is a conceptual framework that is accepted universally by certain scientific standards. Dzandzan (2019), citing Teddlie and Tashakkori (2017), described a paradigm as views shared by researchers in a specific field. Mackenzie and Knipe (2006) delineated the term “paradigm” in the realm of educational research as signifying a researcher's overall worldview. This worldview represents an overarching ideology, a viewpoint that the research paradigm inherently reflects the perspective and ideal way of life of the researcher. It encompasses the fundamental concepts and beliefs that direct the researcher's worldview, as well as how the researcher perceives it and behaves in it. Research by Creswell and Creswell (2018) and supported by Kankam (2019) was explicit that choosing a research paradigm serves as the foundation for adopting research methodologies. There are four main paradigms, as quoted by Kankam (2019). They are interpretivism, post-positivism, positivism, and pragmatism.

The study employed a pragmatic paradigm to guide the research. The reason behind adopting this pragmatic paradigm is that pragmatism opens up for so many approaches, various ideological worldviews, various presumptions, as well as various modes of data collection and

interpretation. It gives researchers the autonomy to make individual decisions, allowing them to choose research methodologies, strategies, and procedures that align with their specific needs and goals. Pragmatism, in this context, is not restricted to any specific philosophy or conception of reality. This is the best approach for multiple case research, where researchers extensively employ both quantitative, qualitative assumptions and observations in their investigations. The Multiple case approach allows the use of both qualitative, quantitative, observations and documental tools and methods to carry out research. To reach an empirical conclusion, it is essential to identify the various special issues that may arise from the various universities and compare the outcomes from the various approaches. The pragmatic paradigm was appropriate because the study is focused on assessing the effectiveness of virtual reference services in selected academic libraries in Ghana. The multiple case design is well-fitted to investigate the complexities of virtual reference services in the information age in academic libraries and can provide valuable insights that can inform the development of effective virtual reference services in academic libraries in Ghana. Overall, the choices of multiple case study research methods resonate on the specific goals of the research, the nature of research questions and the resources for the study. A well-structured research design is essential in providing a solid procedure for any scientific study. Research Design is the discipline of how to plan and conduct empirical research, including the use of both Quantitative and Qualitative methods (Mweshi & Sakyi, 2020). Lune and Berg (2017) have emphasized that the research design serves as a broad framework for addressing study questions. Research designs are types of inquiry within quantitative, qualitative and mixed method approaches that provide specific directions for procedures in a research study (Creswell & Creswell, 2018). It includes several decisions that

are made to lessen or control bias. In the encyclopaedia of survey research methodology, Kalaian (2011) cited in Dzandza and Akussah (2018) delineates three categories of mixed method research: exploratory, explanatory, and triangulation. Similarly, Creswell (2014) recognizes the three main forms of mixed methods research; however, he uses different terminology while giving the same reason for each type.

According to Dzandza (2019), the triangulation mixed method research design enables the researcher to concurrently envision quantitative and qualitative search approaches, facilitating the collection and analysing of both types of data. Moreover, it involves using outcomes from both the quantitative and qualitative studies to authenticate findings derived from both. She noted that, Creswell (2016) refers to this design as the “convergent parallel mixed method”.

A suitable research method for this topic was a case study. A case study allows for an in-depth examination of a particular phenomenon, such as assessing effectiveness of virtual reference services in selected academic libraries in Ghana. A case study involves collecting data through interviews, questionnaires, observations, and document analysis, which can provide rich insight into the practices, attitudes, and experiences of librarians and other stakeholders in virtual reference services processes.

Multiple case study approach befits the study, and the same is adopted for the study as its research design. As reported by Creswell and Creswell (2018), “case studies are procedures of inquiry established in many fields of study, especially evaluation, in which the researcher develops an in-depth analysis of a case, often of a program, event, activity, process, or one or more individuals. Cases are bound by time and activity, and researchers obtain detailed information using various data collection procedures over a sustained period”. Lavdaniti,

Tsitsis, and Tsiligiri (2014) also opined that a case study is done by investigating intensively in one or a small set of cases, paying more attention to details and the context of each case under study.

Case studies go beyond just their flexibility, they also potential to introduce unexpected and new results during the study, as a result leading the research into a new direction and breaking ground. The practical nature of case studies makes it solution than merely a statistical survey (Creswell & Creswell, 2018). In the field of research case study can either be a single-case or multiple-case design. A single case study is generally used to contradict or validate a theory or to represent or inquire into cases that are rare or extremely inaccessible. Single case applications require detailed attention and need to be done carefully to avoid misrepresentation. As cautioned by Hamel (1993) stated single case studies may fail to represent the purpose and objective of a study if it not carefully selected. Also, the dependence of a single case may be incapable of providing a generalized conclusion to a study.

Gustafsson (2017) has stated that when a study involves more than a single case, a multiple-case study approach is necessary to replicate the same methodology across several cases, even though they are complete studies on their own. This approach will help identify and explore emerging trends, making it the best research design for this study.

Nonetheless, case studies also come with their challenges and drawbacks. Construct validity, which is the degree to which a measurement correlates to a concept under research, is foremost among these challenges. Multiple case studies have inconsistent and questionable construct validity (Flyvbjerg, 2001). The use of various sources of evidence, the setting up of a chain of evidence, and giving key informants and respondents the opportunity of reviewing their

opinions and inputs in a preliminary case study report form part of the ways of mitigating the problems associated with construct validity in multiple case studies (Yin, 2014) cited in Harrison et al. (2017). This research work will therefore use the multiple case study approach to investigate and assess the effectiveness of virtual reference services as it stages in real real-life setting in three selected academic libraries in Ghana, thus highlighting and analysis of similarities and differences between the cases.

3.3 STUDY SETTINGS

The study focuses on these three (3) Academic University libraries in Ghana. University for Development Studies (UDS), SDD Dombo University of Business and Integrated Development Studies, C.K. Tedam University of Technology and Applied Sciences.

3.3.1 BRIEF BACKGROUND OF THE MAIN LIBRARY OF THE UNIVERSITY FOR DEVELOPMENT STUDIES

The first public university established in northern Ghana was the University for Development Studies (UDS). It was set up by the Ghanaian government on May 15, 1992, by PNDC Law 279, which was published in the gazette. The objective of this law is to combine community development and academia, facilitating positive interactions that will contribute to the overall development of northern Ghana and the nation as a whole (PNDC Law 279, section 279). The UDS emerged from the new belief that universities and other higher education institutions must be crucial in tackling societal issues, especially those that affect rural communities (Effah, 1998). Due to its purpose and constituent base, the university has a pro-poor stance that is evident in its outreach service, teaching, and research priorities to bring about community transformation and national development. Through the university vision, a standard academic

library was built as a catalyst to support research and enhance quality education.

The academic library is among the biggest libraries in Ghana. More than 36,000 volumes of books have been stored (UDS library KOHA system 2023). The library has a collection of digital items (databases for research works) as well as an institutional repository (UDS Library 2023).

3.3.2 BRIEF BACKGROUND OF CKT-UTAS LIBRARY, TEDAM UNIVERSITY OF TECHNOLOGY AND APPLIED SCIENCES.

A parliamentary act, Act 1000(2019), established the C. K. Tedam University of Technology and Applied Sciences (CKT-UTAS) and went into force on May 27, 2021. Disseminating knowledge related to theory and practical development in integrated technology and applied sciences is the University's mandate, as stated in the parent Act.

CKT-UTAS was one of the four campuses of the University for Development Studies (UDS) before obtaining autonomy. The university houses a good number of faculties. To assist and improve teaching, learning, and research, the library outfit is stocked with educational materials in both hard and soft formats. The university library offers online reference services like phone, email, and Ask the Librarian (CKT-UTAS Library, 2023).

3.3.3 BRIEF BACKGROUND OF SDD-UBIDS LIBRARY, DOMBO UNIVERSITY OF BUSINESS AND INTEGRATED DEVELOPMENT STUDIES.

S. D. Dombo University of Business and Integrated Development Studies was formerly the University for Development Studies (UDS) Campus in Wa. With its main campus located in Bamahu, Washington, the Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS) was founded in May 2020 through an Act of Parliament

(Act 1001). The Simon Diedong Dombo University of Business and Integrated Development Studies is required by the Act (Act 1001, 2019) to be an exceptional, globally recognized applied research and practical-focused educational institution committed to business advancement and integrated development studies, as well as related subjects.

The SDD-UBIDS Library offers staff and students access to physical and digital resources. Location is not a barrier to ready library materials. These same resources are available online or through digital means (SDD-UBIDS LIBRARY, 2023)

3.4 SELECTION OF CASES

The study focused on the University for Development Studies, CK. Tedam University Technology and Applied Sciences and S.D. Dombo University of Business and Integrated Development Studies. This is because they are the oldest universities in the northern part of Ghana. These were carefully selected based on their online information about virtual reference services. It is also worth noting that these institutions were previously associated with UDS and have undergone similar phases of academic library reference service transitions.

3.5 SELECTION OF SUBJECTS.

The study assessing virtual reference services in selected academic libraries in Ghana, which employed a multiple case study design, was adopted. This approach was chosen due to its ability to solicit an in-depth response when carrying out a survey. Moreover, the use of this approach is based on the fact that the strength inherent in one type of data collection can compensate for the limitations of the other. Finally, a multiple case study design is essential to help clarify similarities and differences across various case studies under investigation. The researcher

considered these academic libraries because they have adopted a virtual reference service system for their academic library users to access assistance from the library virtually. The university's selection was keen on criteria that can help in the generalization of the data collected and the academic libraries' providing virtual reference service. Universities' identification was also done base on the online secondary data at the university's website in Ghana.

3.6 POPULATION OF THE STUDY

The population of the study is the complete representation of people to be considered. According to Mweshi and Sakyi, (2020) population of a study refers to the group of individuals that share common characteristics and from which a sample can be drawn. Neuman (2014) also defined the population of a study as the largest units that exhibit similar characteristics from which a sample can be obtained. All postgraduate students constitute the study population of the three institutions (2,138). However, this excludes postgraduate students such as PhD, MPhil, and MA/MSc who are in their first year of study. The table below shows the total categories of the various study populations for the respective institutions, which include second-year and above postgraduate students.

Table 3:1 Population of post graduate students

University	PhD	Mphil	MA/MSc	Sample frame
UDS	41	758	21	820
CK-Tedam	34	698	37	769
S.D. Dombo	39	464	46	549
Total	114	1,920	104	2,138

Source: Graduate schools 2024.

Table 3.2. Population of library staff

Universities	Uni.Librarian	Reference staff head	ICT head	Total
UDS	1	1	1	3
CK-TEDAM	1	1	1	3
SDD	1	1	1	3
Total	3	3	3	9

Source: University libraries 2024.

3.7 THE STUDY SAMPLE SIZE

According to Daniel (2012), a sample is a subset of a population with the same characteristics as the whole population. The study used Krejcie and Morgan's (1970) Sample size determination table to determine the sample size (Abdul & Bukhari, 2021). With this formula, the sample size was 315 for the postgraduate students and 9 library staff, for a total of 324. The table below shows the various categories of the sample size.

Table 3.3 Library respondents (key informants)

Universities	Uni.Librarian	Reference staff head	ICT head	Total
UDS	1	1	1	3
CK-TEDAM	1	1	1	3
SDD	1	1	1	3
Total	3	3	3	9

Source: Field data 2024

Table 3: 4. Sample size of the study population for graduate students

University	PhD	MPhil	Ma/MSc	Sample Size
UDS	41	39	35	118
CK-Tedam	34	36	21	94
S.D.Dombo	39	24	46	112
Total	114	99	102	315

Source: Field data 2024

The researcher calculated each university's MPhil population proportionately relative to the total population. This was done because the MPhil numbers were large, but in the case of the other categories (MSc, PhD), they recorded lower numbers, hence, they were all used for the study. The order of the calculation is as follows

Given data.

UDS= 758

CK-Tedam= 698

S.D. Dombo= 464

Step 1: Find the total population

Total population = 758+698+464=1920

Step 2: calculate the proportion for each university

For UDS:

Proportion of UDS= $\frac{758}{1920} \times 100 = 39.48\%$

For CK-Tedam:

Proportion of CK-Tedam= $\frac{698}{1920} \times 100 = 36.35\%$

1920

For S.D.Dombo:

$$\text{Proportion of S.D. Dombo} = \frac{464}{1920} \times 100 = 24.17\%$$

$$\text{MPhil total} = 39 + 36 + 24 = 99$$

This gives the proportional distribution of MPhil students across the three universities.

Step 3: The sample size was determined by adding up the total number of PhD, MSc/MA, MPhil, and library staff. **Hence the total sample size is 324.**

3.8 SAMPLING TECHNIQUE

Sampling is process of selecting a subset of subjects or people randomly bearing the same or similar characteristics to represent a population. This is because it is sometime practically impossible to use the entire population for some research studies. The process of selecting units from the population of a study is called sampling technique (Gronmo, 2023). The researcher obtained data of the population for each institution consisting of contacts (**names and phone numbers of postgraduate students**) from various graduate schools who are pursuing their postgraduate degrees from second year and above. The study included this category of students as their length of time with the University library can help the researcher with valuable information about virtual reference services awareness, usage, accessibility, responsiveness, staff competence, and reliability. The total PhD students for all the institutions under study was 114, and the MA/MSc students was 102. The study includes all MA/MSc/PhD categories due to their small size; hence, no sampling procedure was used since the entire population was used. However, it is worth noting that, study does not include first-year postgraduate students in the following categories: PhD, MPhil, and MSc. This is because their time with the service is too short to elicit in-depth information from students who did not use the system for a long time.

On the part of the MPhil students who has the higher numbers, the researcher adopted proportionate and simple random sampling was used. The proportionate was used to calculate MPhil students for each institution. This was done because the large number of MPhil students made it impossible for the researcher to use all populations. This method ensures that each university is represented proportionally in the final sample (Mitani et al., 2021).

Simple random sampling was deployed, and the MPhil students were selected for the study after dividing the population. This method was used to choose the students from each group. This method is important for the study because it allowed the researcher to draw an equal number of samples from different institutions for the virtual reference service assessment. This can prevent any group from being over- or under-represented, leading to more reliable generalizations (Rosenzweig et al., 2020). After the numbers were obtained excel was used randomly in the selection of respondents from the list of population for each of the institutions. The key characteristic of this technique is that every possible sample of a given size has an equal likelihood of being chosen, making the results generalizable to the population (Banerjee & Chaudhury, 2010). The randomness ensures that the sample is unbiased and representative of the entire population (Walters, 2021).

One of the major strengths of simple random sampling is its simplicity and ease of implementation, especially when a complete list of the population is available. This method eliminates selection bias, thereby ensuring the validity of statistical inferences (Walters, 2021). However, its effectiveness can decrease when the population is large and diverse, as it may not capture all relevant subgroups adequately (Bornstein, Jager, & Putnick, 2013).

For the selection of respondents from the library staff, there was no sampling used. Key

informant which includes the respective institutions librarians, heads of ICT, and heads reference staff were selected to gather the qualitative data through the interview. Therefore, every institution, three each were selected. This was considered because, this category is directly responsible for the functionality of these services and have in-depth knowledge of virtual reference services in the institutions of study.

3.9 DATA COLLECTION INSTRUMENTS (INSTRUMENTATIONS)

In research, data collection can be referred to as a fact-finding mechanism used as a strategy for data collection. Instrumentations can be defined as the means or tools utilized by a researcher in an attempt to quantify variables (Kumar, 2019).

Interviews, questionnaires, and observation are instruments explicitly known for data collection. This study includes a research questionnaire and an interview guide for the data collection.

Sections two (2) and three (3) of the questionnaires will address objective one (1), which assesses the awareness and utilisation of virtual reference services. Also, Section four (4) addresses objective two (2), which examines the virtual reference service accessibility. Similarly, section five (5) addresses objective three (3) on the reliability of virtual reference services in selected academic libraries. However, section six (6) addresses the responsiveness of library staff who provide the virtual reference services and section seven (7) was explicit on staff level of competence and finally the section eight (8) addresses challenges associated with the services. Based on the objective, multiple sources of data collection can be considered, if the objective require combination of questionnaire and interview of respondents. The study

used close-ended questionnaire and semi-structured interviews guides as the primary data collection instruments for the research.

This has enabled the researcher to engage in eliciting in-depth data and information from research respondents. Part 2 of the interview guide addresses management support for VRS, Part 3 also examines the academic libraries' access to resources for VRS delivery, and finally Part 4 assesses the skills training given for the virtual reference staff services delivery. The interview allows for homogeneity as well as a complete utilization of individual respondents' views on specific information provided (Neuman, 2014). Interviews were conducted with university librarians, ICT heads, and heads of reference staff from selected academic libraries. The researcher tried the VRS system to observed its functionality before the interview with library staff.

The use of semi-structured interviews has been academically criticized for being time-intensive, however, the visual cues and gestures it elicits in this research add to enrich the data collection process (Yin, 2014). The use of the close-ended questionnaires' motivations hinges on the fact that the research respondents were literate and did not need explanations and translation of the questions. The questionnaire was used to collect data from the graduate students on the research topic" assessing the effectiveness of virtual reference services in selected academic libraries in Ghana. The researcher was saved with cost and time since it did not require the physical presence of the researcher (Kumar, 2019). However, the questionnaire did not allow respondents to extensively express themselves on the research problem.

3.10 VALIDITY AND RELIABILITY

Kumar (2011) defines a reliable research tool as one that is consistent, stable, predictable, and

accurate. He also explains that an instrument is considered valid if it can measure what it is intended to measure. Creswell and Crewel (2018) identify three forms of validity: content validity, predictive or concurrent validity, and construct validity. Content validity ensures that an instrument measures what it intends to measure.

The study aims to measure what constitutes the “**effectiveness**” of VRS in academic libraries. Common indicators that the researcher intends to measure include service reliability, accessibility, responsiveness, utilisation, awareness, competence of staff, and management support of the virtual reference services.

The research covers assessment of relevant component of what constitute the VRS technology effectiveness. The study thoroughly evaluated elements of the services such as the technology use, staff training, staff expertise and how this impacts the academic library user.

To establish research validity, the closed ended questionnaire and semi-interview guide was developed to investigate virtual reference services in academic libraries in Ghana. Previous researches carry out in Ghana on virtual reference services will be compared or test to the research reliability. The findings similarity or consistency in evaluating services accessibility, reliability, responsiveness, staff competence as well as training has tested and indicated reliability. The degree to which other researchers research aligns with the study when assessing virtual reference services is crucial to ensure that, results of the study are dependable.

3.11 TRUSTWORTHINESS AND AUTHENTICITY

In a research scholarly environment, trustworthiness is anchor to credibility, dependability, confirmable and transferability. The researcher has ensured that, standard research procedures of the VRS in selected academic libraries in Ghana are followed to ensure credible outcome of

research findings. The study has been conformed with established methods of data collection and analysis such as surveys, interview which were credibly deployed for data collection. The study used triangulation where multiple data source was gathered to ensured that findings were all rounded robust and transparently credible.

The transferability of the VRS study findings can be replicated in other academic libraries as the study allow rigorous research processes including a detail methodology, technologies use to deploy virtual reference services and descriptive data about the academic libraries to enable researchers determine the applicability of the findings of the libraries in that context.

Also, dependability of the research process was consistent to the research process, the research design which uses multiple case study, data collection procedures, which involves closed-ended questionnaire and semi-structure interview procedures to gathered data and data analysis methods.

The study data obtained from participants was strictly used to devoid of personal biases. This gives the research the true reflection and confirmation of the study. The inclusivity of raw data and quotes from participants was used.

The researcher allowed accurate experiences, voices, and perspectives of the graduate students and library staff to be felt in the VRS services assessment in the selected Ghanaian academic libraries. Data collection process and representation of well-documented, credible genuinely reflect the VRS services' effectiveness assessment (Shenon, 2004).

3.12 PRE-TESTING OF INSTRUMENTS

The researcher pre-tested the research instrument to ensure that the results were valid and trustworthy. This is done to make any necessary corrections to unforeseen errors that may arise

during administration and analysis. Regardless of frequent interchangeability, reliability and validity have their meaning in research. Middleton (2019) defines reliability as a method with the capacity to measure an object consistently. When the same results are produced consistently using the same method with the UCC postgraduate students, as it has similar characteristics to the population in similar conditions, the measurement is considered dependable. This explains the extent to which the results can be replicated under similar conditions when the study is executed again.

The level at which the research method accurately evaluates the expected outcome is what is meant by validity. when research results align with characteristics, features, and variances seen in the real world either be it physical, social high validity has been achieved (Middleton. (2019). Also, the extent to which findings of research faithfully correspond to the expected desire. In research validity analysis, accuracy of a measure whereas reliability assesses the consistency with which a measure yields results. The two are important as they guarantee and generate standard research instruments and data. A pre-test was carried out with a sample of postgraduate students University of Cape Coast and the University for Development Studies postgraduate students to enable the researcher to confirm the suitability of the data tools. Previous research has shown that a sample size of 1-10 percent is allowed for pre-testing (Mugenda &Mugenda, 1999), cited in Onyango et al. (2018). A pre-test was done with five (5) postgraduate students. Cronbach's Alpha coefficient was used by the researcher to examine the questionnaire's reliability. The determination was done using SPSS software (version 26). It was proven that the used questionnaires had a reliability of 0.80. As Mugenda and Mugenda's (1999) research has stated alpha coefficient value of 0.700 or over is regarded appropriate especially in social

science-related research.

The researcher also piloted interview with 3 university for development studies staff members of the academic library to evaluate the effectiveness of the recording devices. Supervisors were given the instrument for further examination. once the was done, the equipment's were adapted by the researcher and resolved errors found.

3.13 DATA COLLECTION PROCEDURE

The researcher visited the respective universities to familiarize himself with the scope of the study to determine the most effective approach for data collection sessions concerning logistics and timing. This visit aids in care for the unforeseen challenges capable of arise during the research process to help mitigate them to the barest minimum. conducting interviews and administering questionnaires for the study.

A convenient date was duly scheduled for the questionnaire and the interview by the parties involved to be administered. The researcher delights to conduct face to face interviews and questionnaire administration due to the worth of advantages this approach offers; however, in instances where a personal interview and questionnaire were not possible. Telephone calls were recorded, as well as emails, and Google Forms were deployed. Interviews were recorded and transcribed. The researcher ensured that the transcribed interview was returned to respondents to ensure the right content and context were duly observed and represented. This caters for corrections and additions if the need arises, as well as allowing construct validity of data gathered. Similarly, the Google questionnaires were distributed to the respondents by the assistance of identified course representatives of the various universities. after answers were received, the researcher began analysis.

3.14 DATA ANALYSIS

Data analysis is the process of extracting relevant information from the gathered data, relevant information from which a comprehensible summary is carried out and numerical descriptions can be deduced (Nsonwah- Nuamah, 2012). Data analysis was carried out by the use of mixed methods (Quantitative and Qualitative). Quantitative data from the questionnaires were analysed by the use of IBM Statistical Package for Social Sciences (IMB SPSS) version 23 software and Excel, and results were presented graphically, using charts, tables, and graphs. The questionnaires were coded and entered into SPSS. The results were then represented using descriptive statistics. However, the qualitative data through the interview and observations were analyzed using thematic and content analysis.

The objective one which ‘assess the awareness and utilization of virtual reference services in selected academic libraries in Ghana. Descriptive statistics were used to analyze data collected on the awareness and usage of the virtual reference service in the academic library. The analyzed results were presented in frequency distribution tables, charts and diagrams.

For objective two which seek ‘To examine virtual reference service accessibility in selected academic libraries in Ghana’: Descriptive statistics was used to analyzed the data while thematic content analysis was carry out on the qualitative data on whether the implementation of the technology does enhance or improve user access to information. Results of the survey were presented in frequency tables, charts and diagrams and interviews presented as received from respondents.

Also, the objective three which seek ‘To assess reliability of virtual reference services in selected academic libraries’: descriptive statistics was used to analyzed the quantitative data

whiles content analysis was carry out on whether the implantation of the technology has duly improved user services reliability. These results of the survey were duly presented on frequency tables, chart, and graphs and interviews presented as taking from respondents

Moreso, the objective four seek to 'To assess the staff responsiveness in providing user information needs': This objective was also analyzed using descriptive statistics, on whether the system implementation has met user service timely needs. Results of the survey were presented on frequency tables, chart, and graphs and interviews presented as received from participant.

For objective five which also seek to 'To examine staff level of knowledge on delivery VRS in selected academic': descriptive analysis was carry out and content analysis was also used to analysed the qualitative data relating to the skills training offered to staff to equip them deliver VRS effectively.

The objective six seek to 'To examined management support for virtual reference services in selected academic libraries in Ghana': Purely, thematic content analysis was carried out to analysed the qualitative data gathered from the key informant and focus discussion relating to the objective. For objective seven which seek to 'To examined ICT support for virtual reference services in selected academic libraries in Ghana': thematic content analysis was conducted to analysed qualitative data that was gathered through interview relating to the objective to aid arrive at empirical conclusion.

Finally, the objective eight which seek to 'To identify challenges associated to VRS in selected academic libraries Ghana'. Both descriptive and content analysis were carried out to analysed both the quantitative and qualitative data and results of the descriptive analysis were presented

in frequency tables, charts and graphs whiles data gathered from the interviews were also analyzed using the thematic content analysis to complement the quantitative findings. As clearly stated, this approach include identification, examination, assessment, and summarizing of themes or patterns within a given dataset (Punch, 2005). Inductive approach to analysed the data was the research focused, ensured coding data was carry out without trying to fit it into any pre-existing coding frame or according to the researcher own analytic ideologies. The results of the from the thematic analysis were presented using verbatim quotation thus representing the identify concepts. Codes were extended to participants to hide their identities. A single code was given to all the interviewees in three (3) universities libraries to protect their identities throughout the study. This will make it difficult to link any respondent to any of the sampling institutions.

