USABILITY OF KOHA ONLINE PUBLIC ACCESS CATALOGUE BY UNDERGRADUATE USERS FOR INFORMATION RETRIEVAL IN TECHNICAL UNIVERSITY OF KENYA LIBRARY

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ABSTRACT

KOHA is a web-based open source Library Management System (LMS) with an Online Public Access Catalogue (OPAC) module. KOHA OPAC is a versatile information retrieval instrument available to users both on and off campus. In Kenya most libraries use KOHA OPAC to facilitate information retrieval in various formats. This is made possible because of infinite potential and magnitudes of searching such as basic, advanced and keyword search which helps the user in retrieving needed information resources. However, despite these features, KOHA OPAC remains overlooked as observed in the tendency of users ignoring its utilization by going to the shelves straight. This brings about doubt as to the usability of KOHA OPAC thus hindering realization of its benefits. Purpose of this study was to probe usability of KOHA OPAC by undergraduate patrons for information retrieval in Technical University of Kenya Library (TU-KL). The study investigated usability of KOHA OPAC concerning; usability testing, interface design, ease of use, time taken, and user satisfaction. This research was governed by Roger's Diffusion of Innovation Theory. Target population was 8,328 which yielded a sample size of 382 undergraduate students picked by stratified random sampling technique. Descriptive survey design was applied, with questionnaires adopted to gather data. A pre-test to ascertain validity and reliability of Pre-Task Questionnaire was conducted during a pilot study at Jomo Kenyatta University of Agriculture and Technology (JKUAT) Nairobi Central Business District (CBD) Campus giving a Cronbach correlation coefficient of 0.70 which was regarded as appropriate. A usability test was administered to participants in TU-KL. Descriptive statistics like mean, standard deviation and percentages were applied for data analysis. Findings were presented in tables using Statistical Packages for Social Sciences (SPSS). It was established that majority of undergraduate library users (about 70%) claimed that it was difficult to learn how to utilize KOHA OPAC for information retrieval. This was prompted by user inability to utilize the advanced search of KOHA OPAC which required application of Boolean operators to specify or broaden a search, unfamiliarity with features of KOHA OPAC, poor visibility and clarity of the link facilitating access to the online help feature which made it difficult for users to get assistance. The researcher concluded that using KOHA OPAC was not easy since participants could not employ the advanced search option effectively, they experienced difficulties locating online help feature and they were unable to get needed results after using KOHA OPAC since they lacked knowledge regarding features of KOHA OPAC such as the call number. The researcher suggested customization of KOHA OPAC interface to provide clear and descriptive features that adopt user friendly terminology, intensify visibility and clarity of the link to online help and escalate training on utilization of KOHA OPAC by collaborating with members of faculty so as to amalgamate the training in the university curriculum to enhance user information search and retrieval skills.

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ACRONYMS AND ABBREVIATIONS

CBD	**:**	Central Business District
CSS	**:**	Cascading Style Sheets
EPUB	**:**	Electronic Publication
GUI	**:**	Graphical User Interface
HTML	**:**	Hypertext Markup Language
HCI	**:**	Human Computer Interaction
ICT	**:**	Information Communication Technology
OPAC	**:**	Online Public Access Catalogue
PDF	**:**	Portable Document Format
PSSUQ	**:**	Post-Study System Usability Questionnaire
URL	**:**	Uniform Resource Locator
CUE	**:**	Commission for University Education
TU-KL	:	Technical University of Kenya Library
ILS	:	Integrated Library System
NCBD	:	Nairobi Central Business District
SERP	:	Search Engine Result Page
RFID	:	Radio Frequency Identification
LMS	:	Library Management System

DEFINITION OF TERMS

OPAC:	A module within an Integrated Library System consisting of bibliographic information that describes information resources held by the library.
KOHA:	A free, open-source database that uses Structured Query Language (SQL), runs on Apache2 server and uses Perl programming language with cataloguing data housed in Machine Readable Cataloguing accessible via Z39.50.
OPAC instruction:	Teaching users how to use OPAC for information retrieval.
Information resource:	A resource which can convey or describe characteristics of a resource.
Usability:	Ability to use a product based on efficiency, ease of use, interface design, minimal likelihood of making errors while using it, reduced memory load and high levels of user satisfaction
Boolean search:	A search performed using Boolean operators (AND, OR, NOT) with the intention of broadening or narrowing a search or excluding a specific term from the search
Interface:	Is the space where correspondence between user and system occurs

Integrated Library System:	Software that bolsters library operations namely; circulation, cataloguing, reports, administration, acquisition, serial control and OPAC
Information retrieval:	User activities that involve tracing and recovering information from stored data with the aim of satisfying existing information needs
Skill:	Techniques patrons require for using OPAC efficiently
Usability Test:	Procedure that entails gathering usability data with the aim of evaluating and improving the data in structured manner.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter showed various sections organized as follows; background, statement of the problem, purpose, objectives, research questions, significance, limitation and delimitation, assumptions of the study, theoretical and conceptual framework.

1.2 Background to the Study

Library consists of information in print and non-print formats. In the likely event that this information is well organized, there is need for the patron to have a mechanism that enhances retrieval. To aid patrons in retrieving information resources, academic libraries provide computerized information retrieval apparatus called Online Public Access Catalogues (OPACs). OPAC was adopted by libraries in late 1970s and at the onset of the 1980s, eventually undergoing several stages of development. Before OPAC was developed, academic libraries employed card catalogues which contained bibliographic details that described library materials and offered guidance to their location. Similarly, OPAC also contain bibliographic details of library materials in machine readable format (Babu & O'Brien, 2000).

Odunola & Tella (2020) claimed that in libraries, the value of OPAC cannot be overstated. Its benefits include the capacity to put requests for library items, fast access to library collections, locating shelves, checking status of library materials, all of which reduce the time it takes to find information resources in libraries. Without a doubt, the utilization of OPAC has altered bibliographic data in libraries by enabling keyword, Boolean, wildcard, and shortened searches that were not feasible with card catalogues.

According to (Shokane & Bopape, 2023), OPAC supplies patrons with information concerning creators' names, titles, subject terms, standard numbers, publication areas, physical descriptions and notes detailing information sources to facilitate effortless information retrieval. It is necessary for patrons to consult OPAC to gain direct access to information resources. Absence of OPAC places burden of locating an information resource to the library patron.