3.15 ETHICAL CONSIDERATION

Ethical considerations are essential and indispensable in all spheres of academic research. In recognising its importance, the researcher abided by all the university of Ghana policy on research ethics in the entire research processes.

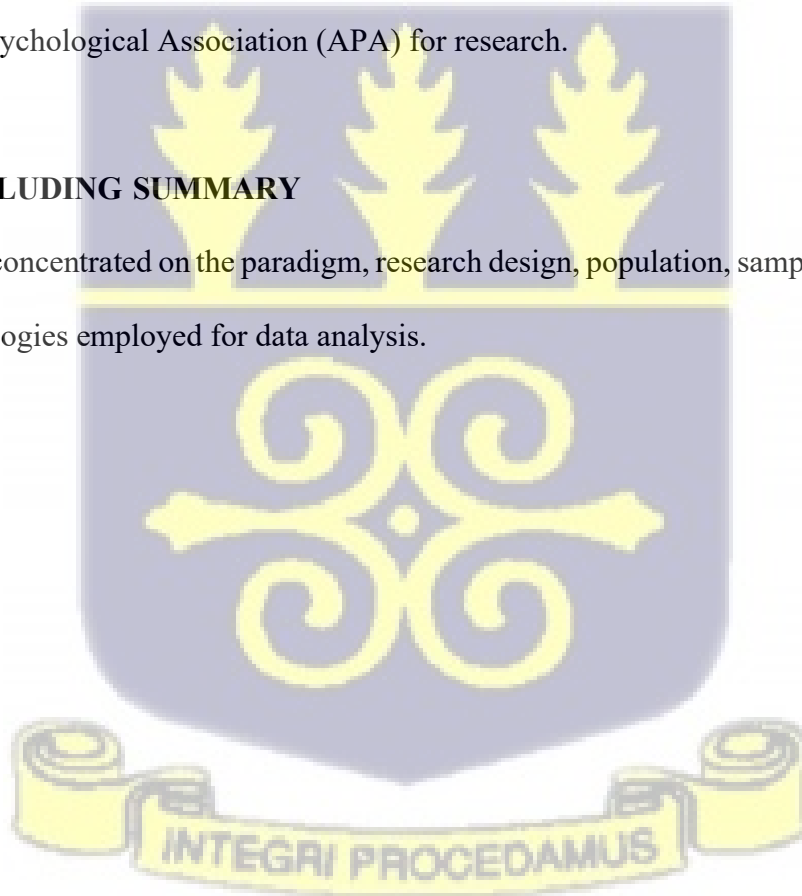
- a) Respondents of the study were dully assured of anonymity and the confidentiality of their responses and their names were not demanded to be written.
- b) Consent to conduct the research was also dully obtained from respective University of Ghana ethics for humanities committee as well as the various Universities involved prior in the study commencement
- c) The research participation was voluntary, and no participant was coerced or forced to join. When participant willingly agree to join, their privacy and confidentiality

are assured and protected.

- d) The study participants were regularly reminded of their obligations and rights within the process of the research, including the freedom to leave the study at any given time without suffering negative consequences.
- e) In order to avoid plagiarism, due acknowledgement was given to all sources of information used in the study.
- f) In conclusion, adherence was duly served to all ethical requirements in the academic inquiry, following the graduate school guidelines enshrined at the University of Ghana, as well as ethical principles and code of conduct outlined by the American Psychological Association (APA) for research.

3.16 CONCLUDING SUMMARY

This chapter concentrated on the paradigm, research design, population, sampling, instruments, and methodologies employed for data analysis.



CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This chapter presents the findings from the analysis of the data gathered from the quantitative survey and the raw qualitative data gathered through interviews.

4.2 DATA ANALYSIS AND PRESENTATION OF FINDINGS

Data gather for study primarily include quantitative data, qualitative data, and observations. Quantitative data which involved questionnaire administration, qualitative through interviews, and system observation by researcher in the respective academic libraries under investigation. The quantitative aspect of the findings is found in Part A while Part B contains the qualitative observations aspect of the findings. Quantitative data was analysis using the statistical package for social sciences whiles the qualitative data observations was coded for confidentiality and anonymity purposes and the data was analyzed using thematic analysis. The data obtained from interview and observations have been handle separately from the data from the questionnaire in addressing each objective. The findings are display through charts, tables, graphs and direct quotes.

Presentation of the data has been structure based on the different sections of data collection instrument: Respondent background information, awareness and utilization of virtual reference services, accessibility of VRS, reliability of virtual reference services, responsiveness of virtual reference services, competences of reference staff, management support and infrastructural support of virtual reference services as well as challenges associated to virtual reference services.

4.3 RESPONSE RATE OF THE STUDY

A total of 315 questionnaires were distributed, 300 hundred were returned resulting response rate of 92.59% for the three (3) academic libraries examined, and total 9 were targeted for the interview and these were all interviewed. They include university librarian each, heads of ICT, and reference staff sections.

The sample consisted of 324 individuals, including 114 PhD students, 99 MPhil students, 102 MA/MSc students, and 9 library staff members. Data was collected from all MPhil, MA/MSc students and library staff. However, from the 114 PhD participants, data was obtained from 99 respondents. The researcher could not retrieve 15 questionnaires from the PhD respondents. Nine (9) of the library staff were interviewed. Overall, the total response rate exceeded 92.59% which according to Holtom et al., (2022) is adequate to conduct research. The deployment of the **multiple case approach** was cleared. **Part A** of the study analyzes the quantitative data gathered from the graduate students through the questionnaire while **Part B** deals with the qualitative data collected from library staff through the interview guide and observations made by the researcher of the VRS operations.

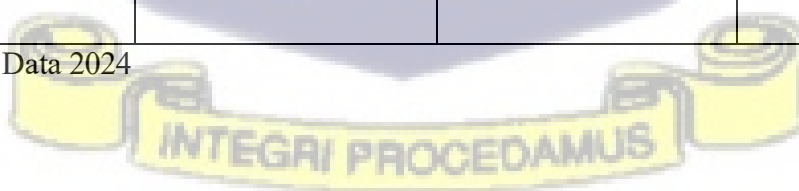
4.4 BACKGROUND INFORMATION OF THE RESPONDENTS

The research aimed to investigate the effectiveness of virtual reference services in selected academic libraries in Ghana. To comprehensively understand the phenomenon, the researcher examined the essential background information of the respondents relevant to the study. This included information on institutions used in the study, programs offered, gender, and age that influence and shape the needs and behaviors of study respondents.

Table 4.1 Background information of the respondents

Biodata category	Subcategory	Frequency	Percentage
Academic affiliations			
	UDS	115	37.2
	CK- Tedom	104	33.7
	S.D. D	90	29.1
Total		309	100
Gender			
	Male	191	61.8
	Female	118	38.2
	Total	309	100
Age group			
	21-30	61	20.3
	31-40	173	57.7
	41-50	64	21.3
	51-60	2	0.7
	Total	300	100
Programs			
	PhD	99	33.0
	MPhil	99	33.0
	MSc/MA	102	34.0
	Total	300	100

Source: Field Data 2024



4.4.1 ACADEMIC AFFILIATION OF INSTITUTIONS

The survey results provide insights into the demographic composition of respondents using virtual reference services in the selected academic libraries in Ghana. The academic affiliations show a fairly balanced distribution, with UDS having the highest representation (37.2%), followed by CK-Tedam (33.7%) and S. D. Dombo (29.1%). This suggests active participation across the three institutions.

Table 4. 2: Academic affiliation

Academic affiliation	Frequency	Valid percent
UDS	115	37.2
CK-Tedam	104	33.7
SDD	90	29.1
Total	309	100

(Source Field Data, 2024)

4.4.2 GENDER OF RESPONDENTS

In terms of gender, males constituted 61% of the respondents, while females made up 39%, indicating a gender disparity.



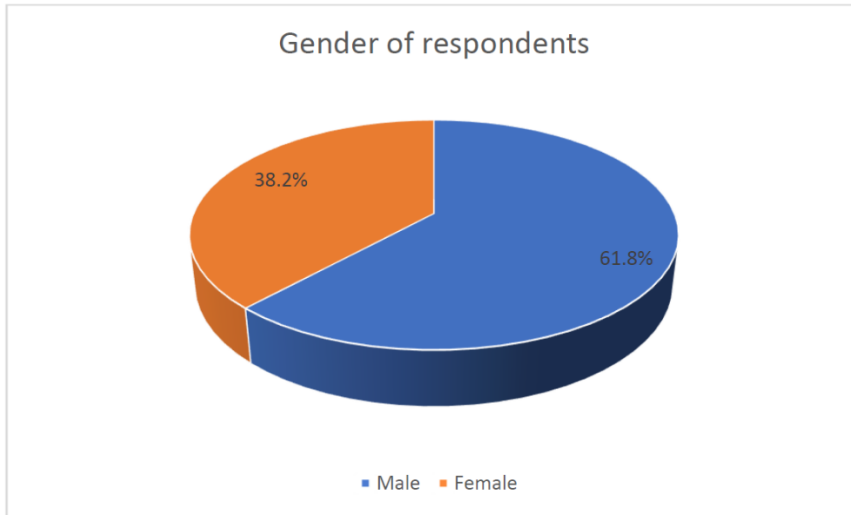
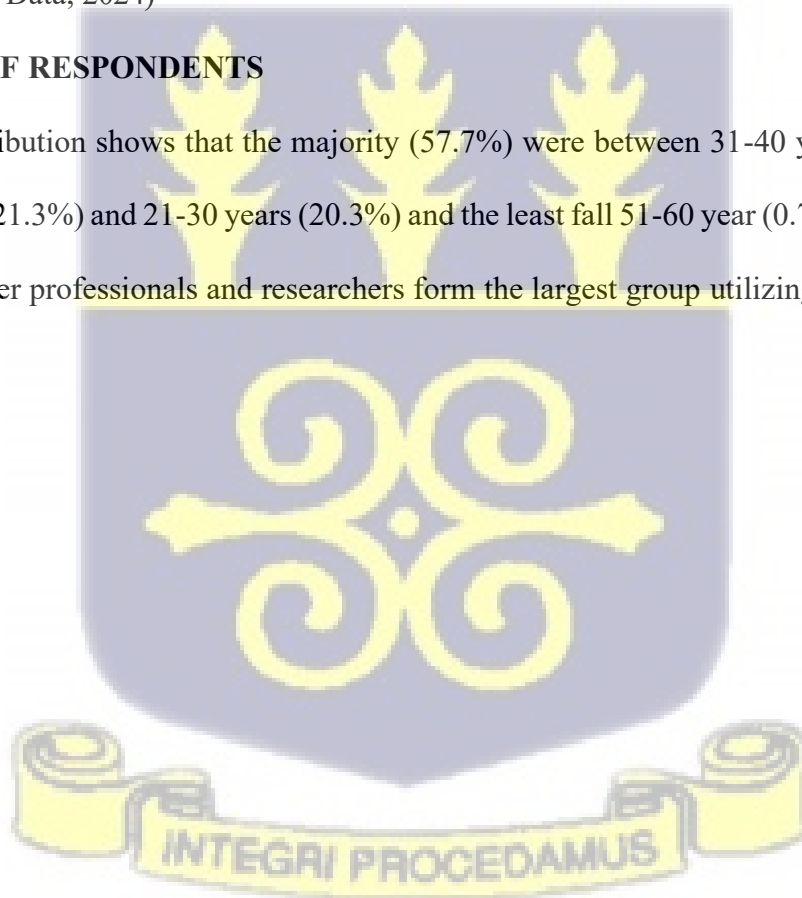


Figure 4.1. Gender of respondents.

(Source Field Data, 2024)

4.4.3 AGE OF RESPONDENTS

The age distribution shows that the majority (57.7%) were between 31-40 years, followed by 41-50 years (21.3%) and 21-30 years (20.3%) and the least fall 51-60 year (0.7%). This suggests that mid-career professionals and researchers form the largest group utilizing virtual reference services.



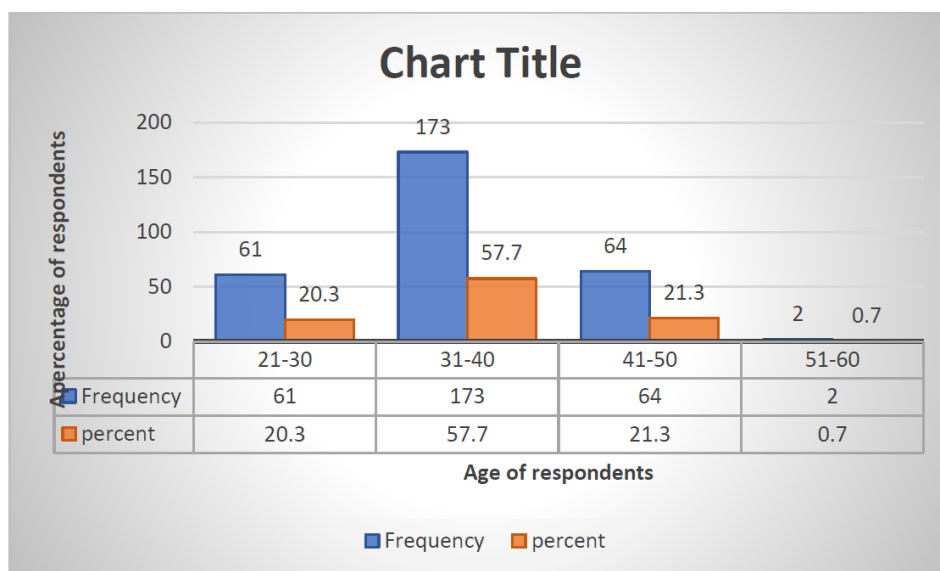


Figure 4.2: Age of respondents.

(Source Field Data, 2024)

4.4.4 ACADEMIC PROGRAMS OF RESPONDENTS

Academic program distribution was relatively even, with PhD and MPhil students each representing 33% and MSc/MA students making up 34%. This balance ensures perspectives from different academic levels are captured.

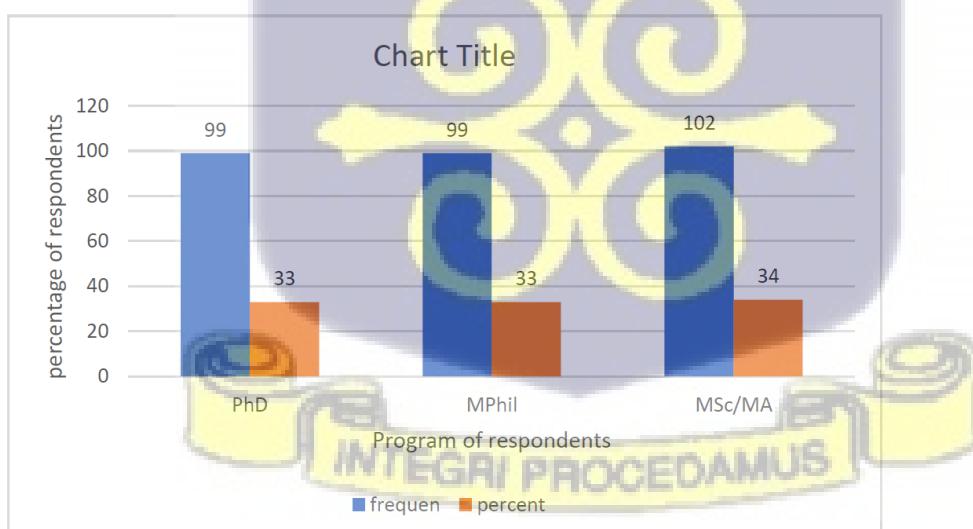


Figure 4.3. Program of respondents.
(Source Field Data, 2024)

Generally, the results highlight a diverse respondent base, with a strong presence of postgraduate students and mid-career academics, emphasizing the critical role of virtual reference services in supporting research and learning in Ghanaian academic institutions.

4.5 CROSSTABULATION OF THE RESPONDENT'S BACKGROUND

INFORMATION

This section cross tabulates the respondents background information with their level of awareness of VRS. These include academic affiliation, gender, age and program of study.

4.5.1 CROSSTABULATION OF ACADEMIC AFFILIATION AND AWARENESS OF ACADEMIC LIBRARY VRS

A notable variation of results among students from different institutions was revealed, at the University for Development Studies (UDS), 66 students (22%) reported being aware of virtual reference services, while 11 (3.67%) were somewhat aware. However, 9 (3%) remained neutral, and 26 (8.67%) were not aware at all. This implies that, as more students are aware of the services, one must recognize the notable portion of those who remain neutral or unaware pointing to a gap in communication or outreach

In contrast, C.K. Tedam University of Technology and Applied Sciences had 45 students (15%) aware of these services, with 28 (9.33%) somewhat aware. A significantly lower number, 1 (0.33%), remained neutral, while 13 (4.33%) were unaware. The higher number of students who are somehow aware compared to the fully aware has indicated that a good number of students may be partially familiar with the services, more efforts should be carried out to

enhance users' complete understanding of the service.

Moreso, S.D. Dombo University of Business and Integrated Development Studies, 46 (15.33%) students reported services awareness, 25 (8.33%) were somewhat aware, and 12 (4%) were neutral. The proportion of students unaware of virtual reference services was 18 (6%). The distribution here is relatively even comparing awareness and somewhat aware, with fewer students in the neutral and not aware categories

Generally, the results indicate that, most students across the study institutions are somehow aware of the VRS. However, there is a clear need for awareness campaigns. Though most of the students indicate their awareness of UDS, a significant proportion of students are unaware or neutral in UDS indicating the need for outreach. C.K. Tedom had the highest percentage of those somewhat aware. S.D. Dombo had a relatively even distribution. This means that more efforts should be committed to maintaining and strengthening the services.

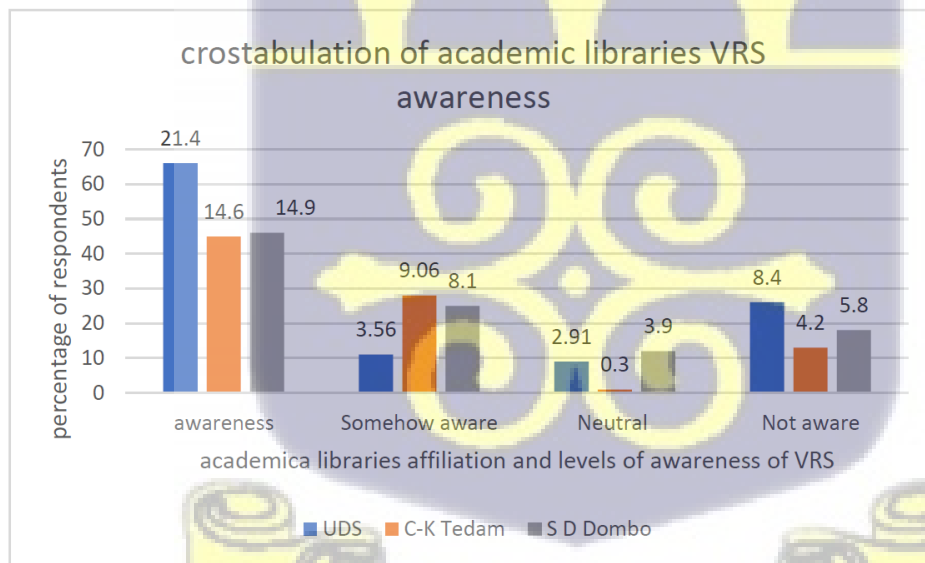
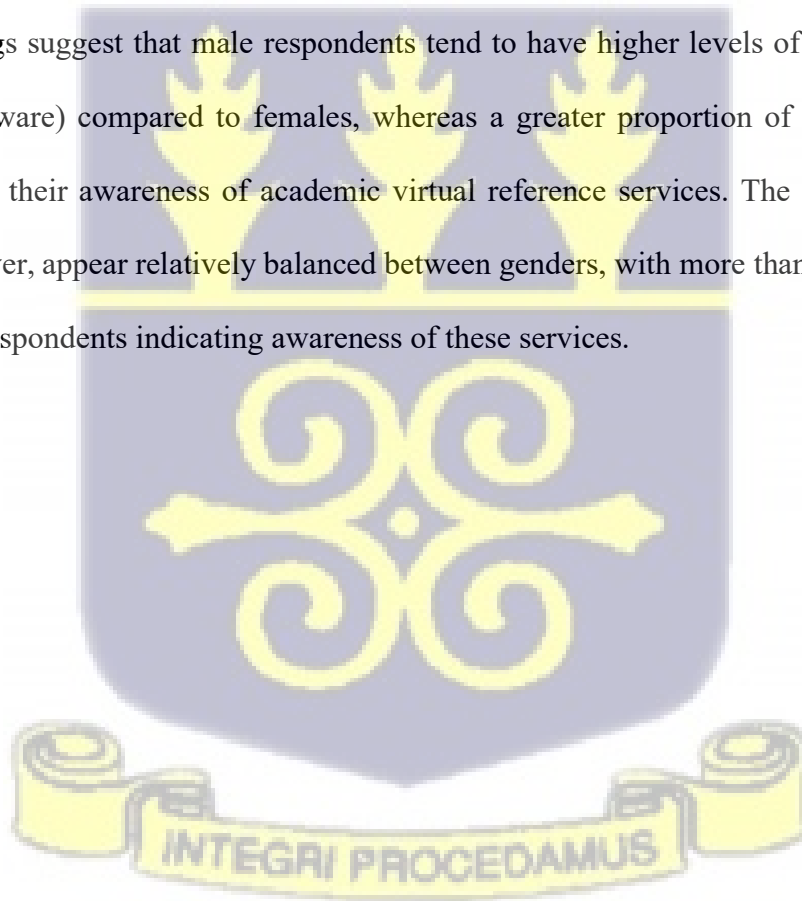


Figure 4.4. academic affiliation of respondents. ($X^2=43.827$ $P=0.000$)
(Source Field Data, 2024)

4.5.2 THE CROSSTABULATION OF RESPONDENT'S GENDER AND VRS AWARENESS IN SELECTED ACADEMIC LIBRARIES.

The crosstabulation of gender and awareness of academic virtual reference services reveals notable differences in awareness levels between male and female respondents. Among males, 50.9% (88 out of 173) reported being aware of these services, while 36.4% (63) were somewhat aware. A small proportion, 1.7% (3 out of 173), remained neutral, whereas 16.8% (29 out of 173) were not aware. In contrast, among female respondents, 53.3% (64 out of 120) indicated awareness, while 15% (18 out of 120) were somewhat aware. The percentage of females who remained neutral was 13.3% (16 out of 120), and 15.8% (19 out of 120) were not aware.

These findings suggest that male respondents tend to have higher levels of partial awareness (somewhat aware) compared to females, whereas a greater proportion of females remained neutral about their awareness of academic virtual reference services. The overall awareness levels, however, appear relatively balanced between genders, with more than half of both male and female respondents indicating awareness of these services.



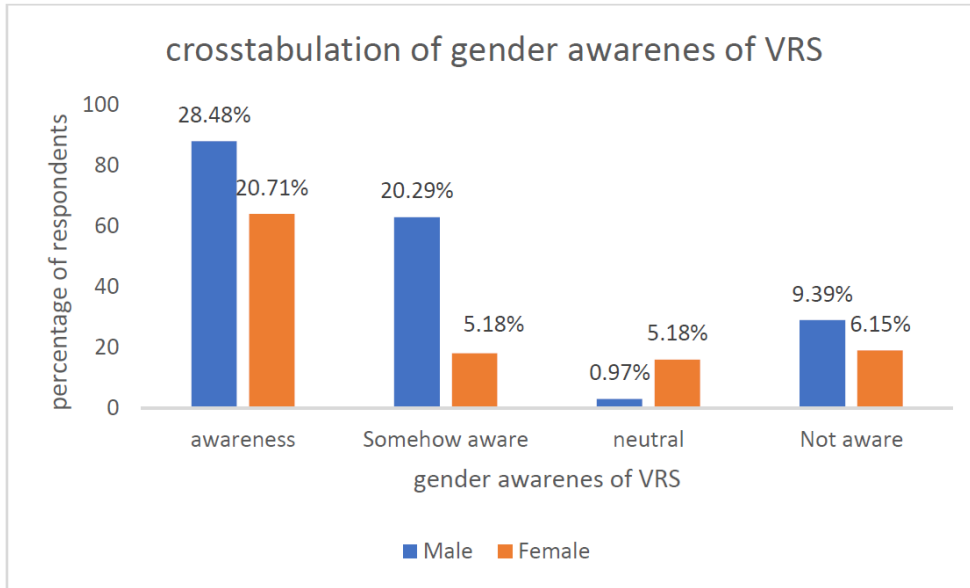


Figure 4.5. Gender of respondents. ($X^2 = 36.813$ $P = 0.000$)
(Source Field Data, 2024)

4.5.3 CROSS-TABULATION OF RESPONDENTS' AGE AND VRS AWARENESS IN SELECTED ACADEMIC LIBRARIES.

The crosstabulation of age and awareness of virtual reference services in academic libraries reveals significant variations across different age groups. The results indicate that younger respondents are more aware of these services than older individuals.

Among respondents aged 21-30, 32 reported being aware of virtual reference services, while 12 were somewhat aware, and only 3 remained neutral. However, 14 individuals in this age group stated that they were not aware of such services. The 31-40 age group demonstrated the highest awareness, with 88 respondents indicating familiarity, 52 being somewhat aware, and only 13 neutral. Despite this, 20 individuals in this category were not aware of virtual reference services.

In contrast, awareness levels declined among older age groups. The 41-50 age group had 31 individuals aware, 17 somewhat aware, and only 3 neutral, but 13 respondents in this category were unaware of virtual reference services. The lowest awareness was observed in the 51-60 age group, where only one person was aware, and no respondents in this category expressed neutral or partial awareness.

These findings suggest that younger library users, particularly those between 21 and 40 years old, have greater exposure to virtual reference services, possibly due to their higher engagement with digital resources. On the other hand, older users, particularly those above 50, exhibit minimal awareness, highlighting the need for targeted outreach and training programs to bridge the knowledge gap and promote the effective use of virtual reference services across all age groups.

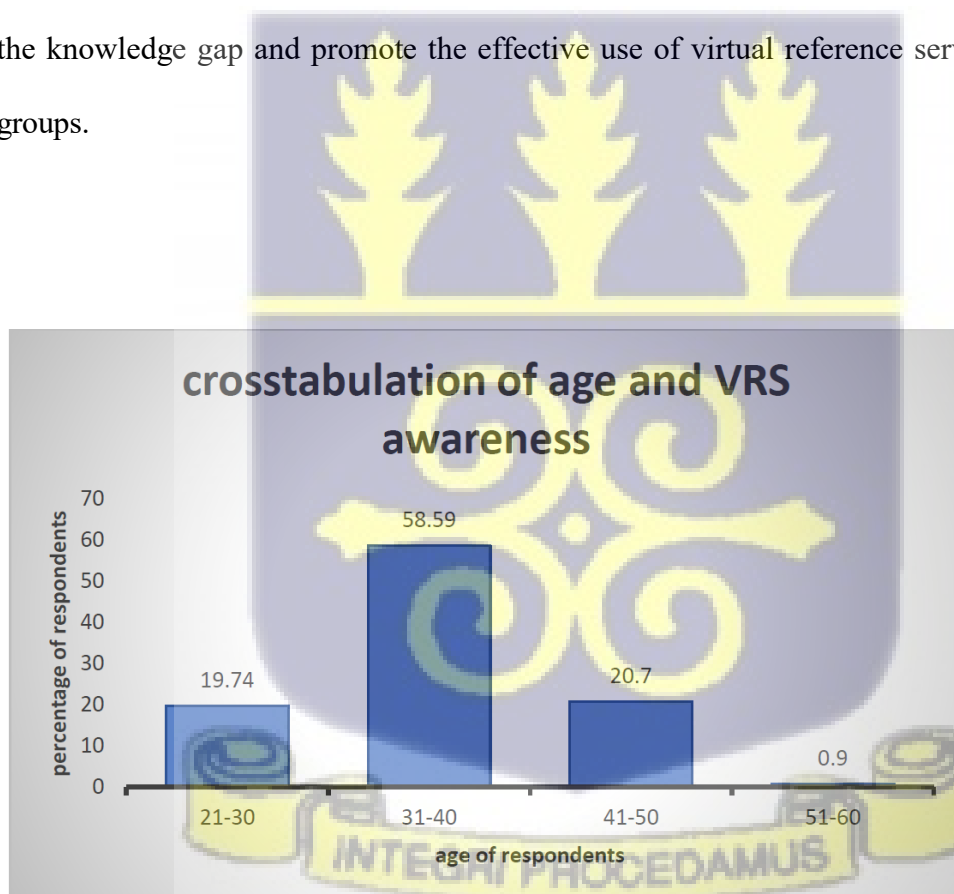


Figure 4.6. Age and VRS awareness of respondents. ($X^2= 11.063$ $P= 0.524$)

(Source Field Data, 2024)

4.5.4 CROSS-TABULATION OF PROGRAMS AND AWARENESS OF VRS IN SELECTED ACADEMIC LIBRARIES.

The crosstabulation of graduate programs and awareness of academic virtual reference services reveals notable differences in familiarity across degree levels.

Among PhD students, 75% reported being aware of virtual reference services, while 15% were somewhat aware. A smaller proportion remained neutral (9%) and (11%). were unaware MPhil students showed a slightly lower awareness level, with 55% aware, 25% somewhat aware, 10% neutral, and only 4% unaware.

Master's (MA/MSc) students exhibited the lowest awareness, with only 37% aware and 29% somewhat aware. Additionally, 11% were neutral, while a significant 19% were not aware of these services.

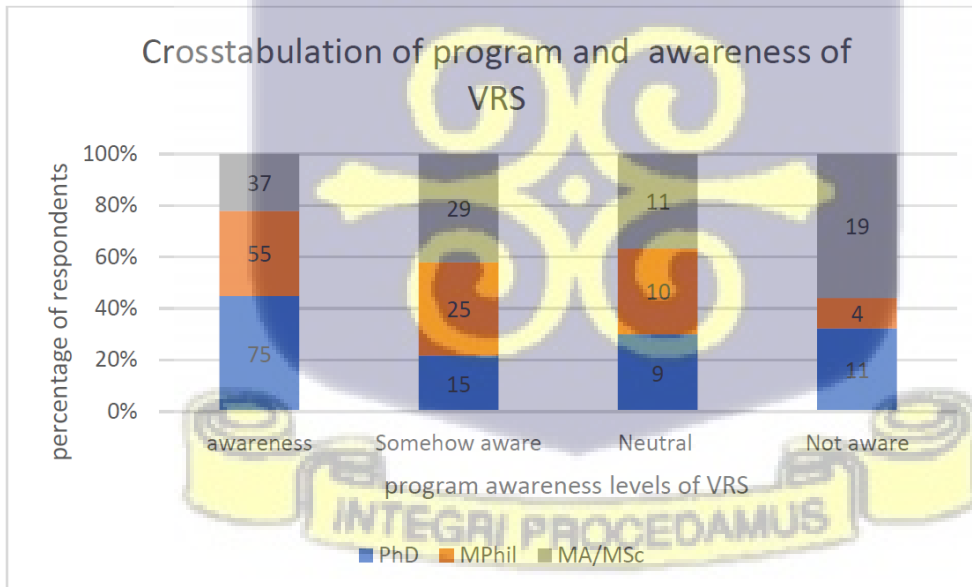


Figure 4.7. Program and VRS awareness of respondents. ($X^2= 71.557$ $P= 0.000$)

(Source Field Data, 2024)

4.6 AWARENESS AND USAGE OF VIRTUAL REFERENCE SERVICES IN SELECTED ACADEMIC LIBRARIES IN GHANA

This section presents the results of awareness and use of virtual reference services in academic libraries in Ghana. For easy presentation of the results in this chapter, the objective is broken into awareness and use of virtual reference services.

4.6.1 ASSESSING SERVICE QUALITY OF AWARENESS OF VRS IN SELECTED GHANAIAN ACADEMIC LIBRARIES

Virtual Reference Services awareness in academic libraries refers to the publication of available services by the academic library to inform users about the service and its benefits. The data shows that library orientation programs (62.3%) and website announcements (61.0%) were the most widely used strategies for creating awareness of VRS. Workshops/seminars and social media promotions also played significant roles, though with moderate reach. The least utilized method was through institutional emails (49.7%), suggesting limited integration of VRS promotion into formal communication system. This awareness creation is usually characterized by user education, digital literacy, and promotions, among others. Awareness of academic VRS often leads to increased utilization and engagement with these services. The findings indicate that 44.0% (132 individuals) reported being aware of virtual reference services. A simple majority proportion, 26.2% (81 individuals), are categorized as somehow aware. On the other hand, 6.3% (19 individuals) of respondents were neutral, indicating either a lack of strong opinion or minimal engagement with virtual reference services. Lastly, a significant 16.0% (48 individuals) of the respondents reported that they were not aware of these

services at all.

Table 4.3. Service quality awareness of virtual reference services in selected academic libraries in Ghana

Awareness of virtual reference Services	Frequency	Valid Percent
Awareness Somehow aware	13	44.0
Neutral	2	26.2
Not aware	81	6.3
	19	16.0
	48	
Total	30 0	100.0

Source Field Data, 2024

Service quality Awareness levels of (VRS) among the three institutions findings revealed that, UDS postgraduate students consist of (66 or 22%) were aware of VRS, making it the highest among the other institutions. This was followed by SDD-UBIDS, 46 respondents (15.3%) were aware, close to CK-Tedam's level whiles CK-Tedam University, 45 respondents (15%) were aware, but many (28 or 9.3%) were only somewhat aware constituting partial knowledge of the VRS. The study findings reveal that, UDS recorded the highest awareness, followed by SDD-UBIDS, then CK-Tedam University. This means awareness of VRS is generally good, but not

equal across institutions.

Table 4.4 Service quality awareness levels of virtual reference services by institution

Institution	Aware	Somehow Aware	Neutral	Not Aware	Total (n)
UDS	66 (22.0%)	11 (3.7%)	9 (3.0%)	26 (8.7%)	112 (37.3%)
CK-Tedam University	45 (15.0%)	28 (9.3%)	1 (0.3%)	13 (4.3%)	87 (29.0%)
SDD-UBIDS	46 (15.3%)	25 (8.3%)	12 (4.0%)	18 (6.0%)	101 (33.7%)
Total	157 (52.3%)	64 (21.3%)	22 (7.3%)	57 (19.0%)	300 (100%)

Source Field Data, 2024

4.6.2 ASSESSING THE SERVICE QUALITY OF VRS UTILIZATION IN

SELECTED ACADEMIC LIBRARIES IN GHANA

Virtual reference service utilization in academic libraries refers to the explicit extent to which academic library users use the digital or online-based services offered by the academic library for their academic and research purposes. These services can be live chatbots, AI-driven tools, email or phone services, or knowledge bases through which users seek assistance remotely rather than visiting the physical library. Factors that influence VRS utilization include accessibility of services, technological infrastructure, awareness, and perceived usefulness. Survey results on the services usage demonstrated that, out of the 300 respondents, 161 individuals reported using VRS, which accounts for 53.7% of the total. Conversely, 139 respondents, or 46.3%, indicated that they do not utilize these services.

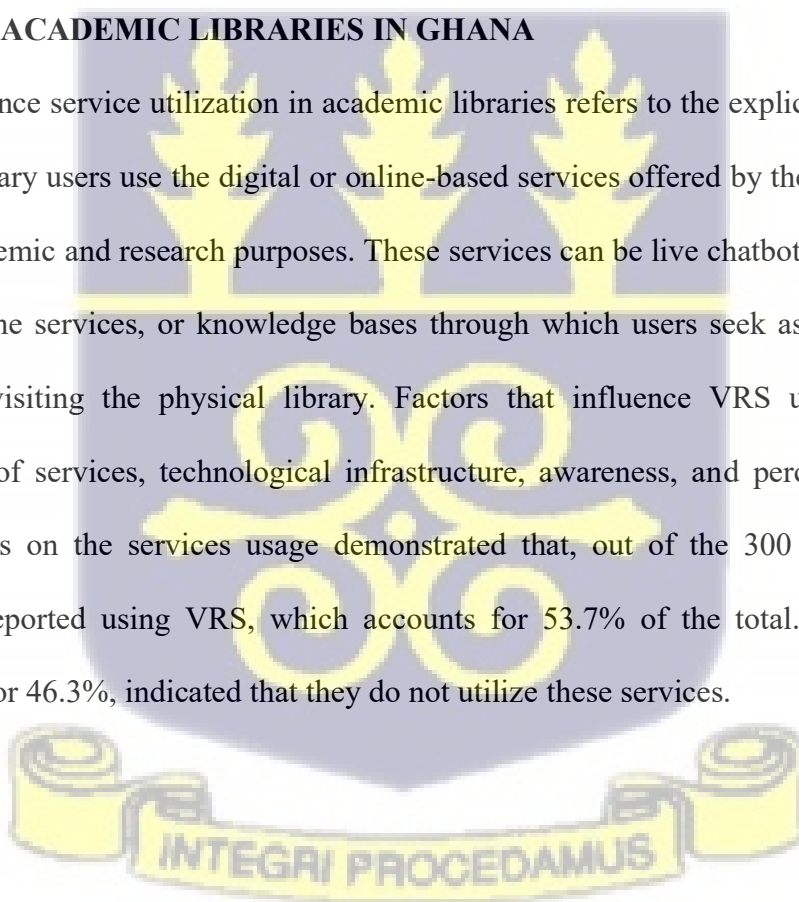


Table 4.5 Utilization of VRS in in selected academic libraries

Utilization of VRS	Frequency	Valid Percent
Yes	161	53.7
No	139	46.3
Total	300	100

Source Field Data, 2024

The study results vary based on the usage of VRS among the three institutions. However, UDS was the highest within the studied institutions constituting, 63 respondents (21%) who used VRS. In CK-Tedam University 49 respondents (16.3%) use VRS showing moderate usage. At SDD-UBIDS, 49 respondents (16.3%) also use VRS, similar to CK-Tedam. The research shows that, more respondents (52 or 17.3%) do not use it. UDS has the highest VRS usage, while SDD-UBIDS and CK Tedam has the lowest. In total, 53.7% of all respondents use VRS, while 46.3% do not. This shows that although more than half of the students use VRS, there is still room for improvement, especially at SDD-UBIDS

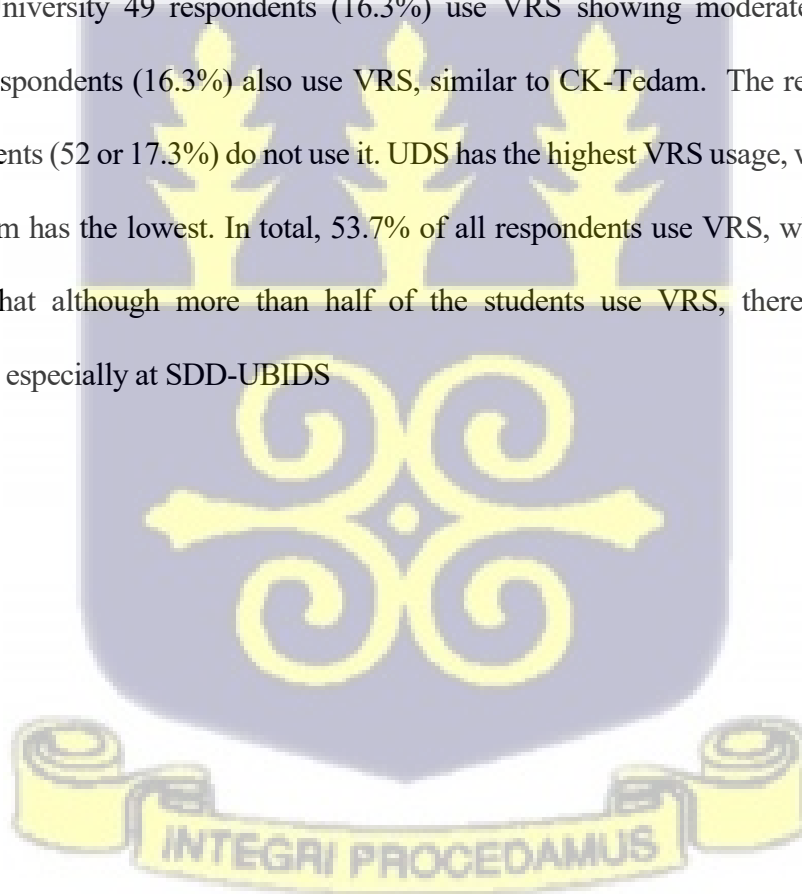


Table 4.6 Utilization levels of virtual reference services (VRS) by institution

Institution	Use VRS (Yes)	Do Not Use VRS (No)	Total (n)
UDS	63 (21.0%)	49 (16.3%)	112 (37.3%)
CK-Tedam University	49 (16.3%)	38 (12.7%)	87 (29.0%)
SDD-UBIDS	49 (16.3%)	52 (17.3%)	101 (33.7%)
Total	161 (53.7%)	139 (46.3%)	300 (100%)

4.6.2.1 FREQUENCY OF VRS USAGE IN SELECTED ACADEMIC LIBRARIES IN GHANA

The survey results on the frequency of virtual reference service use are as follows: 10.7% of respondents use the service daily, 6.3% use it monthly, 37.7% use it occasionally, and 33.7% rarely use it. However, 11.67% do not use it at all. The total number of respondents is 300.

Table 4.7. Frequency of VRS usage

	Frequency	Valid Percent
Daily	32	10.7
Monthly	19	6.3
Occasionally	113	37.7
Rarely	101	33.7
Not at all	35	11.67
Total	300	100

Source Field Data, 2024

4.6.2.2 FACTORS THAT INFLUENCE QUALITY OF VRS UTILIZATION IN SELECTED LIBRARIES IN GHANA

Several factors influence the decision to use virtual reference services (VRS). Among these, convenience emerges as the most significant, with 42.3% of respondents identifying it as the primary motivator. Distance barriers also play a role, with 26.7% of respondents citing it as a critical factor, highlighting the value of VRS for users who are geographically distant or unable to visit the physical library. Ease of use, identified by 20.3% of respondents, further enhances the appeal of VRS, especially in an academic environment. Additionally, recommendations from peers or faculty influence 10.7% of users to adopt these services.

4.6.3 RELATIONSHIP BETWEEN AWARENESS AND USE OF VRS IN SELECTED ACADEMIC LIBRARIES IN GHANA.

The relationship between awareness and utilization of Virtual Reference Services (VRS) quality in academic libraries reveals a statistically significant correlation. From the data presented, among those who reported utilizing VRS, the majority (82) were aware of the service, while a smaller number (54) were "somehow aware." Notably, none of the respondents who reported using VRS indicated that they were "not aware" of the service. In contrast, among those who did not utilize VRS, a substantial number (40) were "not aware," and an even larger group (51) were only "somehow aware." This pattern suggests that awareness plays a crucial role in utilizing VRS. The chi-square test statistic ($X^2 = 83.725$, $p = 0.000$) confirms a highly significant association between awareness and utilization, indicating that this relationship is not due to chance. In essence, the higher the awareness among graduate students, the more likely they are to use VRS. Therefore, academic libraries should prioritize awareness campaigns to boost the

utilization of virtual reference services.

Table 4.8 Relationship between awareness and utilization of VRS quality

Utilisation of VRS in the library	Aware of VRS in the Library			
	awareness	Somehow aware	Neutral	Not aware
Yes	82	54	25	
No	31	51	17	40

(X²= 83.725 P= 0.000)

Source Field Data, 2024

4.7 VIRTUAL REFERENCE SERVICE QUALITY ACCESSIBILITY IN SELECTED ACADEMIC LIBRARIES IN GHANA

This section presents the results of how virtual reference services in some selected Ghanaian academic libraries meet user quality information needs. Virtual reference services accessibility refers to the ability of the library online services ease to access and to interact with reference staff on the digital platform by a user for their information requirements, regardless of location or physical barriers. Virtual reference services aim to provide personalized assistance, curate reference materials, assist users in finding reliable sources of information, and promote reference materials and resources (Cassell & Hiremath, 2023). A digital reference transaction commonly encompasses the user, interface, electronic resources, and information professional (Adayi, Neboh & Oluchi, 2023).

Accessibility of virtual reference services refers to how available services in the system can be reached online at all times by library users. The accessibility of VRS encompasses several issues such as technology use to deploy the services, issues of internet connectivity and technical support, and infrastructure.

This study results of the study accessibility show that 55.7% of respondents believe virtual reference services in the selected academic libraries in Ghana are accessible, while 41.7% think they are not. A small percentage, 2.7%, are neutral on the matter.

Table 4.9: Quality of VRS Accessibility in Selected Academic Libraries in Ghana

Accessibility of VRS	Frequency	Valid Percentage
Yes	167	55.7
No	125	41.7
Neutral	8	2.7
Total	300	100

Source Field Data, 2024

Findings of the study shows varying levels of accessibility of VRS among the institutions. At UDS, 30 respondents (10%) rated VRS as highly accessible and 49 (16.3%) as moderately accessible, making it the most accessible overall. At CK-Tedam University, 17 (5.7%) found it highly accessible and 40 (13.3%) moderately accessible. At SDD-UBIDS, 21 (7%) said it was highly accessible and 43 (14.3%) moderately accessible. Overall, UDS recorded slightly higher

accessibility than the others, followed by SDD-UBIDS, then CK-Tedam University.

Table 4.10 Quality of VRS accessibility by institution

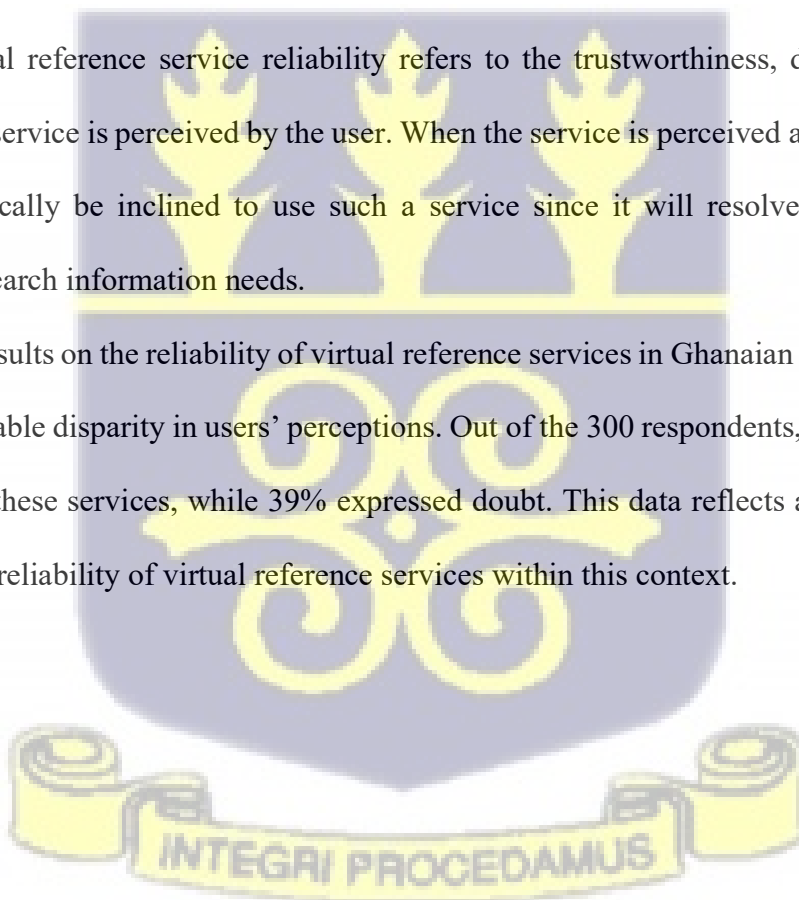
Institution	Highly Accessible	Moderately Accessible	Less Accessible	Not Accessible	Total (n)
UDS	30 (10.0%)	49 (16.3%)	20 (6.7%)	13 (4.3%)	112 (37.3%)
CK-Tedam University	17 (5.7%)	40 (13.3%)	18 (6.0%)	12 (4.0%)	87 (29.0%)
SDD-UBIDS	21 (7.0%)	43 (14.3%)	20 (6.7%)	17 (5.7%)	101 (33.7%)
Total	68 (22.7%)	132 (44.0%)	58 (19.3%)	42 (14.0%)	300 (100%)

Source Field Data, 2024

4.8 QUALITY OF VRS RELIABILITY IN SELECTED ACADEMIC LIBRARIES IN GHANA

Library virtual reference service reliability refers to the trustworthiness, dependability, and accuracy the service is perceived by the user. When the service is perceived as reliable, the user will automatically be inclined to use such a service since it will resolve or enhance their academic research information needs.

The survey results on the reliability of virtual reference services in Ghanaian academic libraries indicate a notable disparity in users' perceptions. Out of the 300 respondents, 61% affirmed the reliability of these services, while 39% expressed doubt. This data reflects a majority view in favour of the reliability of virtual reference services within this context.



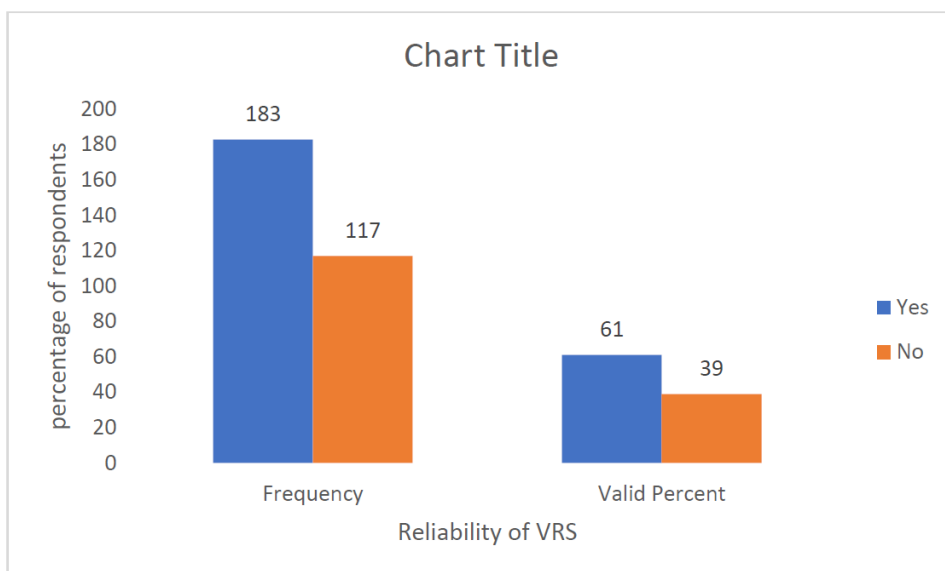


Figure 4.8. Quality of VRS reliability (Source Field Data, 2024)

The research results shows that the reliability of VRS varies across the institutions. UDS has demonstrated high levels of reliability as most students (9.7% very reliable, 15.7% reliable) viewed VRS as dependable. At CK-Tedam University, 7.7% found it very reliable and 12% reliable, showing moderate trust. At SDD-UBIDS, 6.7% rated it very reliable and 14% reliable, which is close to UDS. This means that while reliability is generally good, UDS leads slightly, with CK-Tedam and SDD-UBIDS showing fairly consistent but lower ratings.