During early stages of its development, OPAC could only be accessed by logging into computer terminals within a secluded section of the library. The emergence of internet in 1993 led to formation of a web-based OPAC which offered an opportunity to library clientele to search the catalogue regardless of their location. Web-OPAC provides access using Uniform Resource Locator (URL). Unlike the early OPAC, Web-OPAC is not limited to desktop computers and it can also be accessed through hand held devices thereby increasing accessibility (Yuvaraj, Verma & Kumar, 2024).

Naik & Nikam (2014) argue that users of Web-OPACs can be able to access hyperlinks to various subjects due to Hyper Text Markup Language (HTML) coding. On the results page of Web-OPAC, users view bibliographic details of their preferred information resource and select the subjects given in order to access information resources of similar or related subjects. When users enter correct queries on the search box of Web-OPACs, retrieval of information resources is facilitated. One of the most critical bibliographic details is the call number which directs users to the exact location of the information resource. This enhances timely retrieval of the information resource sought.

Item type	Current location	Call number	Status	Notes	Date due	Item holds
General Circulation Books		**TA338.B64 1982** (See Similar Items)	Available	sam-OLD LIB		

Figure: 1.0 Selected Search Result in KOHA OPAC

Graph theory in operations research: t;

By: Boffey Material type: Book Series: MacMillan computer science series.

Publisher: UK: Macmillan 1982 Edition: 1.Description: 301; x. 24.ISBN: 033382140

Source: http://library.tukenya.ac.ke/cgi-bin/koha/opac-search

In this day and age when electronic resources are part and parcel of the library collection, effective use of OPAC is an important means of increasing usage of electronic resources (Ndungu, 2016). HTML tags can be used to specify the URL of electronic resources that the university library intends to integrate with Web-OPAC. This aids Web-OPAC to function as a discovery tool where both print and electronic library materials are retrieved. This enables users to conduct information search and retrieval using a single search box thus enhancing access to electronic resources.

KOHA, an open source Web based Integrated Library System (ILS) is distributed freely and its source code can be modified to enhance its performance in order to suite local needs (Khatun, 2014). Due to its open source nature, it is easier to customize KOHA ILS to suit local needs. KOHA ILS comprise modules that automate functions of a library like reports, cataloguing, circulation, serial control, patrons, tools, administration and a Web-OPAC. User views can be incorporated during customization of KOHA OPAC to ensure user involvement.

According to (Sadeh, 2010), naturally, software solutions that are "open" allow libraries to extend and significantly alter them. A fully open product is one that allows libraries to access both the specific functionality it offers and the data it saves and manages through source code created by them or others. Since few solutions in today's software settings function well in a vacuum and integration with other systems is essential for gainful implementation, openness has become a prerequisite for the majority of libraries.

Eserada & Okolo (2019) posit that library users may gain access to KOHA OPAC by entering a qualified domain name on the Uniform Resource Locator (URL) bar of a web browser or by visiting the library website and clicking the library catalogue link. KOHA ILS is hosted on two interfaces with one interface dedicated to staff where access is through login credentials while the other interface is dedicated to users where logins are not required. KOHA OPAC is hosted on the user interface to allow users to conduct search and retrieval tasks either on campus or remotely. Since cataloguing records in KOHA are encoded, KOHA OPAC displays a basic search field embedded with access points. It also provides an advanced search option which allows users to employ Boolean search strategies to narrow, broaden or eliminate specific terms from the search.

According to (Nielsen, 1993), usability is based on five common attributes: learnability, efficiency of adoption, indelibility, errors and contentment. This implies that KOHA OPAC ought to be; simple to learn, have capabilities that link the user to needed information resources, it ought to have mechanisms that enable the user to use it effectively following extended period of non-use and users should encounter minimal errors in order to achieve higher levels of satisfaction during retrieval of information resources.

Research carried out in Taiwan's Fu Jen Catholic University to determine undergraduate students adoption of mobile applications to search library catalogues established that study participants encountered difficulties when conducting subject searches (Chen, 2019). Borgman, (1996) emphasized that today's online catalogues continue to be censured since most are hard to utilize. This is because online catalogues require users to describe information that they do not yet have.

During a study of next-generation catalogues in Kenya, 83% of the OPACs showed evidence of faceted navigation. The study demonstrated that different systems do not share a common set of features. In many systems, this feature is customizable. Most OPACs comprise location or campus as a facet because colleges in Kenya can have multiple campuses (Chilimo, 2014). The presence of faceted navigation allows users to filter unwanted information sought in order to narrow down to specific information.

In Kenya there is massive expansion in cyberspace and the use of online databases to access library materials. This growth has been propelled by good legislation and existing digital environment thus expanding the Information Communication Technology (ICT) sector. According to statistics, there were 49.9 million internet subscribers as of June 30, 2019, with 99.9% of them using mobile data (Communications Authority of Kenya, 2019).

According to a June 2019 report by Kenya's Communication Authority, many Kenyans now have access to the internet and digital technology. Availability of library OPACs with good interface designs delivering library services online encourages working-class students and tech-savvy youth to attend colleges to get information. Currently, most libraries of higher learning institutions in Kenya especially private university libraries have adopted technology. New public

universities that have been upgraded from constituent colleges have also initiated projects to computerize library tasks and avail services online (Chilimo, 2014).

Technical University of Kenya (TU-K) is a public university in Nairobi, Kenya's capital city. TU-K was founded when Kenya Polytechnic University College (KPUC) was elevated in accordance with the planned Universities Act of 2012 making TU-K to become the first technical university in Kenya. TU-K aspires to be a technical powerhouse in support of Vision-2030 and Kenya's general economic development. For TU-K to realize this there is need for a usable OPAC that serves as an instrument for retrieval of scholarly information to support learning, research and innovation among undergraduate library users. TU-K Library (TU-KL) runs library operations by employing KOHA. In TU-KL, KOHA OPAC is accessible via the library website or through the university website. TU-KL promotes usage of KOHA OPAC through information literacy instruction supplemented by guides provided in the library page.