Table. 4.11 Quality of VRS reliability by institution

Institution	Very Reliable	Reliable	Somewhat Reliable	Unreliable	Total (n)
UDS	29 (9.7%)	47 (15.7%)	22 (7.3%)	14 (4.7%)	112 (37.3%)
CK-Tedam University	23 (7.7%)	36 (12.0%)	17 (5.7%)	11 (3.7%)	87 (29.0%)
SDD-UBIDS	20 (6.7%)	42 (14.0%)	23 (7.7%)	16 (5.3%)	101 (33.7%)
Total	72 (24.0%)	125 (41.7%)	62 (20.7%)	41 (13.7%)	300 (100%)

4.9 QUALITY OF VRS RESPONSIVENESS IN SELECTED ACADEMIC LIBRARIES

The responsiveness of VRS is the ability of the system to address online academic library user queries or requests promptly, effectively, and efficiently through the virtual platforms such as emails, live chat, phone services.

The survey results on the responsiveness of library system demonstrated varying levels of responsiveness among respondents. Specifically, 6% of participants rated the system as "Very responsive," while 29.3% found them "Responsive." A significant portion, 42%, described the staff as "Moderately responsive." On the other hand, 19.7% of respondents deemed the staff "Unresponsive," and 3% rated them as "Very unresponsive." This distribution highlights a range of perceptions regarding the timeliness of virtual reference services provided by library staff.

Table 4.12. Quality of VRS responsiveness in selected academic libraries in Ghana

	Frequency	Valid Percent
Very responsive	18	6.0
Responsive	88	29.3
Moderately responsive	126	42
Unresponsive	59	19.7
Very unresponsive	9	3.0

Total	300	100
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Source Field Data, 2024

The results show that VRS responsiveness differs among the institutions. At UDS, 32 students (10.7%) found the service very responsive and 48 (16%) responsive, making it the highest overall. At CK-Tedam University, 25 (8.3%) rated it very responsive and 37 (12.3%) responsive. At SDD-UBIDS, 22 (7.3%) said it was very responsive and 41 (13.7%) responsive. Overall, most students (42%) across all institutions found VRS responsive. This shows that responsiveness is generally good, with UDS performing best, followed by SDD-UBIDS and CK-Tedam University.

Table 4.13 Quality of VRS Responsiveness by institutions

Institution	Very Responsive	Responsive	Somewhat Responsive	Not Responsive	Total (n)
UDS	32 (10.7%)	48 (16.0%)	20 (6.7%)	12 (4.0%)	112 (37.3%)
CK-Tedam University	25 (8.3%)	37 (12.3%)	15 (5.0%)	10 (3.3%)	87 (29.0%)
SDD-UBIDS	22 (7.3%)	41 (13.7%)	23 (7.7%)	15 (5.0%)	101 (33.7%)
Total	79 (26.3%)	126 (42.0%)	58 (19.3%)	37 (12.3%)	300 (100%)

4.10 QUALITY OF STAFF COMPETENCE IN PROVIDING VRS IN SELECTED ACADEMIC LIBRARIES

The competence and skills VRS staff in delivery online services as far as information of users

is concern cannot be underestimate. Inability to provide trusted and accurate services can defeat the purpose that promise effectiveness. The data on the knowledge and expertise of staff members providing virtual reference services reveals the following distribution: 9.7% of respondents rated the staff as having excellent knowledge and expertise, while 55.7% considered it good. 24.7% rated it as fair, 1.7% remained neutral, 5.7% found it poor, and 2.7% viewed it as very poor.

Table:4.14 Quality of staff competence in providing VRS

Knowledge and expertise of staff	Frequency	Valid Percent
Excellent	29	9.7
Good	167	55.7
Fair	74	24.7
Poor	22	7.4
Very poor	8	2.7
Total	300	100

Source Field Data, 2024

The study findings show that staff competence in providing VRS varies among the institutions. At UDS, 28 respondents (9.3%) rated staff as highly competent and 47 (15.7%) as competent, making it the highest overall. At CK-Tedam University, 21 (7%) found staff highly competent and 36 (12%) competent. At SDD-UBIDS, 19 (6.3%) rated staff highly competent and 41 (13.7%) competent. Overall, most students (41.3%) across all institutions said staff were competent. This indicates that VRS staff competence is generally good, with UDS leading slightly, followed by SDD-UBIDS and CK-Tedam University.

Table 4. 15 Quality of staff competence in providing VRS by institutions

Institution	Highly Competent	Competent	Somewhat Competent	Not Competent	Total (n)
UDS	28 (9.3%)	47 (15.7%)	23 (7.7%)	14 (4.7%)	112 (37.3%)
CK-Tedam University	21 (7.0%)	36 (12.0%)	20 (6.7%)	10 (3.3%)	87 (29.0%)
SDD-UBIDS	19 (6.3%)	41 (13.7%)	25 (8.3%)	16 (5.3%)	101 (33.7%)
Total	68 (22.7%)	124 (41.3%)	68 (22.7%)	40 (13.3%)	300 (100%)

Source Field Data, 2024

4.11 CHALLENGES IN PROVIDING QUALITY VRS IN SELECTED ACADEMIC LIBRARIES IN GHANA.

The survey shows that virtual reference services (VRS) face several technological barriers, including internet failure (27.7%, 83 participants), slow speeds (13.3%, 40 participants). Awareness and education deficits affect 13.3% (40 participants) who lack training, and 19.7% (59 participants) who are unaware of the services. Service delays impact 11.6% (35 participants), and who find it difficult to access VRS, with 14.3% (43 participants) deeming it generally inaccessible.

Table 4.16: Challenges in providing quality VRS

Challenges	Frequency	Valid percent
Internet failure	83	27.7
Slow speed	40	13.3
Lack training	40	13.3
Unawareness	59	19.7
Service delay	35	11.6
General inaccessibility	43	14.3
Total	300	100

Source Field Data, 2024

The results reveal that the major challenges affecting Virtual Reference Services (VRS) in the selected academic libraries include limited funding and maintenance inadequate ICT facilities and poor internet connectivity. These indicate that financial and infrastructural constraints remain key barriers to effective VRS delivery. At the institutional level, SDD-UBIDS faced the highest challenge in funding and maintenance (14.7%), while CK-Tedam University recorded the greatest concern with inadequate ICT facilities (11.0%). UDS also struggled with both funding and internet connectivity. Low awareness or promotion of VRS (14.7%) and limited

staff training (9.3%) were also noted, particularly at CK-Tedam University and UDS, respectively.

Overall, the findings suggest that although staff training and awareness efforts exist, challenges such as poor internet, insufficient ICT infrastructure, and inadequate funding continue to limit the effective implementation and utilization of VRS in these academic institutions.

Table 4.17: Challenges in providing quality Virtual Reference Services by institutions

Institution	Poor Internet Connectivity and Bandwidth	Inadequate ICT Facilities	Limited Staff Training / Technical Support	Low Awareness / Promotion of VRS	Limited Funding and Maintenance	Total (n)
SDD-UBIDS	28 (9.3%)	22 (7.3%)	11 (3.7%)	7 (2.3%)	44 (14.7%)	112 (37.3%)
CK-Tedam University	19 (6.3%)	33 (11.0%)	8 (2.7%)	27 (9.0%)	0 (0.0%)	87 (29.0%)
UDS	24 (8.0%)	20 (6.7%)	9 (3.0%)	10 (3.3%)	38 (12.7%)	101 (33.7%)
Total	71 (23.7%)	75 (25.0%)	28 (9.3%)	44 (14.7%)	82 (27.3%)	300 (100%)

4.10.1 FREQUENCY OF CHALLENGES AFFECTING QUALITY VRS IN SELECTED GHANAIAN ACADEMIC LIBRARIES.

The data on challenges affecting virtual reference services reveals varying frequencies of these issues. Specifically, 6.3% of respondents indicated that challenges occur frequently, while 19.0% reported frequent occurrences. A significant 29.0% experienced challenges occasionally. In contrast, 24.7% noted that these issues rarely arise, and 21.0% indicated that they do not encounter such challenges.

Table: 4.18 Frequency of challenges in providing quality VRS in selected academic libraries in Ghana.

	Frequency	Valid Percent
Very frequently	19	6.3
Frequently	57	19.0
Occasionally	87	29.0
Rarely	74	24.7
Not at all	63	21.0
Total	300	100

Source Field Data, 2024

4.10.2 MEASURES TO IMPROVE THE QUALITY OF VRS IN SELECTED ACADEMIC LIBRARIES

The results show that the effectiveness of virtual reference services can be enhanced by improving the following:

Staff Training:

The results indicate that 7.7% of responses highlight the need for ongoing training and professional development for library staff.

Accessibility:

Improving service accessibility is crucial, with 3.0% suggesting extended hours or 24/7 support. Additionally, 1.7% emphasize the need for better internet connectivity to ensure consistent

access.

Awareness creation

According to 5.7% of feedback, increasing awareness among students is necessary.

Technological Support:

Finally, 3.7% of responses stress the importance of a user-friendly interface and robust internet support, with 1.7% advocating for upgrades to library technology and automation to enhance service efficiency.



PART B OF CHAPTER FOUR

4.1 INTRODUCTION

This section presents the research results of PART B of chapter four (4) are mainly the qualitative data gathered through interviews library staff and observations made by the researcher on VRS system from various universities. The study did not include research objectives which were mainly for quantitative survey. The data results were presented as received from participants of the university Library. The qualitative research was coded for confidentiality and anonymity purposes and the data was analysed using thematic content analysis.

4.2 QUALITY OF VRS ACCESSIBILITY BY LIBRARIANS IN SELECTED ACADEMIC LIBRARIES

A question was asked how academic library staff ensure that virtual reference services are accessible to graduate students within the university community

Interviewee 2

Regular update of virtual reference service platforms and windows updates as well as Redundant connections.

The observation made from this objective was the fact that, the system is accessible but encountered internet challenges which compromise the service quality.

Interviewee 7

More so regular staff training through workshops to equip them to ensure VRS

access 24/7

A question was asked of how library collaborate with faculty or other departments to ensure graduate students have full access of virtual reference services.

Interviewee 6

The library writes to faculties and departments and organise workshops about VRS

Interviewee 5

The library also organizes workshops, seminars, to graduates student upon the request of faculties or departments

Interviewee 4

Invitation is extended to faculty and departments for both staff and students to attend seminars and orientations of any online information resource services.

A question was asked for the library staff to describe the process a graduate student would follow to seek assistance for virtual reference service utilization.

Interview 3

First, the visit the university homepage, locate the library and called through the number on the library website for assistance

Interview 8

Graduate student uses the email locate on the library homepage to send their request for assistance

Interview 9

Graduate students use live chat which is boldly written on the library page for online assistance.

A question was asked about how staff collect feedback from graduate students concerning service utilization

Interviewee 5

Graduate students sent feedback through email

Interview 9

Students also walk into the library to give

feedback about a service Interview 3:

Some graduate students, as well, were called to give their experience about the services

A question was asked whether there have been any notable improvements made to the virtual reference services based on feedback from graduate students about services utilization

Interviewee 2

Yes, graduate students, after taking them through on how to search databases from a request, a good number were impressed to be able to explored the databases to solved their information needs without paying from their own money.

Interviewee 9

Feedback from graduate students has improve the internet connectivity

than before. Also, most time the library collect feedback beyond immediate resolution and table before management for future plans to be address, this has encouraged virtual reference services usage in academic library.

4.3 QUALITY OF RELIABILITY OF VIRTUAL REFERENCE

SERVICES IN SELECTED ACADEMIC LIBRARIES

A question was asked about how academic library staff ensure that virtual reference services can be relied upon by graduate students within the university community.

Interviewee 2

A reference interview is conducted to ensure that graduate students get a reliable VRS from the reference staff. The particular information students seek; the virtual reference system allows online instant alerts to be received by the virtual reference service staff on their phones when a user comes online to seek assistance.

Interviewee 7:

Regular staff training to equip staff for easy access to 24/7 service

Interviewee 4:

Regular update of the systems to ensure reliability

Interviewee 3:

Ensuring internet connectivity

Observation: Very worried observation that affect reliability was when a user go online to chat with the VRS staff, after putting your query, you get feedback which

says our online staff are currently not available. The researcher tried this some instances for more two different days. Whiles in other instances you get quick responses.

4.4 QUALITY OF VRS RESPONSIVENESS IN SELECTED ACADEMIC LIBRARIES

A question was asked about how academic library staff ensure that virtual reference services are responsive to graduate students' information needs within the university community

Interviewee 8:

Dedicated staff are set aside to ensure graduate students' requests are answered at all times through instant alert received by the virtual reference service staff on their phones when a user comes online to seek assistance and this help user received timely virtual reference services.

Interviewee 7:

More so, regular staff training through workshops to equip them to ensure VRS access 24/7

Observation: Responsiveness is good but need to be improve as sometimes users don't get real time information which affects this academic works.

4.5 QUALITY OF STAFF COMPETENCE AND SKILLS TRAINING FOR DELIVERY VRS IN SELECTED ACADEMIC LIBRARIES

A question was asked of respondents in the interview session to rate skills training programs for staff.

Interviewee 1:

Good,

Interviewee 2:

fair, good,

Interviewee 4:

better, training is good

A question was asked to describe some of the training programs staff received to equip them to deliver virtual reference service

Interviewee 2

In-house training on how to answer user queries, YouTube videos to guide staff to assist users, on how to provide virtual reference services, webinars, how to provide VRS with email, chat, webform, and through calls,

The researcher asked whether there is any additional training needed to improve staff competence.

Interviewer 3

Yes, more and more training, ICT skills, training on marketing, customer services

4.6 QUALITY OF MANAGEMENT SUPPORT OF ACADEMIC LIBRARIES VRS IN SELECTED ACADEMIC LIBRARIES IN GHANA.

A question was asked about the specific action's library management takes to support virtual reference services

Interviewee 1:

library automation, e-resource, *and* off-campus access to VRS services

Interviewee 2:

Staff training on how to deliver VRS

Interviewee 3:

on e-resources delivery, webinars, eBooks, mediated search, and journal subscriptions. Management ensures regular internet connectivity.

A question was asked whether their yearly allocation of a specific budget for VRS

Interviewee 2:

No, as and when we have a need, library management propose and the university management attend to that need for efficient VRS delivery.

Interviewee 3

There is no specific resource allocation set aside for VRS however, whatever is needed to enhance the service we request and management makes it available for seamless VRS delivery

4.7 QUALITY OF ICT INFRASTRUCTURE SUPPORT FOR VRS IN SELECTED ACADEMIC LIBRARIES

The library staff were asked to rate internet connectivity for VRS delivery in the academic library.

Interviewee 4:

Fair

Interviewee 1:

so far good

Interviewee 5:

good but not better, is okay

A question was asked whether the academic library's access to ICT resources was adequate, such as software, hardware, and internet bandwidth.

Interviewee 2:

We have computers, and software's are available but not adequate, some are very old.

Interviewee 3:

Few computers, insufficient internet bandwidth.

Observation. Old computers, internet failures, limited computers, especially some of the study institutions

The question was asked whether measures are put in place to ensure stable internet service

Interviewee 4:

Regular maintenance

Interviewee 6:

Redundant connections

Interviewee 8:

Collaboration with ICT directorate

A question was asked of any plan upgrades for internet improvement for VRS

Interviewee 4:

Redundant connections

Interviewee 6:

Increasing bandwidth,

Interviewee 5

Acquiring additional cellular routers

Respondents were asked about the hardware used to deploy VRS in the academic library

Interviewee 2:

Computers, servers, peripherals

Interviewee 3:

Computers, servers, peripherals

Interviewee 6:

Computers, servers, peripherals, and mobile phones

A question was asked whether the current hardware is sufficient for VRS in academic library

Interviewee 1:

The current hardware is not sufficient

Interviewee 2:

No newer and more computers are needed.

Respondents were asked about the software platform used in delivery VRS in an academic library.

Interviewee 2:

Email, chat, video conferencing, webforms, phone, WhatsApp

Interviewee 3:

chat, webforms, Email; phone, WhatsApp

Interview 4:

chat, webforms, Email, phone

observation. The academic VRS need updated software for effective services delivery

Library participants were asked how often the software is being updated or reviewed to ensure VRS meets the needs of users.

Interviewer 3:

Regularly, we carry out to be able to serve our people

Interview 4:

Mostly, we do update monthly,

Interview 5:

The library carries out system updates very often

A question was whether any specific resource needs are currently unmet

Interviewee 1:

There is a need for new technological software

Interviewee 3:

Also, more computers, dedicated internet service, a library webpage for only VRS

Interviewee 4:

Regular training of staff on how to carry out VRS and employing staff with ICT background.

4.8 CHALLENGES IN PROVIDING QUALITY VRS IN SELECTED ACADEMIC LIBRARIES

A question was asked on some of the primary challenges encountered when delivering virtual reference services to graduate students in your academic library

Interview 1:

Poor internet services, inadequate computers,

Interview 6:

Outdated hardware and software issues,

Observations. Internet unreliability, limited computers, inadequate ICT infrastructure

Interview 7

Inadequate training and the impatience of users to follow through to meet their information needs. Cost of training, cost of data, and inadequate awareness creation

Interview 2:

Software and hardware incompatibility issues, outdated software,

Question on whether there is any challenge with the internet connectivity for VRS

Interviewer 2:

Occasional downtimes due to external factors such as ISP,

Interviewee 3:

The university's internet is so unstable, affecting service delivery

Interviewee 7:

The library website and the VRS homepage can be down, which slows service delivery.



CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 INTRODUCTION

The study sought to assess the effectiveness of virtual reference services in selected academic libraries in Ghana. It is situated within the SERVQUAL framework model developed by Parasuraman, A., Zeithaml, V.A. and Berry, L.L. in 1988 that assess library service quality (Souca, M. L. 2011), as the topic seek to access VRS effectiveness in academic libraries in Ghana.

This section of the research study brings to bear the discussions of the study findings received from the research data gathered. It covers both quantitative and qualitative data collected and presented in chapter four (4). The aid questionnaires were used to gather quantitative data from 300 participants (postgraduate students) from three university libraries, whereas interview guides were deployed for the qualitative data collection of 9 library staff. This includes 3 university librarians and 6 heads of sections (head of reference staff service, head of ICT support service) from the university library.

5.2 BACKGROUND INFORMATION OF RESPONDENTS

The study's gender disparity was obvious among graduate students, with males comprising 61.8% (191 out of 300 respondents) and females only 38.2% (118 respondents), which introduces explicit male dominance in the study's findings. This aligns with broader trends observed in STEM fields, where male enrolment is higher, while humanities and social sciences often show a more balanced or female-dominated distribution (Smith, 2020; Johnson & Lee, 2021). The study also highlights variations in institutional representation, with the University

for Development Studies (UDS) having the highest participation at 37.2% (115 respondents). This distribution aligns with previous research where institutions tend to have higher respondent participation due to broader student populations and greater resource availability (Doe, 2020), followed by C. K. Tadam University of Technology and Applied Sciences (CKT- UTAS) at 33.7% (104 respondents). In contrast, smaller universities, like S. D. Dombo, typically have a lower representation of 29.1%, similar to findings by Oakleaf (2010), who observed that specialized or smaller campuses contribute fewer respondents to library service surveys. The qualitative aspect of the study, however, ensured equal representation from each institution. The respondents included a university librarian, head of the library ICT section, and head of the reference services section from each university. Regarding age, the majority of respondents (57.7%) fell within the 31-40 years range, reflecting a strong presence of middle- aged adults. The study contrasts with a previous study that found younger demographics (21- 30 years) to be more engaged with digital library services. However, others, like Smith and Lee (2019), reported similar trends to the current study, with a dominant 31-40 years age group being the highest. These differences highlight how institutional context and target user bases influence age distributions in virtual reference service studies. Moreover, respondents' experience with virtual reference services ranged from 2 to 5 years, allowing a well-informed respondent pool. The programs of study have seen relative distribution with 33% PhD, 33% MPhil, and 34% MSc/MA students, ensuring balanced representation across different academic levels of the study institutions. Prior studies by Soltani and Nikou (2020), which were also noted by Shahzad, Khan, and Iqbal (2024), confirmed that even the distribution of research participants strengthens the study's reliability by capturing various perspectives on virtual reference service

needs and usage patterns.

5.3 CROSSTABULATION OF ACADEMIC AFFILIATION AND QUALITY OF AWARENESS CREATION OF VRS IN SELECTED ACADEMIC LIBRARIES.

The cross-tabulation of the awareness and academic affiliations enable the study to ascertain awareness disparity among the institutions of the study

The research revealed notable variations in awareness of Virtual Reference Services (VRS) among students from different academic libraries. At the University for Development Studies (UDS), 22% of students were aware of VRS, while 3.67% were somewhat aware. However, 3% remained neutral, and 8.67% were not aware. These figures suggest that while a majority of students recognize the existence of VRS, a significant portion remains neutral or uninformed, pointing to a gap in communication or outreach efforts.

In contrast, at C.K. Tedam University of Technology and Applied Sciences, 15% of students reported awareness, with 9.33% somewhat aware. Only 0.33% remained neutral, and 4.33% were unaware. The relatively high number of students who were somewhat aware, compared to those fully aware, suggests partial familiarity with the services, indicating a need for enhanced awareness campaigns to ensure comprehensive understanding.

Similarly, at S.D. Dombo University of Business and Integrated Development Studies, 15.33% of students reported awareness, 8.33% were somewhat aware, and 4% remained neutral. The proportion of students unaware of VRS stood at 6%. The awareness distribution here appears more balanced compared to the other institutions, with a lower proportion of students in the neutral and unaware categories.

A general trend across the institutions indicates that while most students exhibit some level of awareness of VRS, there remains a critical need for enhanced awareness campaigns. The results from UDS indicate that while a significant number of students are aware, a substantial proportion remain neutral or unaware, necessitating targeted outreach efforts. At C.K. Tedam, the highest percentage of students were somewhat aware, highlighting the need to bridge the gap between partial and complete awareness. Meanwhile, S.D. Dombo University exhibited a relatively even distribution of awareness levels, suggesting a more stable awareness pattern but still requiring efforts to strengthen VRS engagement.

The Chi-Square test ($X^2 = 43.827$, $P = 0.000$) confirms a statistically significant variation in awareness levels across the institutions. This finding aligns with studies conducted by Deng, Yang, and Zhang (2014), which revealed that university students often exhibit varying degrees of awareness regarding digital library services, primarily due to differences in institutional outreach and digital literacy levels. Similarly, a study by Serwaa, Dadzie, and Owusu-Ansah, (2022), universities found that inadequate promotion and user education significantly influenced students' awareness of virtual library services. These results underscore the importance of proactive engagement strategies, including targeted marketing, digital literacy workshops, and faculty-led initiatives to increase student engagement with VRS. A study by Chowdhury and Margariti (2021) highlighted that personalized assistance, promotional activities, and integration of VRS into the curriculum enhance student participation and utilization.

5.4 CROSSTABULATION OF GENDER AND AWARENESS OF VRS IN SELECTED ACADEMIC LIBRARIES

The crosstabulation of gender and awareness of academic virtual reference services reveals notable differences between male and female respondents. The results indicate that 50.9% of male respondents reported awareness, with an additional 36.4% being somewhat aware. In contrast, a slightly higher proportion of female respondents (53.3%) indicated awareness, but fewer (15%) were somewhat aware. Notably, 13.3% of females remained neutral, compared to only 1.7% of males. The proportion of respondents who were not aware of these services was relatively similar, with 16.8% of males and 15.8% of females falling into this category. The Chi-Square test ($X^2 = 36.813$, $p = 0.000$) confirms a statistically significant association between gender and awareness levels.

These findings align partially with previous studies examining gender-based differences in the adoption of virtual academic services. For instance, research by Nwezeh (2010) on digital literacy among university students found that male students were more likely to report partial familiarity with digital services, similar to the higher percentage of "somewhat aware" responses among males in this study. Conversely, a study by Agyekum and Filson (2012) indicated that female students often exhibit higher levels of uncertainty or neutrality regarding new technological interventions in academic settings, a trend reflected in the higher proportion of neutral responses among female respondents in the present study.

Furthermore, the overall balance in awareness levels between genders contrasts with findings from Baro and Keboh (2012), cited in Popoola and Olajide (2022), who reported a more pronounced gender gap in awareness and usage of digital library services in African universities, with males significantly outpacing females in both awareness and adoption. However, the relatively high female awareness levels in this study may indicate increasing

digital engagement among female students in Ghanaian academic institutions, possibly due to evolving educational policies and digital literacy initiatives (Çeliker, 2020).

5.5 CROSSTABULATION OF AGE AND AWARENESS OF VRS IN SELECTED ACADEMIC LIBRARIES

The crosstabulation results indicate a clear age-related disparity in awareness of virtual reference services (VRS) in academic libraries, with younger respondents (21–40 years) exhibiting higher awareness levels compared to older individuals (41 and above). The highest awareness was found among the 31–40 age group, while the lowest was among respondents aged 51–60. Despite these variations, the Chi-Square test results ($X^2 = 11.063$, $p = 0.524$) suggest no statistically significant association between age and awareness of VRS.

These findings align with studies by Oteng, Manful, and Nkansah (2024), which also found that younger library users are more digitally inclined and, therefore, more familiar with VRS. Similarly, Olanrewaju and Afolabi (2022) observed that digital literacy significantly influences VRS awareness, particularly among university students. However, contrasting research by Ngiam et al. (2022) found that age did not significantly impact VRS awareness, possibly due to the widespread digital literacy programs targeting older users.

5.6 CROSSTABULATION OF PROGRAM AND AWARENESS OF VRS IN SELECTED ACADEMIC LIBRARIES

The findings indicate significant disparities in awareness of academic virtual reference services across graduate programs, with PhD students demonstrating the highest familiarity (75%

aware), followed by MPhil students (55%), and master's students (37%). The Chi-Square test ($X^2 = 71.557$, $p = 0.000$) confirms a statistically significant association between degree level and awareness.

Withorn, T., Eslami, J., Lee, H., Clarke, M., Caffrey, C., Springfield, C., ... & Haas, A. (2021). Library instruction and information literacy 2020. *Reference Services Review*, 49(3/4), 329-418.

These results align with studies suggesting that doctoral students, due to their extensive research needs, tend to be more engaged with library services (Sevryugina, Smith, & Mordoch, 2024). Conversely, lower awareness among master's students is consistent with findings by Withorn et al. (2021) and Bentil et al. (2021), who reported that early-stage researchers often underutilize virtual reference services. However, the relatively high proportion of "somewhat aware" responses among MPhil and master's students suggests a potential for increased engagement through targeted awareness campaigns.

5.7 AWARENESS AND USAGE OF VIRTUAL REFERENCE SERVICES IN SELECTED ACADEMIC LIBRARIES IN GHANA

This section discusses awareness and use of virtual reference services in selected academic libraries in Ghana. The study was broken into two categories for easy discussion of the findings of this objective. These include awareness and utilization of the virtual reference services.

5.8 QUALITY OF VRS AWARENESS CREATION IN SELECTED ACADEMIC LIBRARIES IN GHANA

Awareness of virtual reference services (VRS) refers to the extent to which users in academic libraries are informed about the existence, functions, and benefits of such services. According

to the SERVQUAL model, the tangibles component addresses the awareness of VRS objective as it emphasizes creating user awareness through visible communication channels such as signage, promotional materials, and technology-supported platforms. These tangible aspects ensure that users recognize available library services and understand how to access them effectively. As noted by Qobose and Mologanyi (2015, cited in Owusu-Ansah et al., 2021), awareness of virtual reference services may be achieved through several means, including orientations, workshops, signage, literacy education, peer communication, and posters. This aligns with Serwaa, Dadzie, and Owusu-Ansah (2022), who stress that active marketing is crucial to academic libraries as it enhances user awareness and participation in library services.

5.8.1.1 QUALITY OF AWARENESS CREATION OF VIRTUAL REFERENCES SERVICES BY INSTITUTIONAL

The findings of this study reveal varying levels of VRS awareness among postgraduate students in the three participating institutions. At the University for Development Studies (UDS), 66 respondents (22%) reported being aware of VRS, representing the highest awareness level among the universities surveyed. This was followed by Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS), where 46 respondents (15.3%) indicated awareness. The CK-Tedam University of Technology and Applied Sciences (CKT-UTAS) recorded slightly lower awareness, with 45 respondents (15%) reporting awareness and 28 respondents (9.3%) indicating they were only “somewhat aware” of VRS, reflecting partial or superficial understanding.

These results suggest that UDS has achieved relatively higher visibility and communication of VRS, likely due to more consistent library orientation programs and digital engagement. In

contrast, CKT-UTAS and SDD-UBIDS exhibit moderate awareness, reflecting potential gaps in marketing and user sensitization efforts. Overall, the data indicate that awareness of VRS is generally good but uneven across institutions—a trend consistent with Qobose and Mologanyi's (2015) observation that awareness levels vary widely depending on institutional emphasis on promotion and user education.

The overall findings indicate that a majority (44.0%) of postgraduate students across the institutions demonstrated a high level of awareness, showing that many users possess substantial knowledge about VRS. This aligns with prior studies which found that awareness of virtual library services is generally high among academic users, particularly when consistent outreach strategies are implemented (Qobose & Mologanyi, 2015; Owusu-Ansah et al., 2021). However, 26.2% of respondents exhibited only partial or superficial awareness of VRS users who recognize the existence of the service but do not actively utilize it. This finding echoes Ocran and Afful-Arthur (2022), who reported that many students identify VRS as an available service but rarely engage with it due to limited comprehension or perceived lack of importance. Such “surface awareness”, as identified in both this and prior studies, indicates that awareness does not always translate into meaningful use.

Furthermore, 6.3% of respondents expressed neutral awareness, suggesting either disinterest or low perceived relevance of VRS to their academic needs. Kotoroi and Magaya (2024) found similar results, noting that academic library services are often underused when students perceive them as non-essential to their studies. A notable finding is that 16% of participants demonstrated a complete lack of awareness regarding VRS. This corroborates the observations

of Mawhinney (2020), who reported that insufficient promotion and user education significantly reduce the effectiveness of virtual services. Likewise, Bentil et al. (2021) identified lack of awareness as a major barrier to the successful implementation and usage of electronic resources in Ghanaian academic libraries.

In conclusion the findings demonstrate that while a substantial proportion of postgraduate students are aware of VRS, institutional differences remain pronounced. UDS leads in awareness, suggesting a stronger outreach structure, whereas CKT-UTAS and SDD-UBIDS display moderate awareness, revealing areas that require strategic communication improvement. The evidence also highlights the existence of a smaller but critical group of users with limited or no awareness, which could hinder full utilization of VRS resources.

Consistent with Serwaa et al. (2022), the study emphasizes that sustained marketing and user education are indispensable for improving VRS awareness. Academic libraries must continue to employ diverse promotional strategies such as digital campaigns, signage, orientations, and peer advocacy—to ensure that all postgraduate users not only recognize VRS but also understand how to utilize it effectively. In conclusion, while awareness levels are promising overall, there remains a pressing need for continuous outreach and structured training programs to bridge awareness gaps across Ghanaian academic institutions.

5.8.1.2 PARTICIPATION OF QUALITY OF VRS AWARENESS CREATION BY GRADUATE STUDENTS IN SELECTED LIBRARIES IN GHANA

Awareness of VRS in academic libraries is crucial for enhancing user engagement and optimizing resource utilization. Analysing the data on postgraduate students' participation in awareness creation by the academic libraries. The data collected from 300 respondents shows

that libraries employ various strategies to promote VRS awareness. The study highlighted that Orientation programs are the dominant platform of awareness creation of the services in the library, with a representation of 124 responses (41.33%). A previous study by Beile (2020) highlights that orientation sessions are often the most effective method in academic libraries due to their direct interaction with new students. Similarly, literacy education courses 79 (26.33%) and workshops 72 (24%) were found to be other platforms for awareness of VRS among respondents of this study. This finding is in line with that of Withorn et al. (2021), who found that workshops and literacy courses offer deeper engagement and practical experience, supporting that continuous training reinforces digital literacy and service familiarity.

A smaller percentage, 25 (8.33%), indicated a combination of orientations and literacy education. However, the relatively low percentage of mixed-method approaches suggests that libraries might underutilize integrated strategies that combine formal programs with peer-to-peer influence. This contrasts with a study by Qobose and Mologanyi (2015) cited in Owusu-Ansah et al. (2021), who found that hybrid approaches, including library exhibitions, significant campus events like Information Literacy Week, and presentations at faculty and departmental meetings, have raised awareness and use of VRS.

5.8.1.3 FACTORS THAT ENHANCE QUALITY VRS AWARENESS CREATION AMONG GRADUATE STUDENTS IN SELECTED ACADEMIC LIBRARIES IN GHANA

Data analyzed research findings indicated that various approaches can effectively promote virtual reference services awareness in academic libraries. These include workshops, enhancing internet connectivity, increasing visibility on digital platforms, integrating into the

curriculum, and engaging in targeted communication with faculty collaboration.

Workshop integration and implementation: Workshops are emphasized as a primary approach for raising awareness of virtual reference services, accounting for 4.0% of survey responses. This approach promotes experiential learning, actively allowing students to participate and comprehend these services' advantages. To optimize their influence, libraries should provide diverse workshops throughout the academic year, customized to cater to varying levels of familiarity and specific research requirements (Canuel et al, 2019). Research by Zheng et al. (2024) suggests that experiential learning can greatly improve student involvement with library services.

Improve Internet Connectivity: Another crucial recommendation, backed by 3.7% of the survey participants, is to improve internet connectivity. Dependable and fast internet is essential for the efficient utilization of virtual reference services. Disruptions or sluggish connections can hinder access and utilization (Martzoukou, 2021). It is essential to work together with university IT departments to strengthen the internet infrastructure in the library. Prior research has also highlighted that inadequate internet connectivity can discourage students from making use of online library resources (Coetzer & Mapulanga, 2021).

Increasing Visibility on Digital Platforms: A total of 3.7% of the responses indicated that to enhance the prominence of library virtual reference services on digital platforms, university websites, student portals, and social media must be used to publish updates regularly. This finding has been confirmed by Akeriwa et al. (2015), who reported that social media has become a crucial tool for sharing information. Enhancing visibility on popular platforms can greatly increase awareness and utilization, as Qobose and Mologanyi (2015) observed, cited in

Owusu-Ansah et al. (2021).

Curriculum integration: Incorporating virtual reference services into the academic curriculum is a strategy that is currently supported by 3.7% of people. Incorporating details about these services into course syllabi and academic materials guarantees that students are well-informed and motivated to utilize them. Engaging in collaboration with faculty members to incorporate these resources into research assignments enhances their integration into the academic experience. Studies provide evidence that integrating the curriculum can significantly enhance student involvement with library services (Sengupta, Blessinger, & Cox 2020).

Targeted Communication and Faculty Collaboration: Utilizing targeted email campaigns and faculty collaboration, with a response rate of 3.0%, effectively ensures that students are well-informed about virtual reference services. Regular and informative emails, along with faculty endorsement during lectures, can enhance the importance of these services (Milteneff, 2024). Studies suggest that targeted communication and active engagement of faculty members are essential for increasing awareness and utilization of services (Wang & Si, 2024).

This research findings were explicit with other studies; it becomes evident that effectively promoting virtual reference services necessitates an all-encompassing and varied approach. According to Sengupta, Blessinger, and Cox (2020), workshops and curriculum integration are important for effectively engaging students, as they support experiential learning and embedding the curriculum. The recommendations proposed by Martzoukou (2021) and Owusu-Ansah et al. (2021) highlight the importance of improving internet connectivity and increasing visibility on digital platforms. They emphasize the importance of having reliable infrastructure and a prominent online presence. Adams (2022) asserts that focused

communication and cooperation among faculty are essential in raising awareness and utilization of library services.

5.9 QUALITY OF VRS UTILIZATION IN SELECTED ACADEMIC LIBRARIES IN GHANA

Virtual Reference Service (VRS) utilization in academic libraries refers to the extent to which users engage with online or digital platforms to seek information, conduct research, and communicate with librarians. According to the SERVQUAL model, components such as assurance, reliability, empathy, and responsiveness directly address the service utilization objective. When virtual services are dependable, responsive, and user-oriented, they tend to experience higher usage rates.

The findings of this study indicate that 53.7% of participants actively utilize virtual reference services, while 46.3% do not. This distribution reflects a moderate level of engagement, with a slight majority benefiting from the convenience and accessibility of online library support. However, the narrow gap between users and non-users highlights a need for further improvement in promoting and supporting virtual engagement. The 53.7% utilization rate suggests that most postgraduate students are familiar with and benefit from VRS, but the relatively high proportion of non-users indicates that nearly half of the academic community either lacks digital literacy, prefers traditional face-to-face interaction, or encounters infrastructural barriers.

This trend aligns with findings by Mubarik and Naghavi (2021), who noted that although digital library services have become increasingly common, many users remain unfamiliar with or hesitant to adopt virtual reference systems. Conversely, Serwaa and Dadzie (2022) observed

higher levels of VRS engagement in Ghanaian academic libraries, attributing this success to consistent digital infrastructure investment and proactive marketing. Similarly, Wang and Si (2024) emphasized that robust ICT frameworks and ongoing service promotion significantly increase user participation and satisfaction.

5.9.1.1 SERVICE QUALITY OF VRS UTILIZATION BY INSTITUTIONS

The study results also revealed notable differences in VRS usage among the three universities. The University for Development Studies (UDS) recorded the highest utilization, with 63 respondents (21%) actively using VRS. CK-Tedam University of Technology and Applied Sciences (CKT-UTAS) and Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS) both reported 49 respondents (16.3%) using VRS, representing moderate engagement levels. However, 52 respondents (17.3%) across all institutions indicated that they do not use VRS.

This institutional breakdown demonstrates that UDS leads in VRS usage, likely benefiting from improved ICT facilities, stronger promotion of online library services, and perhaps a more digital-savvy postgraduate population. In contrast, SDD-UBIDS and CKT-UTAS exhibit relatively lower usage levels, which may reflect inadequate awareness, infrastructural challenges, or users' preference for traditional assistance methods.

5.9.1.2 FACTORS INFLUENCING NON-UTILIZATION OF VIRTUAL REFERENCE SERVICES

The non-utilization rate of 46.3% can be attributed to several factors, including limited awareness, inadequate digital literacy, poor internet connectivity, or preference for in-person interactions. These observations are consistent with Serwaa and Dadzie (2022), who found that

user attitudes, technological challenges, and limited digital competence substantially hindered VRS adoption in Ghanaian academic libraries. Similarly, Dadzie and Walt (2015) highlighted that effective VRS use depends on skilled library staff, digital readiness, and the quality of communication between librarians and users.

The role of infrastructure cannot be overstated. As Abubakar (2023) and de Leon, Flores, and Alomo (2024) argue, reliable internet connectivity and timely response to user queries are crucial for sustaining VRS engagement. Poor bandwidth or slow response times discourage users from returning to online platforms, reinforcing the need for service responsiveness and technical stability.

Moreover, Mousaion (2024) notes that weak ICT infrastructure in many African universities—including intermittent connectivity and limited technical support—continues to undermine virtual reference use. These infrastructural and technological challenges explain why almost half of the respondents in this study have not yet adopted VRS as their primary means of library interaction.

In a comparative summary, the moderate utilization rate observed in this study mirrors similar findings in developing academic contexts, where digital transformation is still evolving. While Serwaa and Dadzie (2022) reported relatively higher engagement in institutions with well-established ICT systems, this study's results reveal an uneven landscape across Ghanaian universities. UDS's superior usage figures indicate stronger institutional emphasis on ICT-driven services, while SDD-UBIDS and CKT-UTAS appear to lag, likely due to limited exposure, fewer technical resources, or lower user confidence in virtual platforms.

The study findings demonstrate that VRS utilization among Ghanaian postgraduate students is

promising but uneven. While more than half of the respondents actively use virtual reference platforms, a substantial minority remain disengaged due to infrastructural limitations, insufficient awareness, or skill deficits. UDS stands out as the most active institution, followed by SDD-UBIDS and CKT-UTAS, confirming that institutional investment in ICT and user training significantly influences utilization. This study reveals that 53.7% of participants utilize these services, while 46.3% do not. The distribution suggests a moderate level of engagement with VRS, with a slight majority benefiting from its convenience and accessibility. However, the narrow margin highlights the necessity for improvements, as nearly half of the participants either lack expertise or prefer traditional methods. The utilization rate of 53.7% indicates that most patrons are currently using VRS, but there is still significant room for growth. This finding aligns with research conducted by Mubarik and Naghavi (2021), which found that despite the widespread use of digital resources, a considerable number of users remain unfamiliar with virtual reference services. Conversely, a study conducted by Serwaa and Dadzie (2022) discovered elevated levels of engagement. This means that virtual reference services are gradually winning the hearts of academic library users. The presence of a robust digital infrastructure and the active promotion of virtual services were credited for this phenomenon (Wang & Si, 2024).

5.9.1.3 FREQUENCY OF VRS USAGE IN SELECTED ACADEMIC LIBRARIES IN GHANA

The study's findings indicate a diverse pattern of usage of Virtual Reference Services (VRS) among the respondents, with only 10.7% of the 300 participants reporting daily use. The minimal daily involvement indicates that VRS has not yet become a regular component of

academic activities for the majority of users, possibly due to factors such as insufficient knowledge, limited availability of required technology, or a preference for conventional, face-to-face services. Other studies have also noted similar patterns, with the utilization of VRS remaining restricted despite the presence of these services (Serwaa, Dadzie, & Owusu-Ansah, 2022).

In addition, 6.3% of the participants reported using the service on monthly basis, usually when they have a heavy workload, such as during exam preparation. This sporadic involvement implies that VRS are considered valuable for particular, rather than regular, requirements. According to Amofah-Serwaa's (2018) studies, it is observed that the use of VRS increases significantly during periods of intense academic pressure, but remains generally low otherwise. Approximately 37.7% of the respondents reported using VRS on an occasional basis, indicating that these services are commonly utilized when conventional methods are inadequate. This is consistent with the results of other studies, which have shown that occasional use of VRS indicates a tendency to rely on them for more complicated or specialized inquiries (Ross, Nilsen, & Radford, 2019).

Finally, a total of 33.7% of participants indicated infrequent utilization of VRS. This could be due to insufficient advertising, problems with internet connectivity, or a preference for in-person communication. This aligns with the results of prior studies that indicate a requirement for enhanced marketing and infrastructure to promote greater adoption of VRS (Hamad, Farajat, & Hamarsha, 2018).

However, 11.67% of the study participants confirmed not using the services at all. This can be occasioned due to a lack of awareness, preference for traditional reference services, or

technological challenges that exclude them from using the service. Wu and Dong (2018) indicated that insufficient knowledge of virtual reference services hinders effective utilization.

5.9.1.4 FACTORS THAT INFLUENCE SERVICE QUALITY IN USING VRS IN SELECTED GHANAIAN ACADEMIC LIBRARIES

Within the study, convenience is identified as the predominant factor that influences the utilization of virtual reference services (VRS) in academic libraries. Specifically, 42.3% of participants indicated that convenience was the primary motive for adopting VRS. This emphasizes the importance of VRS (Virtual Reference Services) in granting students and faculty the adaptability to retrieve library resources at any given time and from any place, following the growing need for instant and on-demand access to information in today's academic setting. Similarly, 20.3% of respondents identified ease of use as a crucial factor, highlighting the attractiveness of VRS as a user-friendly tools that streamline the process of accessing academic resources.

The impact of distance barriers was also significant, as 26.7% of respondents expressed that VRS are especially beneficial for individuals who are geographically distant from the physical library or unable to visit due to other obligations. This highlights the distinctive benefit of VRS in overcoming geographical barriers, enabling library services to be easily accessed regardless of the user's location.

The findings are consistent with the literature that convenience and ease of use are important factors well considered by postgraduate students when it comes to virtual reference service in the academic library. For example, a study conducted by Xie, Joo, and Matusiak (2021), similarly discovered that convenience played a significant role in the adoption of VRS. Many

users expressed their satisfaction with the convenience of being able to access services beyond the regular operating hours of the library. Similarly, Almaiah (2022) highlighted the importance of user-friendliness, especially for students who are already overwhelmed with demanding academic responsibilities.

However, this study differs from others in that it places relatively less importance on recommendations from peers or faculty, which accounts for only 10.7%. Although peer influence is recognized, it seems to have less impact in comparison to other factors, unlike in the study conducted by Brophy (2007), where recommendations were identified as a significant motivator for VRS usage. This comparison implies that although word-of-mouth is still significant, the inherent characteristics of VRS, such as convenience and user-friendliness, have a stronger influence on the adoption of VRS in this specific situation.

5.10 RELATIONSHIP BETWEEN QUALITY OF AWARENESS AND USE OF VRS IN SELECTED ACADEMIC LIBRARIES

The findings indicate a strong relationship between awareness and using virtual reference services (VRS) in academic libraries. A majority (67.4%) of users were fully aware of the service, while only 20.9% of non-users had the same level of awareness. Similarly, 25.6% of non-users were completely unaware, compared to 2.3% of users. The Chi-Square test ($X^2 = 83.725$, $p = 0.000$) confirms a statistically significant association.

These results align with previous studies emphasizing awareness as a key determinant of VRS adoption. For instance, Akanbi, Adekanbi, and Bankole (2021). found that students with higher awareness levels were more likely to engage with digital library services. Similarly, Achugbue, Adeyemi, and Adeyemi (2023) highlighted that limited knowledge about VRS contributed to

underutilization in Nigerian universities. However, unlike Kwadzo's (2020) study, which suggested that even students who are aware may prefer face-to-face assistance, the present findings indicate that awareness strongly influences usage patterns.

The results of the study align with the SERVQUAL framework in several key ways, particularly with respect to understanding the graduate students' awareness and utilization of Virtual Reference Services (VRS).

First and foremost, study results revealed that students who used VRS found it convenient and helpful in obtaining information quickly. This aligns with the responsiveness and reliability constructs, as students who perceived the service as useful were more likely to utilize it. The moderate rate of utilization can be partially attributed to students who see VRS as a valuable resource for academic success.

Moreso, the study found that students who received information and made aware through signage and orientations were more likely to utilize VRS. This corresponds with the tangible component SERVQUAL model, showing that awareness creation through these can significantly impact the decision to use VRS.

The findings also indicated that ease of access and convenience were primary motivators for students using VRS. This directly correlates with the reliability component which guarantee access, and assurances construct, as students who found VRS dependable to use were more likely to engage with the service. However, the findings also pointed to some barriers, such as lack of awareness and limited training, which made it harder for certain students to use the service effectively, suggesting that more effort could be put into reducing these barriers.

The study finally explores the strong relationship between awareness and utilization of VRS,

which confirms that graduate students who are more aware of VRS are significantly more likely to use them. In this study, awareness can be viewed as a form of facilitating condition that directly impacts students' willingness and ability to engage with VRS. The study's findings contribute to the understanding of how awareness, combined with other factors like internet connectivity and service convenience, shapes students' decisions to adopt virtual library service in academic libraries.

SERVQUAL model assess services quality and effectiveness. The effectiveness of the services markets and create its visibility to its users. The findings showed that students who were aware of VRS and had positive perceptions about its dependability were more likely to intend to use it. This indicates that their awareness directly influenced VRS usage.

5.11 QUALITY OF VRS ACCESSIBILITY IN SELECTED ACADEMIC LIBRARIES IN GHANA

The accessibility of virtual references is the ability of the VRS system to be accessed easily by its users. The accessibility of VRS can be better understood through the SERVQUAL model developed by Parasuraman, Zeithaml, and Berry (1985), which identifies key dimensions of service quality. The tangibility component plays a central role in accessibility, as the availability of up-to-date technological facilities, such as computers, internet connectivity, and modern virtual platforms, determines how easily users can interact with library systems. The reliability component is equally crucial, reflecting the consistency and dependability of these virtual systems. Reliable platforms that respond effectively to user queries without frequent downtime enhance the accessibility and credibility of VRS.

Moreover, the assurance dimension, which encompasses the competence and confidence of

library staff in managing virtual systems, strengthens accessibility by ensuring that users can receive accurate and timely assistance when challenges arise. The responsiveness component—representing staff willingness and promptness in addressing users’ access issues—directly impacts user satisfaction and determines how quickly access-related problems are resolved. Lastly, empathy, which involves the ability of librarians to understand and respond to individual user needs, enhances accessibility by ensuring inclusive and personalized service delivery. Together, these SERVQUAL dimensions create a holistic understanding of accessibility, showing that it is not only a matter of technology but also of human interaction and service commitment.

5.11.1 QUALITY OF VRS ACCESSIBILITY IN SELECTED ACADEMIC IN GHANA

The quantitative findings revealed notable differences in accessibility among the academic population surveyed. Out of 300 respondents, 167, representing 55.7 percent, indicated that they had reliable access to VRS, suggesting a positive trend toward the adoption and expansion of digital library resources. However, 125 respondents, representing 41.7 percent, reported challenges in accessing these services, while a small fraction of eight individuals (2.7 percent) expressed neutrality, which may indicate either indifference or limited familiarity with the services.

5.11.2 ACCESSIBILITY OF VRS IN SELECTED ACADEMIC LIBRARIES BY INSTITUTIONS

Across the studied institutions accessibility shows varying levels of performance. At the University for Development Studies (UDS), 30 respondents (10 percent) rated VRS as highly accessible, and 49 (16.3 percent) as moderately accessible, making it the most accessible among

the institutions studied. At CK-Tedam University of Technology and Applied Sciences, 17 respondents (5.7 percent) found the services highly accessible, while 40 (13.3 percent) rated them moderately accessible. Similarly, at SDD-UBIDS, 21 respondents (7 percent) indicated that VRS were highly accessible, while 43 (14.3 percent) found them moderately accessible. Overall, UDS recorded slightly higher accessibility than the others, followed by SDD-UBIDS and CK-Tedam University. These variations suggest that differences in technological investment, internet connectivity, and digital literacy initiatives across institutions directly influence how easily graduate students can access virtual reference services.