KOHA OPAC interface in TU-KL comprises a search box with a drop down menu displaying eight search keys. In its default state, it displays a "keyword" access point. The advanced search option consists of guided style search boxes which can either be increased or decreased using the "more" or "fewer" options. Khatun & Ahmed (2018) assert that most users are not aware of the advanced search and although Boolean operators are displayed on the advanced search screen in a drop-down list, there are no examples of Boolean searching. This implies that a compact design of the user interface that closely combines basic and advanced search is appropriate. Based on the factors presented, this study analysed usability of KOHA OPAC by undergraduate users for information retrieval in TU-KL.

1.3 Statement of the Problem

The OPAC module of KOHA facilitates retrieval of information resources that are owned by the library. This is made possible due to vast capabilities and capacities of searching like the basic, advanced and keyword searches which helps the user in retrieving needed information resources. KOHA OPAC is accessible to users both on campus and off campus 24/7, serving all categories of users who include undergraduates, postgraduates, university staff and researchers. However, despite KOHA OPAC having vital features that help to direct users to the exact location of the information they seek and its ability to provide retrieval of information in a variety of file formats, all this becomes futile if KOHA OPAC features are underutilized as observed in the tendency of users disregarding the use of KOHA OPAC. This tendency of users disregarding the use of KOHA OPAC by going to the shelves directly brings about doubt as to the usability of KOHA OPAC. In the course of user interaction with KOHA OPAC, it is important to get to know how users rate its performance since this will help the researcher to gain insight on its usability. KOHA OPAC being an information retrieval system, the issue that is yet to be addressed is whether undergraduate users in TU-KL are able to use it for information retrieval.

1.4 Purpose of the study

To investigate usability of KOHA OPAC by undergraduate users for retrieval of information resources in TU-KL.

1.4.1 Objectives of the study

The study was guided by the following objectives;

i. To determine usability of KOHA OPAC by undergraduate users for information retrieval with regard to usability testing at TU-KL in Nairobi County.

ii. To analyse usability of KOHA OPAC by undergraduate users for information retrieval with regard to interface design at TU-KL in Nairobi County

iii. To examine usability of KOHA OPAC by undergraduate users for information retrieval with regard to ease of use at TU-KL in Nairobi County

iv. To determine usability of KOHA OPAC by undergraduate users based on time taken to complete search and retrieval of information resources at TU-KL in Nairobi County

v. To establish usability of KOHA OPAC by undergraduate users for information retrieval with regard to levels of user satisfaction at TU-KL in Nairobi County

1.4.2 Research Questions

The study was guided by the following research questions;

i. What is the usability of KOHA OPAC by undergraduate users for information retrieval with regard to usability testing at TU-KL in Nairobi County?

ii. What is the usability of KOHA OPAC for information retrieval by undergraduate users with regard to interface design at TU-KL in Nairobi County?

iii. What is the usability of KOHA OPAC by undergraduate users for information retrieval with regard to ease of use at TU-KL in Nairobi County?

iv. What is the usability of KOHA OPAC by undergraduate users based on time taken to complete search and retrieval of information resources at TU-KL in Nairobi County?

v. What is the usability of KOHA OPAC by undergraduate users for information retrieval with regard to levels of user satisfaction at TU-KL in Nairobi County?

1.5 Assumptions of the Study

The study assumed that:-

i. Undergraduate students have undergone KOHA OPAC instruction.

ii. Undergraduate students had good understanding on how to use computer programs

1.6 Limitations of the Study

TU-KL policy did not allow provision of KOHA OPAC transaction logs to the researcher since he was not a member of staff. The transaction logs are an important source of usage statistics and user search behaviour in KOHA OPAC. The researcher overcame this limitation through the use of user statistics derived from the reports module of KOHA shared by the Circulation Librarian in TU-KL.

1.6.1 Delimitation of the Study

Research focus was usability of KOHA OPAC by undergraduate users for information retrieval in TU-KL, Nairobi County. However, it would have been appropriate to include proprietary ILSs which also comprise OPAC modules. This would have broadened the perspective on usability of OPAC for information retrieval.

1.7 Significance of the Study

Research outcomes were considered essential to the following groups;

Students

The results promote usability of KOHA OPAC as a tool that supports learning, research and innovation among undergraduate students in TU-K. The research enhances maximum use of KOHA OAPC for information retrieval by undergraduate patrons in TU-KL.

Library Staff

The results help library staff in TU-KL to develop strategies that make KOHA OPAC easy to use through OPAC instruction that addresses difficulties that users encountered during retrieval of information resources.

System Designers

Research results assist in development of guidelines that initiate changes in the interface design of KOHA OPAC in TU-KL to enhance usability.

1.8 Theoretical Framework

The research was guided by Rogers (1995) Diffusion of Innovation (DOI) theory. According to (Kaminski, 2012) the theory is a useful change model for driving technological improvements in which an innovation is updated then spread so as to address all kinds of user requirements. Within the adoption phase, it highlights the need for communication and peer networking. According to (Rogers, 1995), DOI puts forward five innovation attributes that determine the spread of an innovation through a specific population; relative advantage (the extent to which existing tools are improved by technology), compatibility (the measure to which technology is in line with mode of operation and standards among its clientele), complexity (ease of use or learning), trialability (testing an innovation before deciding to use it), and observability (the degree to which the technology's benefits and outputs may be seen) are all factors for consideration.

A study done by (Chaputula, 2016) regarding eReadiness of Public University Libraries in Malawi adopted DOI. Chaputula (2016) argued that DOI theory presents an extensive exposition on adoption of technology. DOI focuses on how persons get to make a decision regarding how they ought to meet their information needs using technology following its adoption and the manner in which they may opt to continue utilizing it. DOI had relevance on usability of KOHA OPAC since patrons in TU-KL will make a decision whether to adopt it or not. In this study the attribute of complexity was linked to the need to examine usability concerning ease of using

KOHA OPAC for information retrieval by undergraduate patrons in TU-KL. This variable assessed whether undergraduate users in TU-KL experienced difficulties during use of KOHA OPAC. Trialability attribute was associated with usability testing that was adopted in the study to determine time taken in retrieval of information resources, ease of using KOHA OPAC and to gather user opinion regarding the interface design and user satisfaction levels of KOHA OPAC.

1.8.1 Conceptual Framework

This research was conceptualized in a framework that depicted interrelationships between study variables. Figure 1.1 shows dependent, independent, and intervening variables that were used in this study:

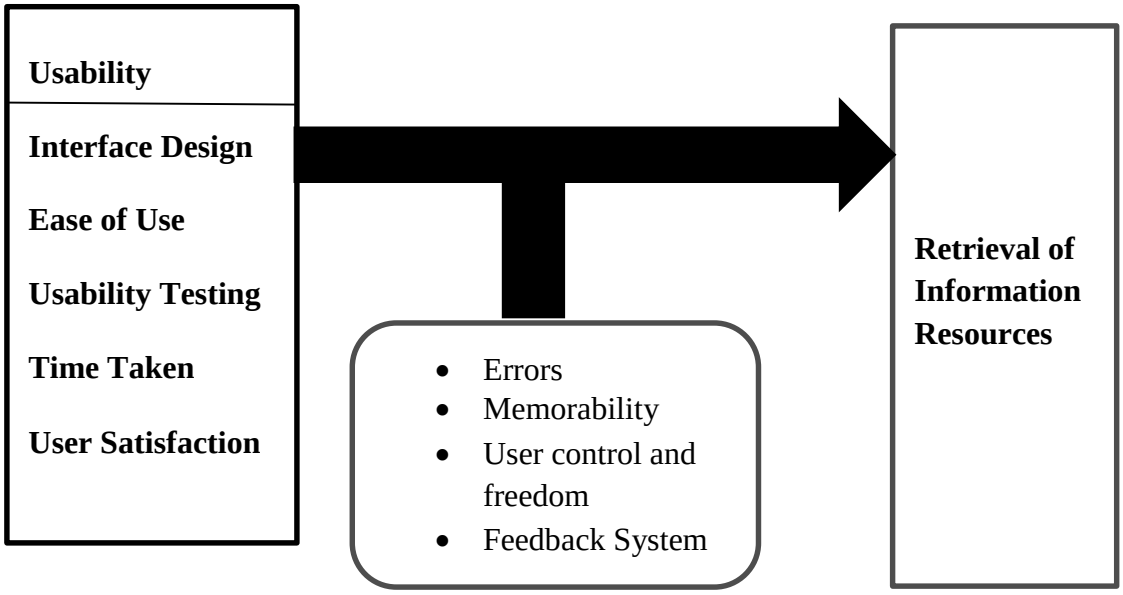

Figure 1.1: Conceptual Framework Source: Researcher 2020

The figure above depicted existing relationship between dependent and independent variables of the study. Retrieval of information resources using KOHA OPAC was dependent on usability testing of KOHA OPAC, ease of using KOHA OPAC, time taken to complete information retrieval using KOHA OPAC, interface design and user

satisfaction. However, intervening variables such as errors, memorability, user control and freedom, and feedback system may have an impact on retrieval of information resources using KOHA OPAC.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This segment discussed many scholarly works reviewed in the field of OPAC usability. The chapter was based on study objectives. It presented an overview of the concept of usability, usability of KOHA OPAC concerning usability testing, interface design, design of user centred OPAC interface, Graphical User Interface, time taken, ease of use and user satisfaction.

2.2 An Overview of the Concept of Usability

The degree to which a product/system is utilized by specific patrons to meet set goals with effectiveness, efficiency, and contentment within a fixed usage environment is called usability (International Organisation for Standardisation (ISO), 2018). The interface received the least attention in previous years since designers, developers, and clients were obsessed with getting the most functionality possible while staying within budgetary and performance parameters.

Usability was a problem that was effectively handled by few, if any, software engineering approaches (Mayhew, 2014). Usability is now regarded as a key ingredient in information retrieval systems since failure is unavoidable for information retrieval systems which are difficult to operate or which provide instruments that are difficult to interpret. This affirms that users have preference for information retrieval systems that address their information requirements with ease and efficiency.

Nielsen, (1993) argued that users' tolerance for complex or painful interfaces is waning as experience with some of the existing interfaces has demonstrated that

software may actually be user-friendly and simple to understand. Tim Frank Andersen of the Technical University of Denmark studied 70 software product reviews in various periodicals for personal computers and tallied 784 comments about the software's usability. He conducted this unpublished study in 1990. This translates to 11.2 usability remarks for every software evaluation on average. A lot of these remarks were really cursory yet their sheer quantity shows how crucial usability is to consumers in the modern world.

According to (Xie , Babu, Lee, Castillo, You & Hanlon, 2020), design flaws make it difficult for visually impaired users to interact with features and contents of digital libraries, hence becoming vulnerable in these environments. A substantial chunk of usability research either suggests design principles or ways to improve the current design by way of customization. According to (Nielsen, 1993) in this day and age the interface is an essential component of the computer than ever before. The rise of personal computers occasioned by low hardware costs is making computers more accessible to a growing number of people who use computers to do many tasks. People currently have higher expectations than they did in the past, when a product delivered new features and strong performance and users were ready to overlook a lack of usability. Today users anticipate that items will not only be useful but also enjoyable to use. Nevertheless, this study will focus on usability of KOHA OPAC by undergraduate users for information retrieval in TU-KL.

In Human-Computer Interaction (HCI) and information science, usability is explored and investigated, with many academicians highlighting its significance in the design and assessment of interactive systems. However, usability of a product may be hampered by difficulties in using it, poor interface design or failure to match user characteristics with system characteristics. This makes users of the product to spend

too much time using it to realize their goals. Such difficulties ultimately lower the levels of user satisfaction.

2.3 Usability of KOHA OPAC with Regard to Usability Testing

Umarani, Nagarkar & Jagtap (2016) suggest that assessing usability of a man-made product like a webpage, computer interface, document, or gadget for its intended use is known as usability testing. The intent of usability testing is to ascertain how intuitive a system is. Hence, a range of methods can be like; surveys, in-person user interviews and video recording of patron forums can be adopted. In addition to this, task analysis is a technique that may be applied in which users are given specific tasks to complete, and observations are made and then further examined.

It is difficult to develop an information retrieval apparatus committed to principles of usability without subjecting patrons to usability testing. Ferreira & Pithan (2005) stated that assigning tasks to users is vital especially during development of virtual systems, specifically during interface design since the interface is the avenue via which interaction between the system and the user takes place. Usability testing can be achieved through allocating chores to a sampled population so as to ascertain whether users have ability to attain the aim of retrieving information efficiently. Contentment will rely on how patrons execute chores given to them.