5.11.3 QUALITY OF VRS ACCESSIBILITY IN SELECTED ACADEMIC LIBRARIES IN GHANA: QUALITATIVE FINDINGS

The qualitative findings from interviews and observations provide deeper insights into how academic libraries in Ghana strive to enhance accessibility to their virtual reference services. Librarians reported that consistent upgrades of virtual platforms, regular maintenance of systems, and the establishment of backup internet connections are key strategies to ensure uninterrupted access. Continuous staff training was also identified as essential, with workshops organized to improve technical competency and enable librarians to provide round-the-clock support for VRS users. Equally important are the collaborative strategies employed to enhance accessibility. Libraries actively engage with faculties and academic departments to raise awareness about VRS through formal communication, orientations, and training sessions. Respondents indicated that these initiatives are often demand-driven, with libraries responding to faculty requests to conduct workshops or awareness programs for graduate students. This approach not only promotes service visibility but also fosters a culture of user engagement and

digital literacy, which are essential for sustained accessibility.

The study's findings agree with earlier research emphasizing the dual role of technological readiness and human capacity in ensuring digital accessibility. Bandyopadhyay and Boyd-Byrnes (2016) observed that continuous staff training and system upgrades are fundamental for maintaining smooth access to virtual services. Similarly, Ogunbodede and Wiche (2022) found that while many students enjoy reliable access to virtual library resources, others still face challenges due to infrastructural deficiencies. Nemati and Babalhavaeji (2013) also highlighted the importance of awareness and technical assistance in promoting successful access, while Akuffo and Budu (2019) identified poor internet connectivity as a recurring limitation to online academic resource access. Within the Ghanaian context, however, a unique emphasis was observed on interpersonal collaboration and user education. Unlike Western settings where digital literacy is often assumed, Ghanaian academic libraries actively promote VRS through faculty-led orientations, seminars, and demand-driven workshops to enhance both awareness and accessibility (Banleman, Dukper, & Dabontin, 2023). This adaptive, user-centered model of service aligns with Sanches and Melo (2022), who advocate for responsive and flexible digital library services that cater to specific user needs.

As observed by the researcher, accessibility in many Ghanaian academic libraries continues to be constrained by inadequate ICT infrastructure. Nonetheless, ongoing collaborative efforts, targeted training initiatives, and user education programs reflect steady progress toward more inclusive and effective virtual reference service provision across academic institutions in Ghana. The findings of the study further demonstrated that accessibility to Virtual Reference Services among graduate students in Ghanaian academic libraries is improving, although institutional

disparities persist. UDS demonstrates relatively stronger digital infrastructure and user engagement practices, while SDD-UBIDS and CK-Tedam University show moderate levels of accessibility.

5.12 QUALITY OF VRS RELIABILITY IN SELECTED ACADEMIC LIBRARIES IN GHANA

Reliability in virtual reference services (VRS) refers to how dependable, trustworthy, and accurate users perceive the service to be. When users believe that a service is reliable, they are more likely to use it regularly for their academic and research work. The SERVQUAL model highlights reliability as one of the key components of service quality. And this component of the model addresses the reliability objective. In the context of academic libraries, reliability means that virtual services should provide timely and correct responses to users' information needs.

The study revealed that 61.0% of respondents agreed that the virtual reference services provided by their academic libraries were reliable, while 39.0% felt they were not dependable enough. This shows that most users are generally satisfied with the performance of VRS in their institutions. Their positive responses may be due to quick feedback from librarians, well-trained staff, and user-friendly online systems. However, some users mentioned issues such as system errors, poor internet access, and limited staff expertise as reasons for finding the service less reliable.

These findings agree with Khan et al. (2023), who discovered that students were happy with VRS because of fast and effective communication. On the other hand, Kaishe-Mulungu et al.

(2024) reported that many users were not satisfied due to technical problems and lack of skilled staff. This shows that the reliability of VRS depends on local factors such as technology, staff training, and infrastructure.

5.12.1 QUALITY OF VRS RELIABILITY BY INSTITUTIONS

The study findings revealed differences in reliability among the three institutions University for Development Studies (UDS), CK-Tedam University of Technology and Applied Sciences (CKT-UTAS), and the Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS). Among the three, UDS recorded the highest reliability level, as most students (9.7% very reliable, 15.7% reliable) described the VRS as dependable. CKT-UTAS followed with 7.7% of respondents saying the service was very reliable and 12% saying it was reliable. SDD-UBIDS also showed similar but slightly lower results, with 6.7% rating it very reliable and 14% rating it reliable.

These results indicate that while all three universities provide reasonably dependable virtual services, UDS leads slightly in reliability. This may be because UDS has a stronger ICT infrastructure, better staff training, and more consistent service delivery. The findings confirm the argument of Lateef and Mairaj (2023), who explain that the reliability of digital services depends on both the human and technological elements working together effectively!

5.12.2 QUALITY OF VRS RELIABILITY IN SELECTED ACADEMIC LIBRARIES: QUALITATIVE FINDINGS

The research findings from the interviews with library staff provided a deeper understanding of why some VRS systems are seen as more reliable than others. Many staff members mentioned that they use virtual reference interviews to make sure that users' questions are properly

understood and accurately answered. The system also sends instant alerts to staff mobile phones when user requests help online, allowing for faster responses. This supports Luo and Buer (2015), who argue that virtual reference interviews are essential for clarifying users' needs and ensuring reliable service delivery.

Interviewed staff also emphasized the importance of regular staff training. Ongoing training helps librarians stay competent in using digital tools and remain updated with new trends such as AI-assisted chat systems. According to Lateef and Mairaj (2023), effective digital services depend greatly on the staff's ability to use these tools confidently and efficiently.

Another key factor mentioned was stable internet connectivity. Staff explained that without a strong and consistent internet connection, it becomes difficult to maintain the reliability of virtual services. This point supports Tella (2023), who stresses that reliable internet access is essential for effective virtual services, especially in developing countries where connectivity can be inconsistent.

Finally, respondents mentioned that regular updates and maintenance of the virtual systems help prevent technical issues and keep the service dependable. Kuma et al. (2021) agree that for VRS to remain reliable, libraries must invest in both system upgrades and staff development while regularly assessing user feedback.

5.12.3 QUANTITATIVE AND QUALITATIVE DISCUSSIONS OF QUALITY OF RELIABILITY OF VRS IN SELECTED ACADEMIC LIBRARIES

The generally findings from quantitative, qualitative and observation was clear that VRS reliability in Ghanaian academic libraries were generally good but varies across institutions. The University for Development Studies (UDS) has shown slightly higher levels of reliability

compared to CKT-UTAS and SDD-UBIDS, which both show moderate trust levels from users. The differences between institutions reflect how factors such as internet stability, staff training, and technological infrastructure influence service reliability. This agrees with Khan et al. (2023), who found that quick and effective service improves user satisfaction, and with Kaishe-Mulungu et al. (2024), who observed that unreliable systems and untrained staff lower user confidence.

In conclusion, the study found that most students (61%) perceive virtual reference services as reliable, though there are still challenges that need to be address to improve VRS. UDS emerged as the most reliable institution, while CKT-UTAS and SDD-UBIDS followed closely with fairly consistent but slightly lower ratings. To strengthen VRS reliability across all institutions, libraries should continue to train their staff, maintain strong internet connections, and upgrade systems regularly. These actions will help ensure that virtual reference services remain dependable and effectively meet the information needs of academic users in Ghana.

5.13 VIRTUAL REFERENCE SERVICE RESPONSIVENESS QUALITY IN SELECTED ACADEMIC LIBRARIES IN GHANA

Responsiveness in Virtual Reference Services (VRS) refers to the ability of VRS system to address users' queries quickly, efficiently, and effectively through various virtual platforms such as live chat, emails, and phone services. In the SERVQUAL model, responsiveness and tangibility are key components for evaluating how quickly and effectively services are rendered. In the context of academic libraries, responsiveness determines whether users can depend on the library to provide timely academic support when needed, especially during critical research or assignment periods.

When the system is responsive students do not experience delays in obtaining academic information or research assistance. It minimizes user frustration, builds confidence in virtual systems, and promotes continued use of the service. In this study, findings revealed that 42% of participants expressed moderate satisfaction with their libraries' responsiveness. This indicates that many students appreciate the promptness of service delivery but still believe improvements can be made. Owolabi et al. (2024) similarly observed that prompt and consistent responses play a central role in maintaining user satisfaction and trust within academic libraries. The research findings revealed that 29.3% of participants were satisfied with the responsiveness of VRS and believed that their libraries adequately met their expectations. However, this proportion being less than half of the total respondents who demonstrated that perceptions of service efficiency vary significantly across users. According to Gómez-Cruz (2019), such mixed satisfaction levels are typical in academic libraries where users' expectations and service capacities differ. A few, constituting 6% of respondents described their libraries' services as "very responsive," suggesting that a small number of users experienced exceptional service quality characterized by prompt and accurate feedback. These users likely interacted with well-trained staff and efficient systems capable of providing immediate responses. Sanches and Melo (2022) found similar patterns, noting that responsiveness in digital reference systems can differ depending on institutional capacity, technology quality, and staff workload. On the other hand, 19.7% of respondents indicated that their libraries' VRS were "unresponsive," while 3% rated them as "very unresponsive." This means that about one in five users felt dissatisfied with response times and follow-up quality. The reasons for these negative perceptions may include staff shortages, limited working hours, weak internet connectivity, or outdated communication

tools, as identified by Barsha and Munshi (2023). Addressing these challenges is essential to ensure that all users regardless of their campus or time of inquiry receive prompt and effective support.

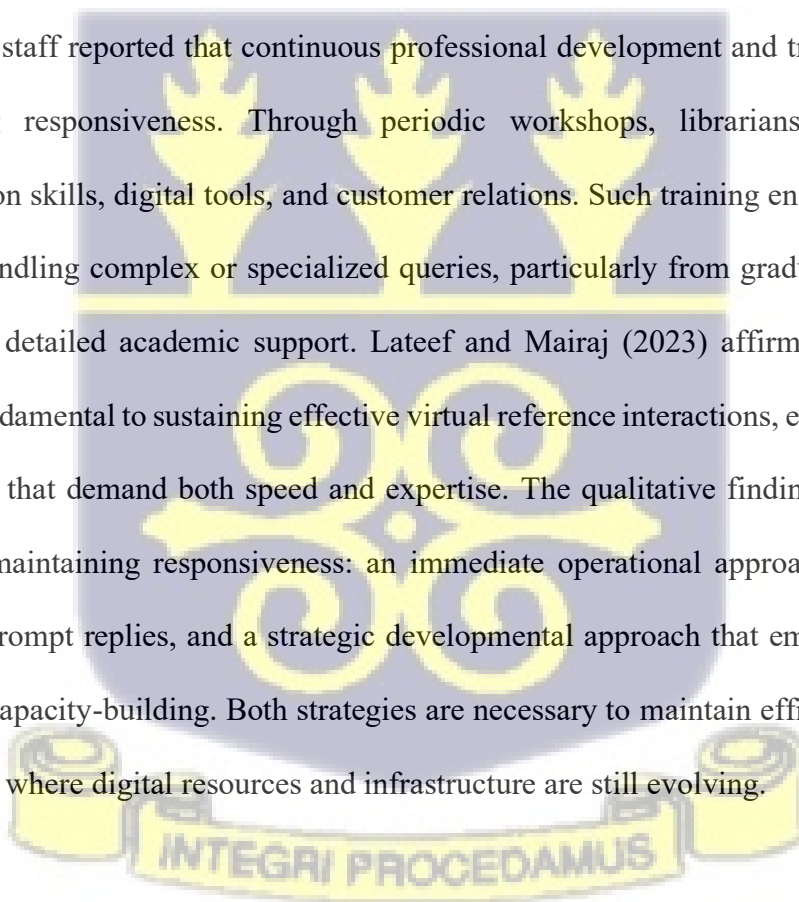
5.13.1 QUALITY OF VRS RESPONSIVENESS BY INSTITUTIONS

Analysis of the research further revealed difference levels in responsiveness across the three studied universities. At the University for Development Studies (UDS), 32 students (10.7%) found the service “very responsive” and 48 students (16%) rated it “responsive.” This makes UDS the institution with the highest level of responsiveness overall. At CK-Tedam University of Technology and Applied Sciences (CKT-UTAS), 25 students (8.3%) reported the service as “very responsive,” while 37 (12.3%) found it “responsive.” Similarly, at the Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS), 22 students (7.3%) said the service was “very responsive,” and 41 (13.7%) rated it “responsive.” The data indicate that UDS leads in responsiveness, indicating real time service followed by SDD-UBIDS and CKT-UTAS, though the differences are not extreme. These findings suggest that while responsiveness is generally good, institutional differences in infrastructure, staffing, and management support likely influence performance. As observed by Yuan and Yang (2024), libraries with efficient communication systems and well-trained personnel tend to deliver faster, more reliable virtual support, thereby improving user satisfaction. Overall, 42% of all students across the three universities viewed their libraries’ VRS as responsive, demonstrating that while the system is working well in many cases, further investments in technology and staff development could enhance the timeliness of responses.

5.13.2 QUALITATIVE DISCUSSIONS OF QUALITY OF VRS RESPONSIVENESS IN SELECTED ACADEMIC LIBRARIES

Interviews conducted with library staff and observation of the system provided deeper understanding of the mechanisms influencing responsiveness in VRS delivery. Respondents emphasized that dedicated personnel are assigned to monitor the VRS platforms. These staff members receive instant alerts on their mobile phones whenever a user logs on or sends a query, enabling them to respond in real-time. This proactive strategy ensures that user requests are handled promptly and aligns with best practices identified by Yuan and Yang (2024), who found that maintaining real-time communication enhances virtual reference effectiveness.

Additionally, staff reported that continuous professional development and training are central to sustaining responsiveness. Through periodic workshops, librarians are trained on communication skills, digital tools, and customer relations. Such training ensures that they are capable of handling complex or specialized queries, particularly from graduate students who often require detailed academic support. Lateef and Mairaj (2023) affirm that professional training is fundamental to sustaining effective virtual reference interactions, especially in digital environments that demand both speed and expertise. The qualitative findings reveal a dual strategy for maintaining responsiveness: an immediate operational approach that uses alert systems for prompt replies, and a strategic developmental approach that emphasizes ongoing training and capacity-building. Both strategies are necessary to maintain efficiency, especially in institutions where digital resources and infrastructure are still evolving.



5.13.3 GENERAL FINDINGS OF QUALITY OF VRS RESPONSIVENESS IN SELECTED ACADEMIC LIBRARIES

The quantitative, qualitative and observations findings present a nuanced view of VRS responsiveness in Ghanaian academic libraries. Quantitatively, a large proportion of students (42%) found the services responsive, while about one-fourth expressed dissatisfaction. This mix reactions suggests that while libraries are making progress, they still face infrastructural and staffing limitations.

The interview findings emphasis on real-time alert systems, staff monitoring, and continuous training shows that libraries are actively seeking ways to improve their responsiveness. This reflects an understanding that responsiveness is not solely about speed, but also about quality, consistency, and personalization of service. As Owolabi et al. (2024) and Wang and Si (2024) note, enhancing digital infrastructure and human resource capacity together can significantly improve the timeliness and reliability of VRS delivery.

In conclusion, the study reveals that the responsiveness of Virtual Reference Services in Ghanaian academic libraries is moderately strong but experience sometimes delays and uneven across institutions. UDS demonstrated the highest level of responsiveness, followed by SDD-UBIDS and CK-Tedam University. While the majority of students were generally satisfied, a notable minority felt that services were too slow or inconsistent.

To strengthen responsiveness, academic libraries must continue to invest in reliable ICT infrastructure, staff training, and real-time service monitoring systems. Encouraging collaborative teamwork, maintaining sufficient staffing levels, and integrating automated chat or AI-based systems can further reduce response time and enhance user satisfaction. The

findings reaffirm that responsiveness is not just a technical issue but also a strategic and human-centered factor that determines the overall success of virtual reference services in higher education potential of virtual support for academic success

5.14 QUALITY OF STAFF COMPETENCE AND SKILLS IN PROVIDING VRS IN SELECTED ACADEMIC LIBRARIES IN GHANA

VRS staff competence and skills in delivery online services as far as information of users is concern cannot be underestimate. Inability to provide trusted and accurate services can defeat the purpose that promise effectiveness. Assurance and tangibility components of SERVQUAL can help users evaluate VRS system, since high staff competence, technologies physical facilities availability in reference service can lead to meeting user expectations. The competence and skills of Virtual Reference Service (VRS) staff in delivering online information services are fundamental to the success and credibility of virtual library operations.

The findings from the study indicate that the knowledge and expertise of library staff play a decisive role in user satisfaction and trust. Out of 300 respondents, a significant majority expressed confidence in the capability of library personnel, with 9.7% rating them as “Excellent” and 55.7% as “Good.” This means that more than two-thirds of users perceive staff as capable and efficient in managing virtual reference queries, which reflects positively on the quality of services provided. However, 24.7% of respondents rated the staff’s knowledge and skills as “Fair,” suggesting that while staff competence is generally commendable, there is room for improvement, particularly in specialized subject areas and the application of digital tools. A smaller segment of participants rated staff performance negatively, with 5.7% describing it as “Poor” and 2.7% as “Very Poor,” indicating notable deficiencies likely caused by limited

professional training or difficulties in using virtual service platforms. Additionally, 1.7% of respondents expressed a neutral stance, possibly reflecting limited interaction with the service or mixed experiences.

These results align with previous research that emphasizes the pivotal role of staff competence in delivering effective virtual reference services. Bachynska et al. (2024) found that library users commonly rate staff knowledge as high, yet they also underscore the need for improved training in digital communication and online engagement. Similarly, Wharton and Mann (2020) observed that although users rate library staff as “Good” or “Excellent,” many institutions still need to strengthen staff capabilities in emerging technological tools. Lateef and Mairaj (2023) further highlight that specialized training and skill enhancement are essential for effectively handling user queries in a digital environment. Conversely, Dempsey (2021) found that dissatisfaction rates tend to be higher in institutions where limited attention is given to staff development. These findings collectively support Suparna (2024)’s assertion that the success of VRS depends heavily on staff’s ability to efficiently navigate platforms and resolve user issues. Therefore, building and sustaining a highly competent VRS team requires ongoing training, institutional investment, and supportive digital infrastructure.

5.14.1 QUALITY OF TRAINING FOR STAFF COMPETENCE IN DELIVERY VRS IN SELECTED ACADEMIC LIBRARIES: QUALITATIVE FINDINGS

The study research findings from interviews with library staff provided further insight into the state of training programs designed to enhance VRS delivery. Staff generally expressed positive but varied views on the adequacy of training. Descriptions such as “good,” “fair,” and “better” suggest that while training opportunities exist, satisfaction differs across individuals and

institutions, likely due to differing expectations or the quality of facilitation. Respondents highlighted that training is delivered through in-house sessions, YouTube tutorials, webinars, and demonstrations on platforms such as email, live chat, web forms, phone calls, and customer service delivery. This approach reflects a flexible, multimodal training system, consistent with the recommendations of Panda and Kaur (2023), who advocate diverse and adaptive training methods to ensure staff readiness in digital environments.

Nonetheless, respondents emphasized the need for continuous professional development, particularly in ICT skills, marketing, and customer service. This aligns with Bandyopadhyay and Boyd-Byrnes (2016), who identified ongoing professional development as essential for sustaining effective VRS in academic institutions, especially in contexts with limited resources. Internet connectivity also emerged as a key concern among staff. While some described it as “good” or “okay,” others rated it as “fair,” revealing inconsistencies in infrastructure that may affect service reliability. This concern is consistent with Akeriwa et al. (2015), who observed that unstable internet connectivity remains a major impediment to the quality and efficiency of virtual services in many developing countries, including those in Africa.

5.14.2 GENERAL FINDINGS OF STAFF COMPETENCE QUALITY IN PROVIDING VRS

Findings of the research results affirm that staff competence in VRS delivery is generally positive. Quantitative data indicate that most users are satisfied with staff knowledge and service quality, while qualitative and observation findings shed light on underlying issues such as inconsistent training, varying ICT proficiency levels, and infrastructural challenges. While survey data highlight user satisfaction with staff professionalism, the interviews point to a

strong desire for more hands-on training, clearer institutional policies, and sustainable digital infrastructure. Together, these insights underscore the need for a comprehensive capacity-building framework that strengthens both the technical and institutional dimensions of VRS delivery in academic libraries.

5.14.3 QUALITY OF VRS STAFF COMPETENCE IN SELECTED ACADEMIC LIBRARIES BY INSTITUTIONAL

The findings also revealed variations in staff competence among the participating institutions. At UDS, 28 respondents (9.3%) rated staff as highly competent and 47 (15.7%) as competent, making it the best-performing institution overall. At CK-Tedam University, 21 respondents (7%) rated staff as highly competent and 36 (12%) as competent. Similarly, at SDD-UBIDS, 19 respondents (6.3%) found staff highly competent and 41 (13.7%) competent. In total, 41.3% of students across all institutions indicated that staff were competent. This demonstrates that VRS staff competence is generally high across the universities, with UDS leading slightly, followed by SDD-UBIDS and CK-Tedam University.

These institutional variations reflect differences in resource allocation, staff training investment, and ICT infrastructure. The findings resonate with studies by Lateef and Mairaj (2023) and Suparna (2024), which highlight that institutional commitment to training and technological support directly affects staff competence and, consequently, the overall performance of VRS. Therefore, maintaining and improving VRS competence in Ghanaian academic libraries requires sustained investment in training, infrastructure enhancement, and ongoing professional development. Among the 300 respondents surveyed, a substantial majority held a favorable opinion regarding the knowledge and expertise of library staff.

Specifically, 9.7% rated them as "Excellent" and 55.7% rated them as "Good." This indicates that more than two-thirds of users perceive the staff as capable of managing virtual reference queries, emphasizing the efficiency of the library staff in this area. Nevertheless, 24.7% of respondents rated the staff's knowledge as "Fair," indicating the need for enhancement, particularly in subject-specific expertise and proficiency in utilizing digital tools. A minority of respondents expressed negative views about the service, with 5.7% and 2.7% rating the staff as "Poor" and "Very Poor," respectively. These ratings indicate notable deficiencies in the provision of services, possibly caused by insufficient training or difficulties with online platforms. In addition, 1.7% of participants expressed a neutral stance, suggesting that they may have had minimal engagement with the service or experiences that were neither notably positive nor negative.

These findings are consistent with other studies conducted in academic libraries, which also indicate that staff knowledge is generally rated as high, but still highlight specific areas that require improvement (Bachynska et al. 2024). In a similar context of research findings discovered that users evaluated library staff as "Good" or "Excellent". However, they also recognized the necessity for improved training in digital tools, which aligns with the concerns expressed in the present study (Wharton & Mann, 2020). Lateef and Mairaj (2023) stress the significance of specialized training and skill acquisition for effectively delivering assistance to user queries. In contrast, Dempsey (2021) found a higher rate of dissatisfaction among participants giving negative ratings to the staff. This indicates that the problems identified in this survey are not isolated but rather reflect a wider challenge in virtual reference services. Previous research by Suparna (2024), opined that the effectiveness of virtual reference services

depends on the staff's ability to navigate to resolve users' problems. It is therefore worth to note that, training of virtual reference staff in their professional line of services is very essential to effective service delivery. The success of the service does not just lie on the infrastructure investment but as well hinges on staff capacity building.

5.15 QUALITY OF MANAGERIAL SUPPORT FOR VRS IN ACADEMIC LIBRARIES: INSIGHTS AND IMPLICATIONS

Virtual Reference Services (VRS) have become an integral component of modern academic libraries, offering remote users access to information resources and professional assistance. As higher education institutions increasingly embrace digital learning platforms, the role VRS in supporting research and learning has grown substantially. The effectiveness of VRS, however, is closely tied to the level of support provided by library management. Tangibles component OF the SERVQUAL model considers how influential other factors can in affect effectiveness of VRS quality. These constructs help to evaluate the impact of management support on VRS. The investigation reveals that managerial support for VRS manifests in a variety of ways. Respondents emphasized the significance of foundational technical infrastructure, stating that management ensures library automation, access to electronic resources, off-campus access, and internet connectivity to VRS platforms. This focus on infrastructure is critical, as it forms the backbone of any virtual service delivery. A study by Tella (2023) emphasized that a strong technological foundation is vital for VRS to function efficiently, particularly in institutions where users expect seamless digital experiences.

Respondents noted the significance of human resource development, noting that management provides staff training on how to deliver VRS. This aligns with findings by Hosman et al.

(2020), who assert that the effectiveness of virtual reference hinges not only on technology but also on the competencies of library personnel. Continuous training ensures that staff remain adept at using VRS tools and are capable of delivering timely, accurate, and user-friendly support.

Findings also revealed a broader perspective, citing management support in subscription to e-resources, hosting webinars, subscribing to journals and eBooks, and facilitating mediated search services. Further findings also noted that, management ensures reliable internet connectivity, an essential component for uninterrupted virtual services. These responses reflect a comprehensive approach to VRS management, incorporating both content access and service delivery tools. Such an approach mirrors best practices in academic libraries globally, as noted by Tella (2023), who advocates for a holistic model that addresses infrastructure, content provision, user education, and technical support.