Ghasemifard et al. (2015) opine that initiating usability test can assist interface designers to bring out interface features of a software product, cut the cost of support and development and raise its market competitiveness. Usability testing assists software developers to establish whether "persons who employ the product can do so quickly and easily to accomplish their own tasks". This study will initiate a usability

test for KOHA OPAC concerning ease of use, interface design, time taken to retrieve information resources and user satisfaction.

Silva & Wijayaratne (2015) emphasized that all libraries ought to conduct usability test for their websites since it helps to provide crucial information, response and intuition. Adopting that which has been learned in usability testing leads to customized websites that are client-focused resulting in more successful researchers. During usability testing, data gathered is analysed and employed to initiate changes on the interface as per user preferences thus leading to user friendly websites. Silva & Wijayaratne (2015) study focused on "University of Colombo library website", nevertheless, this study will focus on usability testing of KOHA OPAC by undergraduate patrons for information retrieval in TU-KL.

Khatun (2014) suggests that usability testing entails observation, a procedure intended to enhance design. Chores are given to sampled participants who apply the interface and perform functions using the system as their executions and reactions are observed and recorded. Main motive for usability testing is disclosure of usability problems that patrons may encounter during system utilization so as to initiate ways of solving them. This study will present a set of tasks to be executed by a sample of study respondents with a view of determining ease of use, interface design and time taken to retrieve information resources using KOHA OPAC. Findings of the study will inform modifications to be made on KOHA OPAC interface.

Usability testing has become a necessary initiative that needs to be undertaken before, during and after an information retrieval system has been implemented since it presents a means of knowing whether it is usable by identifying features of the system that are seamless and the ones that need customization. According to (Denholm et al.,

2009), the State Library of Tasmania developed a new information retrieval apparatus to replace the existing one. However, before implementation, the library was mandated to establish whether users would embrace the new information retrieval system more than they had embraced the older one. The only way that this could be realized was through usability testing. User responses from the usability test influenced modifications on the discovery interface of the new information retrieval system since users were more concerned with information delivery than with discovery of information. However, unlike the information retrieval system at the State Library of Tasmania which was still undergoing development, this study will carry out a usability test on KOHA OPAC, an information retrieval tool that has already been fully installed in TU-KL.

For a library to determine the actual situation with regard to usability of OPAC, a usability test is subjected to a representative of the user population of the library. At a university library in Sweden, a request was made to newly selected users to perform search tasks using the beta version of LIBRIS, a Swedish union catalog (Denholm et al., 2009). This assisted the university library to establish how users approached the system during their first encounter and the working condition of the basic search functionality. This researcher will sample the undergraduate population of TU-K and subject the sample to a usability test involving the use of KOHA OPAC to perform assigned tasks.

At Jiangsu University, patrons were given chores to establish their ability to access e-resources using OPAC. After the usability test, one expert tutor was of the opinion that while the library website provided access to applicable databases, it failed to offer ways of reverting to the homepage after utilizing e-resources (Nyame et al., 2019). Jiangsu University's usability test was able to help OPAC system designers to

enhance interface elements, making them more interactive and user-friendly. Unlike the usability test at Jiangsu University, this study will initiate a usability test of KOHA OPAC in TU-KL with sampled population of undergraduate users.

According to (Yusuf & Adewuyi, 2020), KOHA OPAC users at a Nigerian University experienced difficulties during application of search features, display options, and system speed but overall patrons showed positive perception towards KOHA OPAC during the usability test. Similarly (Nabi & Shafi, 2017) conducted a usability evaluation study of KOHA OPAC among selected university libraries in Punjab, India, using observation, interviews, and questionnaires. It was revealed that the system was generally easy to employ, but there were areas for improvement in terms of search features and display options. This study endeavours to ascertain usability of KOHA OPAC in information retrieval concerning usability testing by undergraduate users at TU-KL in Nairobi County.

During analysis of Search Query Reformulation (SQR) patterns at the University of Dar es Salaam by distant OPAC patrons, it was noted that it is more beneficial to use usability testing as compared to search log analysis since search logs never contain demographic information of searches like age of users, gender, level of education and experience (Ndumbaro, 2022). This study will adopt usability testing in order to establish usability of KOHA OPAC in retrieval of information resources in TU-KL.

Kavulya (2019) while researching integration of KOHA ILS and Radio Frequency Identification (RFID) technology that reviewed prospects for modern university libraries in Kenya asserted that criticism has been accorded to open source software due to poor usability since they do not undergo expert usability review and they fail to take care of a large portion of computer users. Open source software is more developer-centred and is limited to those with skills on the programming language

used and administrative privileges. For instance, functionalities like non-custom reporting need expertise in Structured Query Language (MySQL) for retrieval of information from KOHA (Yuen, 2009; as cited by Kavulya, 2019). The researcher will conduct a usability test on KOHA OPAC in TU-KL to determine usability.

Scrutiny of available literature on usability of KOHA OPAC concerning usability testing shows that there is hardly any evidence of research on usability testing of KOHA OPAC in Kenya and specifically in TU-KL. This study sought to determine usability of KOHA OPAC by undergraduate users for information retrieval with regard to usability testing at TU-KL in Nairobi County.

2.4 Usability of KOHA OPAC with Regard to Interface Design

The interface of ILS empowers users to steer with ease and access resources in this technologically driven age by serving as channels for vast quantities of information (Kline & Barlow, 2006; Xie & Matusiak, 2016). These interfaces are more than just operational; they're complex networks of signals and symbols that guide interactions, elucidate meaning, and mold user experiences (Sadeh, 2010). The interface of OPAC ought to enhance positive user exchanges, and boost its general usability (Yuvaraj et al., 2024).

Information searching can be a difficult endeavour, especially for inexperienced searchers. The effectiveness of online searches is influenced by a number of interconnected elements. One of these elements is the interface design of information retrieval systems. Sadeh (2008) observes that OPACs are more librarian-centred in their design since most of the terminology applied in the interface of OPAC can only be understood by library personnel thereby severely hampering the end user interface. Xie (2008) claims that because the interface is a significant attribute via which users

engage with OPAC systems, its outline will influence triumph or failure of interactions. This research analysed usability with regard to the interface design of KOHA OPAC during information retrieval by undergraduate users at TU-KL.

Since KOHA is an open-source ILS, it uses guides and style sheets to alter KOHA OPAC interface. KOHA OPAC can be customized using HTML and jQuery. KOHA uses template files to generate HTML code for the interface of KOHA OPAC. These files are located in the "intranet-tmpl" and "koha-tmpl" directories within the KOHA installation folder. A text editor like nano or gedit may be used to open these files and modify the HTML code. HTML codes are then added to the templates to customize the appearance of the interface of KOHA OPAC (Mandal, 2018).

Evidence from studies conducted in the past show that poor OPAC design contributes to underutilization of OPAC (Knievel et al., 2009;Mi & Weng, 2008). Knievel et al. (2009) observed that modifying the OPAC interface influences the search behaviour of the user by reducing rate of search failure, following the redesigning of OPAC interface at the University of Colorado Boulder. Data was collected using transactional log analysis on the University of Colorado in Boulder's OPAC for a period of six semesters. Nevertheless, this study will adopt a usability test without a redesign of KOHA OPAC and the data collection tool will entail a questionnaire thus implying that the findings might be different from those of (Knievel et al., 2009).

Ruzegea, (2012; as cited by Chanda, 2018) argues that the interface design of OPACs in some university libraries is inconvenient to users since it does not permit interaction with users during information search and retrieval rendering it inefficient and less effective. Some users have challenges during formulation of search queries using the advanced search option which is presented as a separate link. The link of the

advanced search feature was not visible enough. Therefore, it was recommended that a small screen setup that seamlessly integrates basic and advanced searches could be helpful (Khatun & Ahmed, 2018).

During a study on accessibility and usability of library websites for students with visual and physical disabilities at public universities in Kenya, (Kiruki, B W & Mutula, 2021; cited Chambers 2001) who conducted a usability test on the website of persons with disabilities at Kraemer Family Library, University of Colorado Springs. Usability tests showed side bars on every web page were not effective as a result of low colour variation between the text and background with other links having perplexing vocabulary requiring good labelling. Moreover, deployment of certain links was not adequate making it hard for participants to find information.

OPACs with intuitive interface serve as discovery tools by providing a single search box for accessing all library materials. Ours (2012) initiated a study to evaluate discovery services at Lynchburg College. He found out that an intuitive interface implies that patrons could apply it to locate scholarly information without any formal training. Most discovery systems are configured to offer hard copy and electronic resources and in some instances information resources outside the library collection and they are searchable simultaneously resulting in provision of results that are not available online (Brett et al., 2015).

Indeed, (Yesmin & Ahmed, 2016) during a study to examine how university students prefer to search the library's collection using VuFind, its discovery tool, versus the KOHA OPAC concurs that most library users prefer to search one search box than relying on a slew of distributed systems and interfaces. Chilimo (2014) further clarifies that OPAC ought to provide one entry platform for accessing information

resources. However, this study is determined to analyse usability of KOHA OPAC by undergraduate patrons with respect to interface design at TU-KL dissimilar to (Yesmin & Ahmed, 2016) who did a comperative study between KOHA OPAC and VuFind.

Schmetzke et al. (2007) used heuristic evaluation methods to determine usability. They observed that it is necessary for libraries to ensure that access points that facilitate search and retrieval activities in OPACs are presented using terminology that can be understood by all users. In Web OPACs like KOHA OPAC, some access points like call number, library catalogue and ISBN may be popular among librarians but unknown to users. Indeed, (Kumar, Rajinder & Singh, 2017) clarified this when they analysed application of OPAC at University Libraries in Delhi. Study outcomes showed that out of 191 library users at the Jamia Milia Islamia University, 35% of patrons faced challenges while using OPAC as they were unable to understand OPAC attributes. These studies are distinct to the current study which endeavours to analyse usability of KOHA OPAC by undergraduate patrons for information retrieval with respect to interface design.

A usability study on functionalities of OPAC, (Johnson & Craven, 2010) noted that respondents needed to execute OPAC tasks but because OPAC attributes like the link to Google books were not visible, they felt that OPAC failed to aid them in their pursuit to retrieve information. According to (Ruzegea, 2012), the OPAC interface attributes had many shortcomings like: visibility (50%), accessibility (16.7%), usability (23%), and navigation (10%). This variation in results suggested a considerable difference in the significance of the issues or challenges respondents reported in relation to use. Results of another study initiated earlier in the same university by Schmetzke et al. (2007) similarly demonstrated a lack of visibility of the

Web OPAC interface, as reported by 60% of respondents, proof that visibility was an obstacle.

Ballard (2008) conducted research on VERSO graphic interface, a project of Quinnipiac University's Arnold Bernhard Library. It was revealed that despite the rich collection of the library, it was still underutilized since links to the collection were not visible. Ballard (2008) also clarified that as the volume of electronic resources and the general quantity of library collections continue to enlarge at unparalleled rates, it becomes necessary for libraries to design simple and highly visible interfaces for their patrons. This research analysed usability of KOHA OPAC by undergraduate patrons for information retrieval with respect to interface design at TU-KL.

A support system is a crucial component of any online service. Though accessible through virtually any text-based (telnet session, for example) system, the OPAC support system is absent from the web version. However, OPACs' search systems differ from what consumers are used to from Internet search engine interfaces, thus this kind of assistance appears to be readily available on OPAC websites (Malak, 2008). Presence of help attribute in the interface of OPAC facilitates ease of use since any user who has never used OPAC before will use the help feature for guidance. The researcher sought to determine existence of a help attribute in the interface of KOHA OPAC.

KOHA OPAC interface in TU-KL is characterized by a basic search box with keyword search as the default access point. The advanced search is located in the header of KOHA OPAC. To enhance interactivity the interface of KOHA OPAC in TU-KL comprises of "Ask a Librarian" link (Kwanya, Tom, 2017). Although the most used open source ILS for managing library functions in Kenya is KOHA

(Amollo, 2013), there is no documented evidence of analysis on usability of KOHA OPAC by undergraduate users for information retrieval with regard to interface design in TU-KL. This is critical because the interface as the initial point of contact between KOHA OPAC and users serves as an essential platform of usability that required analysis.