Despite these commendable efforts, the interviews also uncovered a notable gap in the area of financial planning. When asked about the existence of a dedicated annual budget for VRS, findings revealed that no such allocation exists; instead, funding is requested as needs arise, and university management provides funds to address them. Similarly, participants indicated that while there is no specific budget set aside for VRS, management generally fulfils funding requests to support the service's smooth delivery.

This reactive approach to budgeting stands in contrast to findings in more resourced academic environments, where libraries often operate with dedicated budgets for specific services, including VRS. According to Aithal et al. (2024), having a predictable, stable budget allows libraries to engage in long-term planning, invest in staff development, upgrade technologies

regularly, and evaluate services systematically. The absence of such a budget in the interviewed institutions may limit the capacity of libraries to innovate or scale their VRS offerings.

Moreover, the budgeting practice described by the interviewees is indicative of a broader trend in some developing countries, where academic libraries often struggle with limited financial autonomy and rely on broader university structures for resource allocation. Dadzie and Van Der Walt (2015), study on electronic resource usage in Ghanaian academic libraries, noted that funding inconsistencies and administrative delays often impede effective library service delivery. Thus, while the flexibility of on-demand funding can be advantageous in certain contexts, it may not always support the strategic growth or sustainability of VRS initiatives.

When viewed through the lenses of the SERVQUAL framework, the findings align strongly with the constructs of tangibles. Management's provision of infrastructure and training lowers barriers to technology use and enhances staff performance. Nonetheless, the absence of stable financial support may weaken the overall enabling environment needed for consistent and scalable VRS operations.

5.16 QUALITATIVE FINDINGS ON QUALITY OF ICT INFRASTRUCTURE SUPPORT IN ACADEMIC LIBRARIES

The study found that although academic libraries in Ghana have access to ICT resources such as computers, servers, and other essential equipment, these resources are often outdated and insufficient. Limited internet bandwidth and a lack of adequate hardware were highlighted as major challenges affecting the effective delivery of Virtual Reference Services (VRS). To manage these issues, some institutions have taken proactive steps such as implementing redundant internet connections, conducting regular maintenance, and working closely with their

ICT departments. Plans for improvement include expanding internet capacity and acquiring additional mobile routers.

In terms of hardware, most libraries rely on desktop computers, servers, and in some cases, mobile phones. However, the available equipment is generally considered inadequate for delivering efficient VRS. These findings align with earlier studies that identified limited ICT infrastructure as a major barrier to the effective implementation of VRS in academic libraries (Adarkwah, 2021). In contrast, academic libraries in more developed countries typically report better ICT infrastructure and consistent upgrades that support real-time virtual interactions (deLeon, Flores, & Alomo, 2024). Software platforms used include a range of tools such as email, chat, video conferencing, phone calls, web forms, and WhatsApp. This diversity mirrors global trends where libraries use a combination of synchronous and asynchronous tools to meet user needs (Luo, 2008). Encouragingly, most libraries reported that their software platforms are regularly updated, with updates occurring monthly or as needed to meet user demand.

The research objective aligns with one of the key constructs of the framework, Facilitating Conditions, is clearly reflected in the study. The availability, quality, and reliability of ICT infrastructure directly influence how effectively VRS can be adopted and used.

Performance Expectancy is also evident, as library staff and administrators expect improved ICT infrastructure to lead to better service delivery. Effort Expectancy is implied in the desire for more reliable tools and connectivity, which would make it easier to provide services. Social Influence can be seen in the institutional support for ICT improvements, which motivates further adoption and investment in VRS.

5.17 CHALLENGES IN PROVIDING QUALITY VIRTUAL REFERENCE SERVICES IN SELECTED ACADEMIC LIBRARIES IN GHANA.

Virtual Reference Services (VRS) play a crucial role in modern academic libraries by facilitating remote access to information and library resources. The SERVQUAL model components of responsiveness, reliability, assurance, empathy and tangibles will help to address the challenges of VRS objectives. Using the constructs of this model enables to evaluate challenges bedevil the services. The findings reveal that Virtual Reference Services (VRS) in Ghanaian academic libraries face a combination of technological, institutional, and human-related challenges that significantly impede their effectiveness. Quantitative data from the survey indicate that internet failure (27.7%) and slow internet speeds (13.3%) are the most prevalent challenges affecting users' ability to access and utilize VRS effectively. These technological limitations cut across all the studied institutions University for Development Studies (UDS), CK-Tedam University of Technology and Applied Sciences (CK-TUAS), and Simon Diedong Dombo University of Business and Integrated Development Studies (SDD-UBIDS) but with varying levels of severity. UDS and SDD-UBIDS, for example, experienced the highest rates of poor internet connectivity and bandwidth issues, while CK-TUAS reported more challenges related to inadequate ICT infrastructure. These disparities may be attributed to differences in institutional investment in ICT and variations in local network infrastructure. The technological barriers identified in this study are consistent with findings from Akuffo and Budu (2019) and Omeluzor et al. (2016), who observed that unreliable and slow internet connectivity remains one of the major impediments to the adoption of electronic library services in developing countries. Similarly, Banleman et al. (2023) highlight that weak digital

infrastructure continues to undermine the effectiveness of virtual library services in African academic institutions. The situation in Ghana's universities mirrors these patterns, where intermittent internet and inadequate bandwidth limit access to online resources and hinder smooth librarian-user interactions.

Beyond technological factors, awareness and training deficits emerged as another major concern. The study shows that 19.7% of respondents were unaware of VRS, and 13.3% lacked the necessary training to effectively use these services. This lack of awareness and skill affects users, leading to underutilization of available VRS platforms. Among the institutions, CK-TUAS recorded relatively higher levels of user unawareness compared to UDS and SDD-UBIDS, possibly due to limited promotional strategies and fewer user sensitization programs. These findings align with Islam and Tsuji (2011) and Akinola and Okunlola (2019), who noted that limited digital literacy and inadequate awareness campaigns significantly reduce students' engagement with online library services.

In addition, service delays (11.6%) and perceived inaccessibility (14.3%) further compound the challenges, reflecting inefficiencies in system responsiveness and user satisfaction. Users from UDS and SDD-UBIDS, in particular, reported experiencing slower response times, possibly due to higher user traffic and limited staff availability to handle virtual queries. This situation contrasts with libraries in more technologically advanced countries, where delays often result from high user demand rather than infrastructural weaknesses (Tella, 2023). The lack of prompt responses and frequent downtime in Ghanaian universities therefore undermine the responsiveness and reliability components of the SERVQUAL model.

Qualitative data from interviews with librarians complement these findings by providing deeper

insights into institutional-level constraints. Librarians consistently reported poor infrastructure, lack of dedicated budgets, outdated hardware and software, and unstable internet connectivity as the main challenges impeding VRS operations. UDS librarians highlighted the absence of a specific budget for VRS as a key issue, making it difficult to maintain systems or introduce upgrades. CK-TUAS staff emphasized the shortage of ICT equipment and technical support, while librarians at SDD-UBIDS mentioned that network instability and delayed system maintenance affected the timeliness of virtual responses. These challenges echo Boadi (2015) and Alando & Ewuntomah (2021), who argue that financial limitations and outdated infrastructure remain major constraints in library service innovation within Ghana.

Furthermore, Lankes Owolabi et al. (2024) stress that the reliability of digital platforms and the responsiveness of technical support systems are crucial to sustaining effective VRS. However, in the case of Ghanaian academic libraries, frequent website downtimes and inconsistent technical support undermine user confidence and disrupt service continuity. Compared to developed contexts such as the United States and the United Kingdom, where libraries integrate VRS into institutional learning management systems supported by stable funding and continuous training (Martínez-Pérez & Rodríguez-Abitia, 2021; Tella, 2023), Ghanaian institutions still lag behind in aligning technology, funding, and human capacity to achieve seamless virtual service delivery.

Viewed through the SERVQUAL model, the challenges identified affect several service quality dimensions. Responsiveness is weakened by slow response times and service delays; reliability is compromised by frequent internet failures and system downtimes; assurance and empathy are reduced due to limited staff competence and inadequate user training; and tangibles are

affected by obsolete ICT infrastructure and insufficient funding. The institutional differences observed among UDS, CK-TUAS, and SDD-UBIDS demonstrate that while all universities face similar issues, their intensity varies based on resource availability, management support, and technological investment.

The study findings underscore that, for VRS to thrive in Ghanaian academic libraries, there is a need for comprehensive improvement in ICT infrastructure, sustainable funding models, and continuous staff and user training. Addressing these gaps will not only enhance service quality across all SERVQUAL dimensions but also promote equitable access and utilization of VRS across the different institutions.

5.18 VRS ORIGINAL CONTRIBUTION TO KNOWLEDGE

This study makes an original contribution to knowledge by providing an integrated assessment of Virtual Reference Services (VRS) in Ghanaian academic libraries through both user and librarian perspectives, framed by the SERVQUAL model. It contributes new empirical evidence on how awareness, utilization, accessibility, reliability, responsiveness, staff competence, management support, and ICT infrastructure collectively shape the quality of VRS delivery. The research reveals institutional differences among UDS, CK-TUAS, and SDD-UBIDS, showing that varying levels of funding, training, and infrastructural investment influence service outcomes. By contextualizing these findings within the Ghanaian higher education environment, the study expands existing literature on digital library services in developing countries and provides a framework for evaluating and improving VRS quality in resource-limited settings.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter presents a summary of major findings that is based on study research objectives, conclusions, and recommendations.

The main purpose of the study was to assess the virtual reference services in academic libraries in Ghana. This study was guided by the research objectives listed below:

- To assess awareness and usage of VRS quality by postgraduate students in selected academic libraries Ghana.
- To examine the quality of VRS reliability for effective library services in selected academic libraries Ghana.
- To assess the quality of VRS accessibility in selected academic libraries Ghana.
- To evaluate the quality of VRS responsiveness in meeting users' information needs selected academic libraries in Ghana.
- To examine VRS staff competence in providing user information needs in selected academic libraries in Ghana.
- To assess management support of VRS quality in selected academic libraries in Ghana.
- To evaluate infrastructural support and resource allocation in providing quality virtual reference services in selected academic libraries in Ghana.
- To identify challenges associated with quality virtual reference services in academic

libraries in Ghana.

To comprehensively achieve the study objectives, the background and problem that necessitate the research were identified. Limited research has been conducted on virtual reference services in academic libraries within the Ghanaian context, primarily focusing on a few aspects, with the least attention paid to assessing the effectiveness of virtual reference services in academic libraries. This study is well situated in existing literature. The findings discovered remarkable use of virtual reference systems, which demonstrates a gradual transition from traditional library reference to virtual reference service delivery in the selected academic libraries. This has enhanced academic library reference service delivery in Ghana.

The researcher collected two sets of data to address the study objectives. Quantitative data was gathered with a questionnaire, while qualitative data was collected with the help of an interview guide

The SERVQUAL Model was adopted and presented in detail in Chapter One (1). This model purpose is to assess VRS system to ensure service quality provided to postgraduate students

QUALITY OF AWARENESS CREATION AND USE OF ACADEMIC LIBRARY VIRTUAL REFERENCE SERVICES IN SELECTED ACADEMIC LIBRARIES IN GHANA

The study's first objective is in twofold and seeks to examine service awareness and usage in selected academic libraries in Ghana.

The study reveals that, library management system has duly implemented the virtual reference services in the institutions of study and are fully operational. This shows the dedication and commitment put forth by these institutions to improve academic library reference services

through the adoption of technology in the information age. One of the significant changes in the academic library has been the transition from traditional reference services to virtual reference services.

6.1.1 QUALITY OF VRS AWARENESS CREATION IN SELECTED ACADEMIC LIBRARIES

The study reveals that awareness of virtual reference services among respondents is varied across all institutions. Many participants demonstrate awareness of these services, while a notable group shows partial familiarity. Some respondents remain neutral, indicating either a lack of opinion or limited engagement with virtual reference services. Many users were not fully informed about the existence or benefits of VRS, especially at CK-TUAS. Lack of effective promotion and orientation programs limited participation and engagement.

6.1.2 SERVICE QUALITY OF VRS UTILIZATION IN SELECTED LIBRARIES IN GHANA

SUMMARY OF FINDINGS:

The study has demonstrated that virtual reference services (VRS) in academic libraries are utilized by a slight majority of the respondents. The findings indicate that more than half of the individuals surveyed have made use of these services, reflecting a positive reception and an appreciable level of engagement among users. However, some students had heard of VRS, actual utilization was low. Users often preferred traditional in-person interactions due to unfamiliarity with online tools, poor system responsiveness, and unreliable internet connectivity.

RELATIONSHIP BETWEEN QUALITY AWARENESS CREATION] AND UTILIZATION OF VRS IN SELECTED ACADEMIC LIBRARIES.

The study also explored the relationship between awareness and actual use of Virtual Reference Services (VRS) in academic libraries in Ghana. The findings revealed a strong positive correlation between being aware of VRS and actively using these services.

The majority of VRS users demonstrated a high level of awareness, while a significantly smaller proportion of non-users reported the same. In contrast, a considerable number of non-users were completely unaware of VRS, whereas very few. The results of the statistical analysis confirmed that the association between awareness and usage was significant.

These findings emphasize that awareness plays a crucial role in determining the usage of VRS. Higher levels of awareness among users correlates with greater engagement, while limited knowledge among non-users contributes to underutilization.

Unlike previous studies suggesting that awareness does not always translate to usage, this study found that increased awareness strongly influences usage patterns. This indicates that academic libraries can potentially increase VRS adoption by implementing strategies that enhance awareness among their users.

6.1.3 QUALITY OF VRS ACCESSIBILITY IN SELECTED ACADEMIC LIBRARIES

SUMMARY OF FINDINGS:

The second objective seeks to examine the accessibility of VRS in selected Ghanaian academic libraries. The study concludes that virtual reference services (VRS) in academic libraries in Ghana are generally perceived as accessible, however accessibility challenges were common,

with users citing unstable internet connections, outdated library websites, and occasional system downtime. SDD-UBIDS and UDS were particularly affected by limited network coverage and unreliable digital platforms.

6.2 QUALITY OF VRS RELIABILITY IN SELECTED ACADEMIC LIBRARIES

SUMMARY OF FINDINGS:

The third objective also seeks to assess the reliability of VRS in selected Ghanaian academic library. The study assessed the reliability of virtual reference services (VRS) in selected academic libraries in Ghana, focusing on users' perceptions and the factors influencing service reliability. Users reported frequent interruptions, delayed responses, and inconsistent service delivery. Limited staff availability and technical issues contributed to reduced reliability.

6.3 QUALITY OF VRS RESPONSIVENESS IN SELECTED ACADEMIC

LIBRARIES IN GHANA

The fourth objective attempts to evaluate the reference staff's responsiveness in meeting users' information needs. The findings revealed varied perceptions of staff responsiveness, with a considerable proportion of users expressing moderate satisfaction. However, responsiveness was weakened by slow reply times, network interruptions, and inadequate staff-to-user ratios. Users generally across CK- Tadam UDS and SDD-UBIDS all reported longer waiting times sometimes for feedback.

6.4 QUALITY OF STAFF COMPETENCE AND SKILLS TRAINING IN PROVIDING GRADUATE STUDENTS INFORMATION NEEDS.

SUMMARY OF FINDINGS:

The study's fifth objective seeks to assess library staff competence and skills in providing

graduate students information needs.

The findings revealed that, while most librarians were competent in basic reference services, many lacked advanced ICT and online communication skills. Inadequate training and limited exposure to emerging digital tools restricted service quality.

6.5 QUALITY OF MANAGEMENT SUPPORT FOR VRS IN SELECTED ACADEMIC LIBRARIES.

SUMMARY OF FINDINGS:

The sixth objective also seeks to examine management support for VRS in selected academic libraries in Ghana. The study revealed that academic library management in Ghana is taking various measures to support virtual reference services (VRS). Key actions include facilitating off-campus access, providing staff training, automating library services, subscribing to electronic resources such as journals and eBooks, conducting webinars, and implementing mediated search strategies. These efforts indicate a commitment to enhancing the delivery of VRS to meet the evolving needs of library users. However, findings also revealed inadequate funding, policy formulation, and promotion of VRS. UDS reported the absence of a dedicated budget line for VRS as well as CK-TUAS and SDD-UBIDS.

6.6 QUALITY OF ICT INFRASTRUCTURE SUPPORT FOR VRS IN SELECTED ACADEMIC LIBRARIES

The last objective sort to investigate infrastructural support and resource allocation in providing virtual reference services.

The study examined the adequacy of resources allocation and infrastructure for virtual reference services (VRS) in academic libraries in Ghana. The findings revealed that while some libraries

possess adequate computer systems, many of these are outdated and insufficient to meet modern requirements. ICT infrastructure across all institutions was found to be inadequate, with outdated computers, poor connectivity, and insufficient technical support. These limitations directly affected the efficiency and delivery of VRS.

6.7 CHALLENGES IN PROVIDING VRS IN SELECTED ACADEMIC LIBRARIES

Lastly, this objective seeks to identify challenges associated with virtual reference services in academic libraries in Ghana.

The study key challenges identified were limited funding and maintenance (27.3%), inadequate ICT facilities (25.0%), and poor internet connectivity (23.7%). SDD-UBIDS reported the greatest challenge with funding, CK-TUAS with ICT facilities, and UDS with network connectivity. Other issues included low awareness and limited staff training, which further weakened service delivery.

6.8 CONCLUSION

This study has comprehensively examined the awareness, usage, accessibility, reliability, responsiveness, staff competence, management support, and infrastructural challenges associated with virtual reference services (VRS) in selected academic libraries in Ghana. The study concludes that Virtual Reference Services (VRS) have become an essential component of academic library operations, yet their full potential remains underutilized in Ghanaian universities. Awareness and utilization of VRS among graduate students are generally low, largely due to inadequate promotion and limited user education. Accessibility and reliability are further constrained by unstable internet connectivity, insufficient ICT infrastructure, and

poor system maintenance. Responsiveness and staff competence are also affected by limited training and staffing shortages, resulting in delays and inconsistent service delivery.

Management support and institutional commitment to sustaining VRS remain weak, with most libraries lacking clear policies and dedicated funding. The study also reveals that persistent challenges particularly poor internet connectivity, inadequate ICT facilities, and limited funding continue to undermine service quality and user satisfaction.

In conclusion, while VRS have been introduced in the studied institutions (UDS, CK-TUAS, and SDD-UBIDS), significant improvements are needed in awareness creation, staff training, management involvement, and ICT investment. Strengthening these areas will enhance the reliability, responsiveness, and overall effectiveness of virtual reference services in supporting research, learning, and academic communication in Ghanaian higher education

6.9 RECOMMENDATIONS

Several recommendations are proposed to enhance the effectiveness of virtual reference services (VRS) in academic libraries in Ghana:

AWARENESS

Libraries should intensify awareness campaigns through student orientations, workshops, social media platforms, and institutional websites. Regular user education and visibility strategies should be implemented to promote VRS adoption

UTILIZATION

Integrate VRS into academic coursework and research activities. Provide demonstrations and practical sessions to encourage use, and improve system reliability to make VRS a trusted and

convenient service option.

ACCESSIBILITY

Upgrade library systems to be mobile-friendly, ensure 24-hour access, and partner with internet providers to improve bandwidth. Collaboration with other departments and faculties to enhance VRS often takes the form of formal communication, workshops, seminars, and orientations for graduate students.

RELIABILITY

Overall, the study highlights the importance of dedicated support, continuous training, feedback integration, and interdepartmental collaborations in improving the effectiveness and accessibility of virtual reference services.

RESPONSIVENESS

Improve system maintenance and response protocols. Libraries should establish clear timelines for responding to virtual queries and ensure sufficient staff are assigned to handle VRS consistently.

STAFF COMPETENCE

Increase staffing levels and adopt automated response systems to manage peak service times. Continuous training should be offered to improve response efficiency and service consistency. Organize periodic capacity-building workshops on digital reference management, online communication, and emerging library technologies. Encourage staff participation in continuous professional development programs.

MANAGEMENT SUPPORT

University management should provide clear policies and sustainable funding for VRS. VRS

should be integrated into institutional strategic plans to ensure continuous improvement and accountability.

ICT SUPPORT

Libraries should invest in modern ICT infrastructure, including high-speed internet, updated software, and reliable digital equipment. Establish a dedicated ICT support team to maintain and upgrade VRS platforms regularly.

CHALLENGES

Address financial constraints by allocating dedicated budgets for VRS and seeking external support from educational partners. Expand ICT facilities, strengthen internet connectivity, and provide continuous staff training.

6.9.1 RECOMMENDATIONS FOR FURTHER STUDIES

Comparative Studies: Future research could compare the effectiveness of VRS in academic libraries in Ghana with those in other developing and developed regions. This would provide insights into best practices and innovative strategies for VRS implementation.

User Experience Analysis: Further studies could investigate the specific experiences and satisfaction levels of different user groups, such as undergraduates, postgraduates, and faculty members, to better understand their unique needs and challenges.

Impact of Training Programs: Research could evaluate the impact of specific training programs on staff competence in delivering VRS. Analysing training outcomes would help libraries tailor their capacity-building initiatives.

Longitudinal Studies: Conducting longitudinal research on VRS adoption and usage trends over time would help assess the long-term effectiveness of interventions and the sustainability of

service improvements.

Exploring Socio-Cultural Factors: Future studies could investigate how socio-cultural factors affect the acceptance and utilization of VRS in academic libraries. Understanding cultural barriers could guide more inclusive service design.



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APPENDICES

APPENDIX A ETHICAL CLEARANCE



UNIVERSITY OF GHANA

ETHICS COMMITTEE FOR THE HUMANITIES (ECH)

P. O. Box LG 74, Legon, Accra, Ghana

My Ref. No: ECH

334/23-24

September 05, 2024

Bisem Noah
Aduah Library
University of Development
Studies Tel: J0245975753
Email:
bisemnoah@gmail.com

ETHICAL CLEARANCE (ECH 334/ 23-24)

The Ethics Committee for the Humanities (ECH) conducted an expedited review and approved your protocol titled:

**ASSESSING VIRTUAL REFERENCE SERVICES IN ACADEMIC LIBRARIES IN
GHANA: THE CASE OF SELECTED UNIVERSITY LIBRARIES**
PRINCIPAL INVESTIGATOR: BISEM NOAH ADUAH

Please note that the final review report must be submitted to the Committee at the completion of the study. Your research records may be audited at any time during or after the implementation. Any modification of this research project must be submitted to ECH for review and approval prior to implementation.

Please report all serious adverse events related to this study to ECH within seven (7) days verbally and in writing within fourteen (14) days.

This certificate is valid until September 04, 2025. You are required to submit annual

reports for continuing review.
Please accept my congratulations.

Yours Sincerely,


**Professor C. Charles
Mate-Kole
ECH Chair**

Cc: Dr. Philip Kwaku Kankam, Department of
Information Studies, UG Professor Perpetua
Dadzie, Department of Information Studies,
UG

Tel: +233-303933866

Email:

ech@ug.edu.gh



APPENDIX B QUESTIONNAIRE

UNIVERSITY OF GHANA
COLLEGE OF EDUCATION
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES
DEPARTMENT OF INFORMATION STUDIES

A QUESTIONNAIRE FOR GRADUATE STUDENTS OF THE RESPECTIVE
INSTITUTIONS OF THE STUDIES.

Dear Sir/Madam

Introduction

My name is Bisem Noah Aduah, an MPhil Information Studies student in the Department of Information Studies, College of Education, University of Ghana. In partial fulfillment of the requirement for the award of my MPhil Degree, I am conducting a study on **‘Assessing Virtual Reference Services in Selected University Libraries in Ghana.** This questionnaire is meant to help me collect data on the studied topic. Virtual Reference Services in the Academic Library include **email, chat librarian, web form, telephone, video, and FQAs** to help provide information services to users for academic purpose. The data obtained from you and your institution shall be confidentially handled and shall be used for academic purposes only. Your participation is voluntary and you have the option to discontinue as a participant at any point in time.

Thank you for accepting to answer this interview

I consent to participate in this study (tick) Yes [☐]



SECTION A: DEMOGRAPHIC INFORMATION

1. Academic library affiliation

Please, respond to each of the items in this section by a tick [☐] appropriate

to your case [☐] University for Development Studies

[☐] C.K University of technology and applied sciences

[☐] S.D. Dombo University of Business and Integrated Development Studies

2. Gender of respondent: Male [☐] Female [☐]

3. Age range: 21-29 [☐] 30-39 [☐] 40-49 [☐] 50-59 [☐] 60+ [☐]

4. Graduate Program

a) PhD

b) Mphil

c) MSc/MA

SECTION B: QUALITY OF VIRTUAL REFERENCE SERVICE AWARENESS CREATION

5. How aware are you of the virtual reference services offered by your academic library?

a) Aware

b) Somehow aware

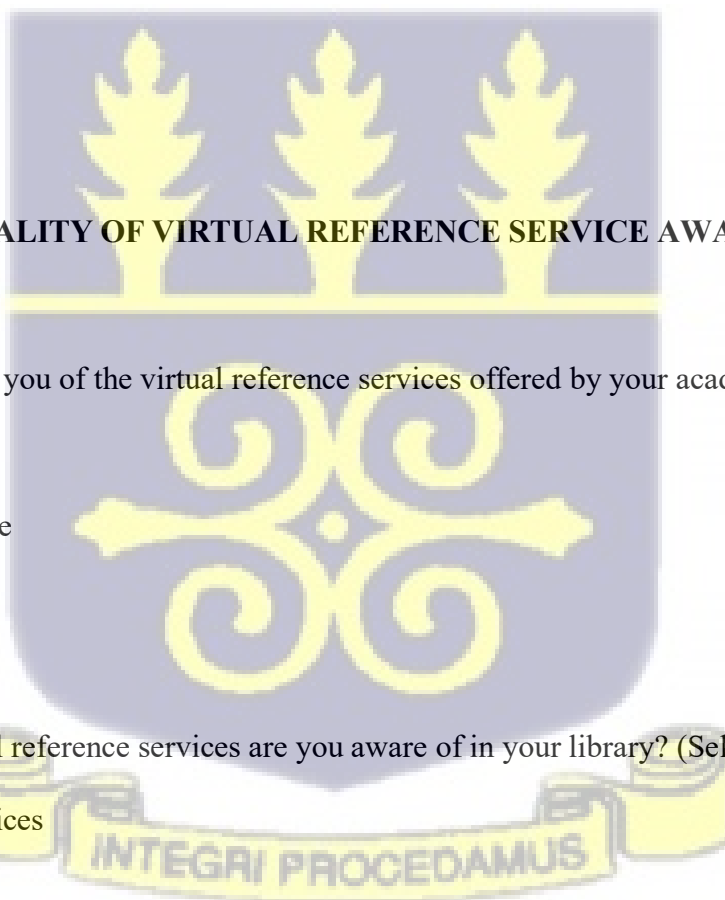
c) Neutral

d) Not aware

6 Which virtual reference services are you aware of in your library? (Select all that apply)

a) phone call services

b) Email services



- c) video conference
- d) chat services
- e) web form
- f) other specified

7. Have you ever participated in any of the following virtual reference sessions or workshops conducted by the library to promote awareness of virtual reference services?

- a) orientation
- b) workshops
- c) literacy education course
- d) others specify

8. Suggest ways by which the awareness of virtual reference services can be enhanced among graduate students?

Your answer

.....

.....

SECTION C: QUALITY OF UTILIZATION OF VIRTUAL REFERENCE SERVICES

9. Have you ever utilized virtual reference services provided by your academic library?

- a) Yes
- b) No

10. If no, please give a reason

11. How frequently do you use virtual reference services?

- a) Daily

- b) Weekly
- c) Monthly
- d) Occasionally
- e) rarely

12. What factors influence your decision to utilize virtual reference services? (Select all that apply)

- a) Convenience
- b) Ease of use
- c) Previous positive experiences
- d) Recommendations from peers or faculty
- e) Distance barriers to visiting traditional library services
- f) Other (please specify) _____

SECTION D: QUALITY OF VRS ACCESSIBILITY IN ACADEMIC LIBRARY

13. Do you always have access to the virtual references' services in your academic Library?

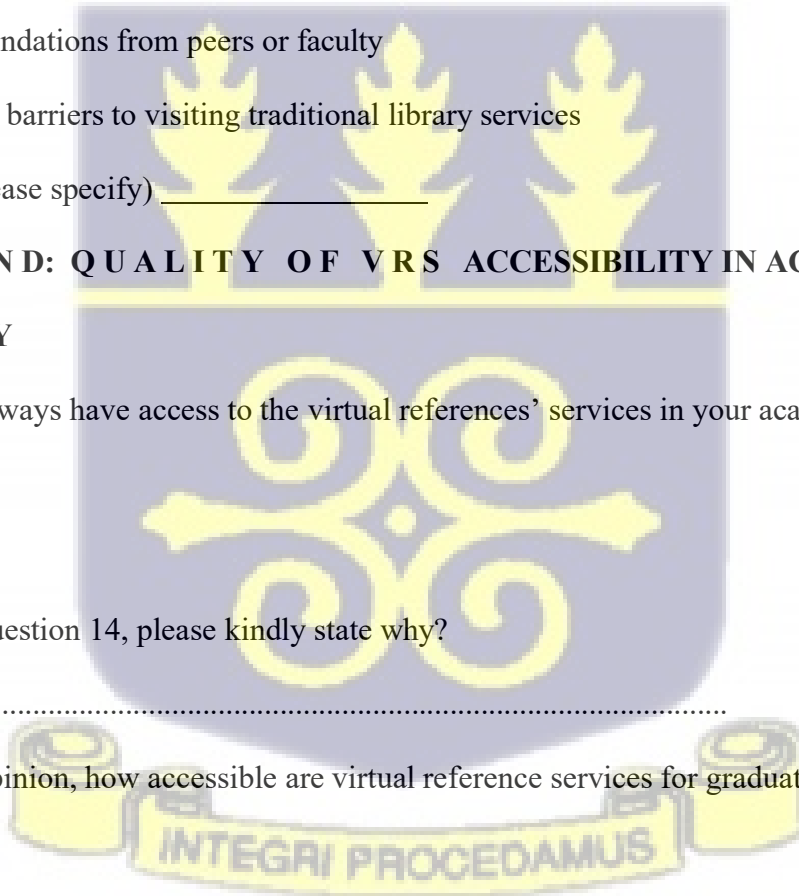
- a) Yes
- b) No

14. If no to question 14, please kindly state why?

.....

15. In your opinion, how accessible are virtual reference services for graduate students?

- a) accessible
- b) moderately inaccessible



- c) inaccessible
- d) very inaccessible

SECTION E: QUALITY OF VRS RELIABILITY IN YOUR ACADEMIC LIBRARY

16. Are your academic library virtual reference services reliable? (If yes skip to 20)

- a) Yes
- b) No

17. If no, to question 18 please kindly give a reason

.....

18. How would you rate the current level of reliability of virtual reference services in your library?

- a) Reliable
- b) Moderately reliable
- c) neutral
- d) not reliable

19. What improvements would you suggest to enhance the reliability of virtual reference services?.....

SECTION F: QUALITY OF VRS RESPONSIVENESS

20. Rate the responsiveness of library virtual reference services

- a) excellent
- b) good
- c) neutral



d) poor

21. How would you rate the responsiveness of library staff in providing timely virtual reference services to meet your information needs?

- a) Very responsive
- b) responsive
- c) Moderately responsive
- d) unresponsive
- e) Very unresponsive

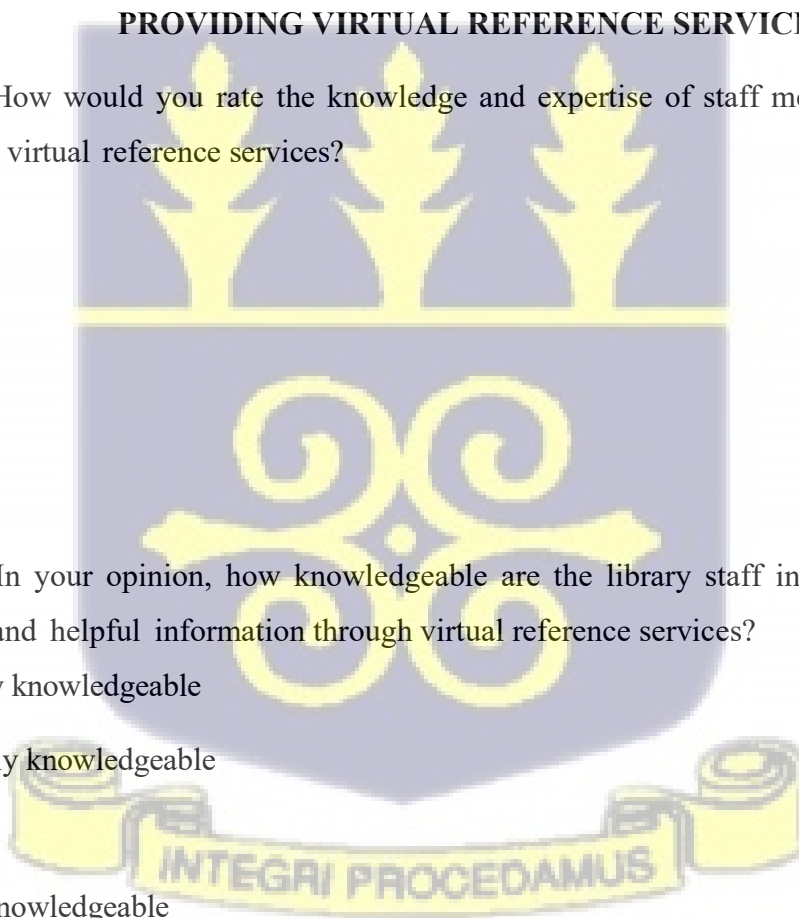
**SECTIONG: QUALITY OF STAFF COMPETENCE AND SKILLS IN
PROVIDING VIRTUAL REFERENCE SERVICES**

22. How would you rate the knowledge and expertise of staff members providing virtual reference services?

- a) Excellent
- b) Good
- c) Fair
- d) Poor
- e) Very poor

23. In your opinion, how knowledgeable are the library staff in providing accurate and helpful information through virtual reference services?

- a) Extremely knowledgeable
- b) Moderately knowledgeable
- c) Neutral
- d) Slightly knowledgeable



- e) Not knowledgeable at all

**SECTION H: CHALLENGES IN PROVIDING QUALITY VIRTUAL
REFERENCE SERVICES**

24. Have you ever encountered difficulties in using and accessing virtual reference services in your academic Library? (If no skip to 32)

- a) Yes

- b) No

25. If yes, please describe the nature of the difficulties encountered.

.....

26. How often do you encounter these challenges in using and accessing virtual reference services?

- a) Very frequently

- b) Frequently

- c) Occasionally

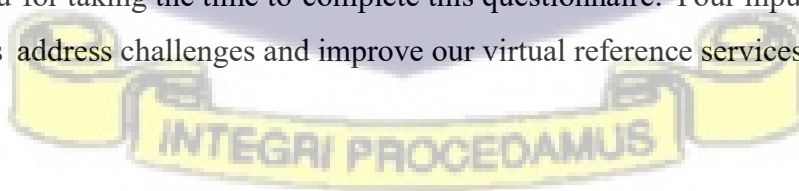
- d) Rarely

- e) Not at all

27. What improvements would you suggest to enhance the effectiveness of virtual reference services in meeting graduate students' informational needs?...

.....

Thank you for taking the time to complete this questionnaire. Your input is invaluable in helping us address challenges and improve our virtual reference services



APPENDIX C INTERVIEW GUIDES

UNIVERSITY OF GHANA
COLLEGE OF EDUCATION
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES
DEPARTMENT OF INFORMATION STUDIES

INTERVIEW GUIDE FOR UNIVERSITY LIBRARIANS

Introduction Dear Sir/Madam,

Thank you for granting this interview. The study topic is “**Assessing Virtual Reference Services in selected universities Libraries in Ghana**”. This Interview seeks to investigate the role of library management in enhancing virtual reference services (email services, phone, chat services, video services instant messaging) in academic libraries in Ghana. Your response will be confidential and used solely for research purposes. No identifiable will be shared or published.

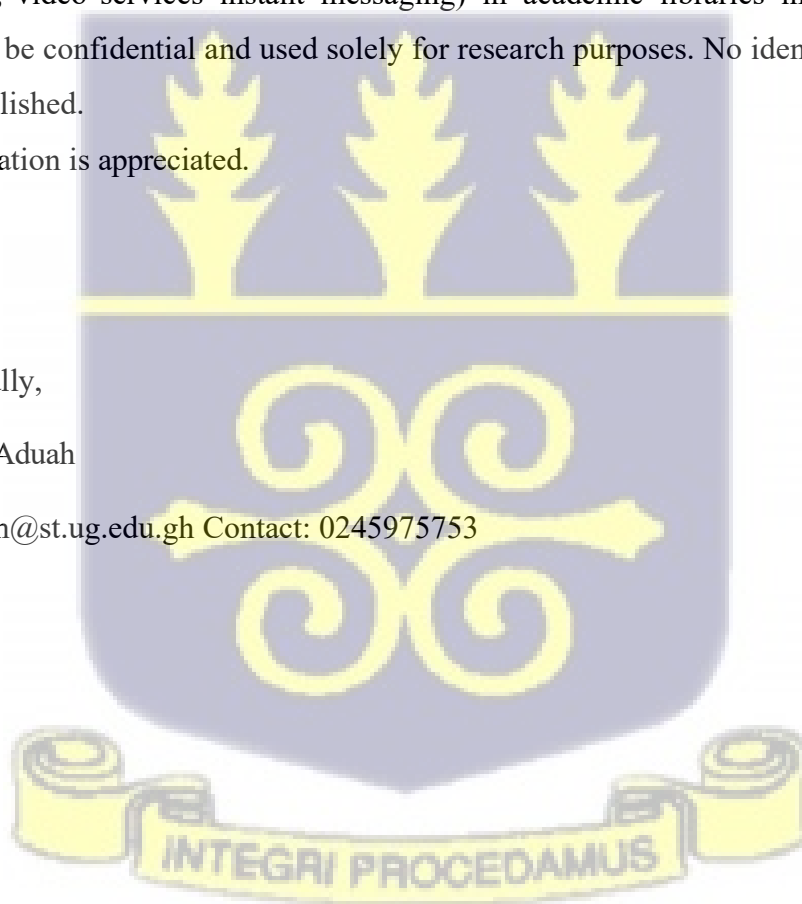
Your participation is appreciated.

Thank you.

Yours Faithfully,

Bisem Noah Aduah

Email: nbisem@st.ug.edu.gh Contact: 0245975753



SECTION A: DEMOGRAPHIC INFORMATION

1. Position:

2. Institution:

Please, respond to each of the items in this section by a tick [] appropriate to your case

3. Qualifications:

a) PhD []

b) MPhil/MA []

c) BSc []

d) Others specify.....

4. Gender of respondent: Male [] Female []

5. Age range: 21-29 [] 30-39 [] 40-49 [] 50-59 [] 60+ []

SECTION B: RESPONSIBILITIES

6. Can you please provide a brief overview of your role and responsibilities as a librarian in this university?.

7. How long have you been involved in virtual reference services?.....

SECTION C: QUALITY OF MANAGEMENT SUPPORT FOR VRS

8. Can you provide examples of specific actions or initiatives taken by the library management to support virtual reference services.

.....

SECTION D: QUALITY OF ICT SUPPORT FOR VRS

15. Do you feel that you have access to adequate technological resources (e.g., software, hardware, internet bandwidth) to support virtual reference services

16. Are there any specific resource needs that you believe are currently unmet concerning virtual reference services?

SECTION E: QUALITY SKILLS TRAINING COMPETENCE

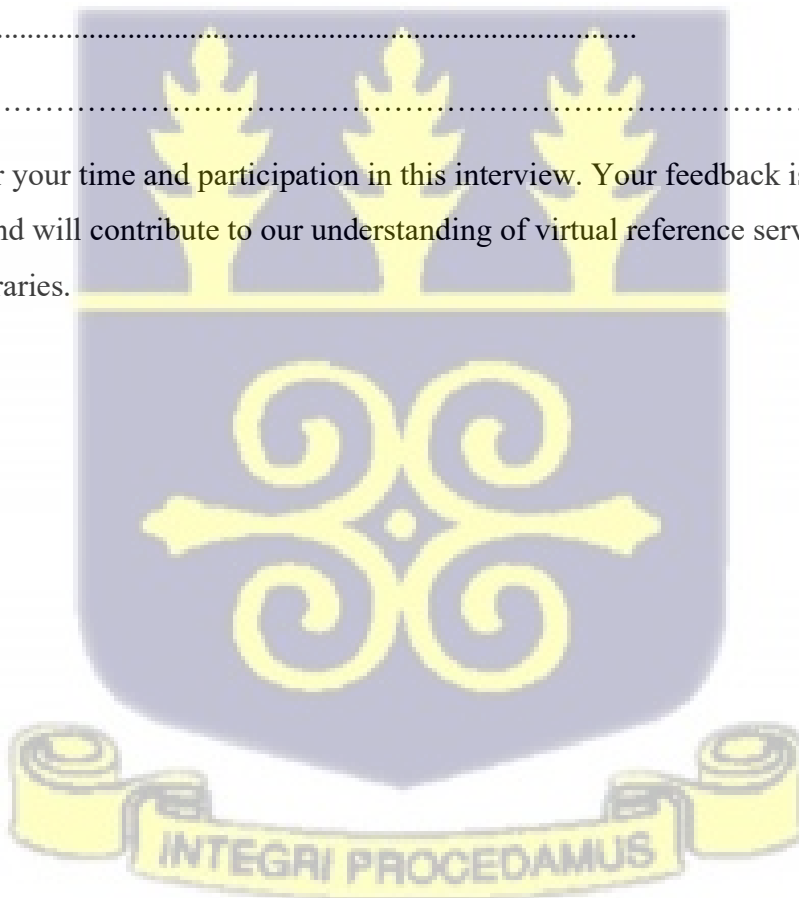
18. How would you rate the quality of skills training provided to staff involved in virtual reference services?

19. Can you describe any training programs or opportunities available to enhance staff competence in providing virtual reference services.....

20.....In your opinion, what additional training or support could improve staff competence in virtual reference services? continues training, good staff, ict training in library, training on marketing.....

.....

Thank you for your time and participation in this interview. Your feedback is greatly appreciated and will contribute to our understanding of virtual reference services in university libraries.



**UNIVERSITY OF GHANA
COLLEGE OF EDUCATION
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES
DEPARTMENT OF INFORMATION STUDIES**

An Interview Guide for ICT Staff of the academic library.

Dear Sir/Madam

Introduction

My name is Bisem Noah Aduah, an MPhil Information Studies student in the Department of Information Studies, College of Education, University of Ghana. In partial fulfillment of the requirement for the award of my MPhil Degree, I am conducting a study on **‘Assessing Virtual Reference Services in selected University Libraries in Ghana.** The VRS includes (email, chat librarian, web form, telephone, video, and FQAs). This interview schedule is meant to help me collect data on the study. The data obtained from you and your institution shall be confidential and used for academic purposes only.

Thank you for accepting to answer this interview.

Thank you.

Yours Faithfully,

Bisem Noah Aduah

Contact: 0245975753

SECTION A: DEMOGRAPHIC INFORMATION

6. Position:

7. Institution:

Please, respond to each of the items in this section by a tick [] appropriate to your case.

Qualifications:

- a) PhD ☐
- b) MPhil/MA ☐
- c) BSc ☐
- d) Others specify.....

8. Gender of respondent: Male ☐ Female ☐

9. Age range: 21-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60+ ☐

SECTION B: RESPONSIBILITY

10. Can you tell me about your role and responsibilities within the ICT department?.....

.....

11. How long have you been working in this role?

.....

SECTION C: INTERNET CONNECTIVITY

12. How would you rate the current internet connectivity in the library?

- a) Excellent,
- b) Good,
- c) Fair,
- d) Poor

13. Have any significant issues with internet connectivity affected virtual reference services? If so, please describe.

.....

.....

14. What measures are in place to ensure stable and high-speed internet connectivity for virtual reference services?

.....

15. Are there any planned upgrades or improvements for internet connectivity?

.....

SECTION D: HARDWARE

16. What types of hardware are currently used to support virtual reference services

a) Computers

b) servers,

c) peripherals

17. Have any hardware-related challenges affecting the delivery of virtual reference services?

.....

18. How frequently is the hardware maintained or upgraded to ensure optimal performance?

. Do you feel the current hardware is sufficient to meet the demands of virtual reference services?

Why or why not?.....

SECTION E: SOFTWARE

19. What software platforms are used for virtual reference services (e.g.,

emailing services chat systems, video conferencing, Phone
services, webform FAQs (knowledge base)

20. Have any software-related issues impacted service delivery? If so, can you provide examples?.....

21. How often is the software updated or reviewed to ensure it meets the needs of users and staff?.....

22. Are there any software tools or features you believe are lacking or could be improved to enhance virtual reference services?.....

SECTION F: RECOMMENDATIONS

23. Can you suggest any improvements or changes to the current setup to enhance the delivery of effective virtual reference services?.....

24. Are there any additional resources or support that the ICT department needs to better support virtual reference services?.....

**UNIVERSITY OF GHANA
COLLEGE OF EDUCATION
SCHOOL OF INFORMATION AND COMMUNICATION STUDIES
DEPARTMENT OF INFORMATION STUDIES**

INTERVIEW GUIDE FOR REFERENCE SERVICES STAFF

Introduction

Dear Sir/Madam,

Thank you for agreeing to participate in this interview on the topic “**Assessing Virtual Reference Services in selected University Libraries in Ghana**”. This Interview seeks to explore the knowledge of reference service staff, on the role of library management in enhancing virtual reference services (email services, phone, chat services, video services instant messaging) in academic libraries in Ghana. Please be assured that your responses to the questions will be kept confidential and will be used solely for research purposes. Your co-operation is fully appreciated.

Thank you.

Yours Faithfully,

Bisem Noah Aduah

Email: nbisem@st.ug.edu.gh

Contact: 0245975753

SECTION A: DEMOGRAPHIC INFORMATION

1. Position: junior ass lib

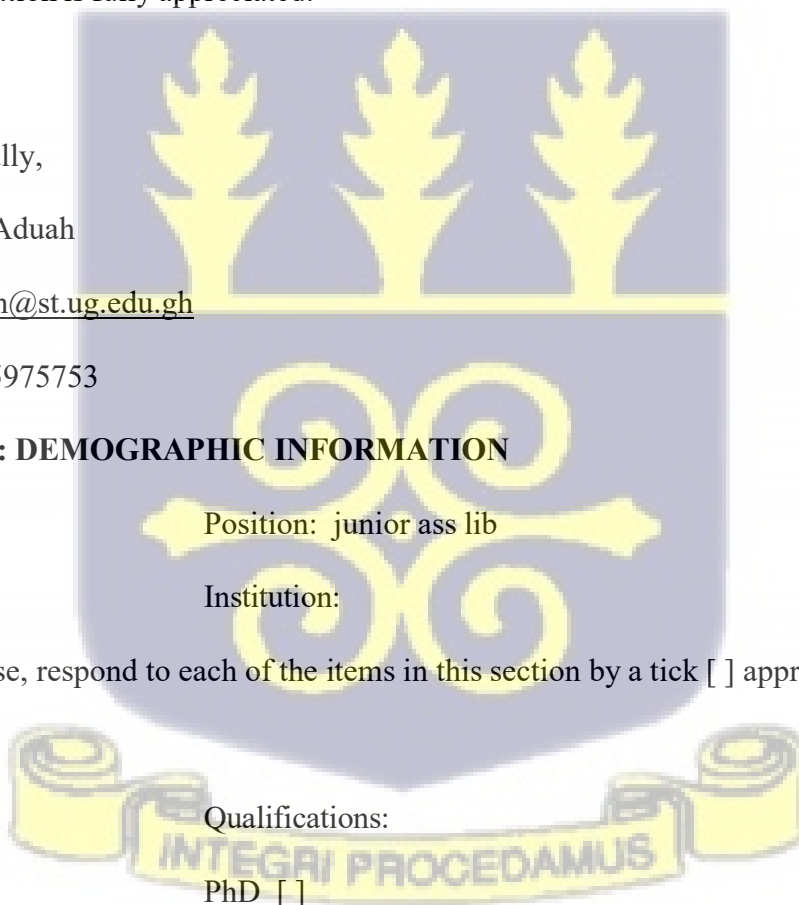
2. Institution:

Please, respond to each of the items in this section by a tick [] appropriate to your

case

3. Qualifications:

a) PhD []



- b) MPhil/MA ☐
- c) BSc ☐
- d) Others specify.....
4. Gender of respondent: Male ☐ Female ☐
5. Age range: 21-29 ☐ 30-39 ☐ 40-49 [.....] 50-59 ☐ 60+ ☐

PART B: RESPONSIBILITIES

6. Can you provide a brief overview of your role and responsibilities in the university library as a virtual reference service staff?
7. How long have you been involved in providing virtual reference services to students, particularly graduate students?
8. What types of virtual reference services are available for graduate students in your academic library?
9. How do graduate students typically access these services? (e.g., phone call, online chat, email, video conferencing)

SECTION C: QUALITY OF VIRTUAL REFERENCE SERVICES ACCESSIBILITY.

10. How do you ensure that virtual reference services are accessible and known to graduate students within the university community?
11. Could you describe the process a graduate student would follow to seek assistance through your virtual reference services?
12. How do you collect feedback from graduate students about their experience with virtual reference services?
13. Have there been any notable improvements or changes made to the virtual reference services based on feedback from graduate students?
14. How do you collaborate with faculty or other departments to ensure that

virtual reference services meet the needs of graduate students?

15. How do you manage the balance between providing personalized assistance and handling a high volume of inquiries from graduate students?

SECTION D: QUALITY OF VIRTUAL REFERENCE SERVICE RELIABILITY

16. What do you do ensure that virtual reference services can be relied upon by graduate students within the university community

SECTION D: QUALITY OF VRS RESPONSIVENESS

17. What measures do you put in place to ensure virtual reference services are responsive to graduate students' information.

SECTION D: COMPETENCE AND SKILLS TRAINING QUALITY

18. Can you rate skills training programs for staff in academic

19. What training or professional development opportunities are provided to staff members involved in delivering virtual reference services to serve graduate students better?

20. Are there any additional training needed to improve staff competence

SECTION D: CHALLENGES ENCOUNTERED OF DELIVERING QUALITY

VIRTUAL REFERENCE SERVICES TO GRADUATE STUDENTS IN YOUR ACADEMIC LIBRARY?

21. What are the primary challenges of VRS in your academic library