2.4.1 Design of User Centred OPAC Interface

It is important to take into consideration the relationship that exists between computers and humans with a steady focus on interactivity. Lazar (2007) argues that diverse patrons give important report during usability tests and implementing such reports improves interface design. Patrons of OPAC in academic libraries are; teaching staff, librarians, students and non-teaching staff members. During the design process, input from these users is vital in enhancing OPAC acceptability and a sense of ownership that is critical for usability (Techataweewan, 2019).

According to (Schmetzke et al., 2007) innumerable research on OPACs have revealed that it is essential to bring the user on board during design of OPAC interface. It is necessary to develop an OPAC interface that is centred on the user to ensure that they accomplish their goals while using the system. However, (Wakeling, 2012) opines that the challenge of designing an OPAC interface based on user input is diversity which is evident in demographic and task orientation. Wakeling's argument though genuine due to diversity of the user population of any given library in terms of information retrieval skills, colour preferences and database terminology should not be adopted in KOHA OPAC to monopolize the design process.

In July 2008, interviews were conducted with sixteen foreign students at the University of Sheffield to ascertain their fondness for prospective features in the

OPACs of the future. A partially organized interview schedule using pictures of mock-up screens was employed. The study established that in order to secure the future of OPACs, the design of their interface should be based on analysis of user demands. Interface designers of KOHA OPAC should be able to solicit views from the user population such as preferred features and colour (Tam, Cox & Bussey 2009). Nevertheless, this study will adopt a usability test to ascertain usability of KOHA OPAC in information retrieval, in contrast to the interviews initiated by (Tam et al., 2009) and the study population will be undergraduate patrons in TU-KL who are heterogeneous.

It is possible to improve the content of OPACs by adding a list of chapters and an abstract of the book with its image (Breeding, 2007). The image of the book is made visible on KOHA OPAC when the cataloguer enters a thirteen digit ISBN on field twenty of the cataloguing module of KOHA ILS. This achieves visual effects on users and helps them to narrow down results quickly. In view of the above, it is apparent that user views and opinions are considered in KOHA OPAC customization to facilitate usability. Hence, this research determined to establish whether adopting user views during design of KOHA OPAC interface improved usability during information retrieval by undergraduate patrons in TU-KL.

2.4.2 Graphical User Interface

Shneiderman (1997) posits that software or application's Graphical User Interface (GUI) refers to the visual components and interactive capabilities that let users engage with it. The layout and efficiency of GUI have a substantial impact on the usability of OPAC. This literature review intends to investigate how GUI determines application of OPAC by looking at pertinent publications and field research.

Schmetzke et al. (2007) noted that it is evident when the next operation can be initiated if there is a GUI menu with clear activation. In the OPAC interface, there are many actions that a user is able to perform ranging from record selection, status viewing, saving a record and downloading electronic resources. Users of KOHA OPAC in TU-KL can download full text versions of electronic books when they click the online access link that facilitates access to the publisher's page where the download option is enabled.

Overflowing graphical components and haphazard HTML element usage, such as combining text hyperlinks with form buttons (which appear as graphical elements), are the most frequent visual layer mistakes of OPACs. Webmasters should continuously employ the same kind of visual elements for related objectives in order to maintain visual coherence. Some functional connections are displayed as text on the websites of many libraries' OPACs, while others are displayed as form buttons or visuals that have nothing to do with their specific function. Only links or features that are very valuable to the service can be identified visually (Malak, 2008).

Papadakis, Stefanidakis & Tzali (2008) did a study on semantic web service for the library domain and found out that due to present online practices, many web-based search engines use a field-based or parametric interface, often referred to as "advanced search," in order to obtain detailed user input. In essence, searchers are asked to complete a form expressing in terms what information they require. They are unlikely to locate any records that meet their information needs if they supply too much information. Furthermore, in order for searchers to match requested information assets stored in the repository, several fields within parametric search form require explicit input from searchers. Stated differently, there appears to be a discrepancy between the metadata that is, description of underlying information assets and terms

that searchers use to find those assets. The GUI systems in use today don't seem to be able to help the searcher select the right terms so that successful results are returned. In some collections, when the editorial staff has invested significant time and energy characterizing the underlying information assets, this vulnerability has a significant impact. Libraries are notable instances of establishment that experience this occurrence. This study endeavours to find out whether GUI features exist in KOHA OPAC at TU-KL and whether they are able to facilitate retrieval of information resources.

A study by (Munyao, Maina, Mambo & Wanyoro, 2024) found that a well-designed GUI can significantly improve usability of OPAC in information retrieval, and that users are most pleased with the system when it is simple to employ. Similarly, a study by (Chow, 2014) investigated the impact of GUI design on usability of OPAC for visually impaired users. The study found that a well-designed GUI that incorporates access attributes like high contrast and screen reader compatibility greatly improves usability of OPAC for visually impaired users. Ssemakula et al. (2023) probed the ramifications of GUI design on effectiveness and efficiency of OPAC for information retrieval. The study found that a well-designed GUI that is simple to employ and navigate resulted in more effective and efficient information retrieval.

Design of KOHA OPAC's GUI has a big impact on its usability. Studies emphasize the significance of an easy, basic, and user-friendly GUI with obvious search choices, clear navigation, adequate font types and sizes, and appropriate colour schemes. To improve usability of KOHA OPAC, user preferences and perceptions should be considered when creating GUI. Additional research in this field may help KOHA OPAC and other systems with comparable GUI designs. The researcher attempted to establish the impact of GUI on usability of KOHA OPAC for information retrieval.

2.5 Usability with regard to Ease of Use of KOHA OPAC during Information Retrieval

Libraries expected patrons would typically utilize OPAC to ascertain availability of information resources in their various formats due to the growing availability of library ILS in the market. Consequently, online catalogues have emerged as a crucial interface for library patrons, and it is imperative that they be user-friendly. It's also critical to remember that OPAC users are incredibly diverse and likely the most varied of all information retrieval system users. Therefore, when assessing effectiveness of online catalogues, it is essential to consider factors like user-friendliness. Assessing whether the upgraded or new systems meet the performance claims made at the time becomes necessary as a result (Guha & Saraf, 2005). This study sought to inquire whether usability of KOHA OPAC for information retrieval by undergraduate users in TU-KL is enhanced owing to ease of use.

Controlled vocabulary from Library of Congress Subject Headings (LCSH) makes the amount of subject information currently available on OPAC records to be insufficient. Random LCSH descriptors and call numbers confuse users and make searching more difficult (O'Brien, 1990). This was also affirmed by (Ndumbaro, 2018) during a study on understanding user-system interactions where unobtrusive OPAC transaction logs were gathered in January and December 2015, and transaction log analysis was performed on them afterwards. Ndumbaro (2018) found out that inability to recoup records from OPAC was as due to users' lack of knowledge regarding LCSH. When patrons perform a search using subjects that are not available on the LCSH then search failures are inevitable. However, Ramesh & O'Brien (2000) stated that the ability of patrons to express their search necessities in natural language is one aspect of OPAC's advanced search. However, unlike (Ndumbaro, 2018) this study will not

use OPAC transaction logs but instead it will adopt questionnaires to gather data regarding usability of KOHA OPAC by undergraduate patrons for information retrieval in TU-KL.

Guo, J., & Huang (2011) conducted research at East China Normal University to determine students' use of subject headers and the results were compared to a study undertaken at the University of Oklahoma. Although two distinct jurisdictions were employed, the results were similar since users rarely accessed the subject access point of OPAC and they ignored OPAC searches when they failed to retrieve needed information. At both schools, subject searching had a significantly larger number of queries that yielded no results, and patron satisfaction with subject searching was low. This study is a departure from (Gou & Huang, 2011) since it endeavours to find usability of KOHA OPAC by undergraduate patrons based on ease of use in TU-KL without focus on subject searching.

Formulating the query in case of subject searching, conceptual and semantic knowledge about the query is necessary (Shivakumaraswmay, K.N. & Narendra, 2016). The user should be able to comprehend the subjects derived from LCSH and assigned to a particular item that he intends to locate. Lack of skills for searching can be sighted as a problem for the library user as demonstrated by Shivakumaraswmay and Narendra who identified that about 28% of respondents from India’s BGS Institute acknowledged that lack of skills was a major challenge that prevented them from using OPAC effectively. Fresnido & Barsaga (2019) found out that during analysis of Transaction Logs users conducted searches using the basic search of OPAC the same way they normally do using Google search and presumably expect to get similar results as it happens on Google leading to search failures.

Igere, (2022) used a descriptive survey for a study on Information Retrieval: OPAC's function in helping students use university libraries' resources at the University of Benin (UNIBEN) and Benson Idahosa University (BIU). Stratified sampling was applied in choosing 191 participants from a student population of 9, 566. It was found that majority of BIU and UNIBEN respondents thought OPAC was an easy-to-use information retrieval tool. Nevertheless, (Igere, 2022) asserts that although OPAC is effective and has several advantages over other types of catalogues due to its flexibility, ease of updating, and ability to access records from multiple locations, its usefulness and significance have not been fully realized.

Fast & Campbell (2005) discovered that university students perceive OPAC to be difficult compared to other information retrieval systems like Google. This was made clearer by Kumar, Rajinder & Singh (2017) when they examined OPAC use at university libraries in Delhi and found that, of the 191 library patrons at Jamia Milia Islamia University, 35% had trouble using OPAC because they did not understand its features. However, (Ariyapala, P.G. & Edzan, 2002) in their research on the ease and difficulties of using OPAC discovered that majority of respondents found OPAC to be simple. This two conflicting scenarios can be attributed to the different cases used since in the first instance OPAC was compared to Google whereas the second case focused on OPAC. This study determined usability of KOHA OPAC by undergraduate patrons for information retrieval in TU-KL.

Chauhan (2019) asserts that library users need training and retraining to become proficient in applying OPAC for information retrieval. According to (Kumar, 2014), a study to identify the relationship of OPAC users' satisfaction at an Indian university setting revealed that out of 304 users, 145 users who did not undergo OPAC instruction found it difficult to use OPAC despite the availability of on-screen help

features. In any case, online help feature should not be a substitute for a poorly designed interface since it is best if users are able to use OPAC without the need for reference to online help.

Zafar & Singh (2017) evaluated the effectiveness of KOHA OPAC in a university library in India. They adopted a survey method to gather data from library users, focusing on factors like relevance of search results and user satisfaction. Results demonstrated that patrons perceived KOHA OPAC to be effective in retrieving relevant information, but some users faced difficulties in refining their search queries. Results of this study might contrast those of (Zafar & Singh, 2017) since participants will be subjected to a usability test to determine whether KOHA OPAC is easy to use.

Research concerned with importance of OPAC in Nigeria regarding how it is used established that OPAC users encounter problems in their attempt to find information. Despite ability to access OPAC through mobile phones, library users lacked adequate ICT skills, awareness and indifference library personnel. It was recommended that regular OPAC instruction should be organized for patrons to acquire critical information retrieval skills and libraries should create awareness of website addresses. Staff working in the library ought to adopt a positive attitude for purposes of addressing information retrieval challenges that are encountered by users (Mohammed & Saka, 2016).

An inquiry regarding influence of information availability and application among 130 higher education institutions South Africa’s Eastern Cape asked participants to rank how helpful they felt OPAC was in assisting them to get information they needed in the library. University of Fort Hare's four PhD students, seven master's students, one postgraduate diploma student, five honours students, and thirty-three third-year

bachelor's degree students made up the fifty respondents that were chosen using a purposive sample technique. It was revealed that only 6% of respondents found OPAC not to be a useful tool for finding information. 60% found OPAC as a useful tool with 34% finding it as a very useful tool (Ngcongolo & Oyelana, 2016). Keil et al. (1995) argue that user adoption of information systems is largely determined by their simplicity of use and utility. This study adopted a stratified technique which differs from purposive sampling technique that was adopted by (Ngcongolo & Oyelana, 2016).

Bukirwa, Joyce, Gudoi, Charles & Sendikadiwa (2018) carried out research on utilisation of OPAC in Uganda's International Health Sciences University Library. They found out that about 70% of library users lacked adequate knowledge and skills for using OPAC. This group of library users found it difficult to use OPAC. Chewe & Chitumbo (2018) found out that subjecting users to OPAC instruction plays a vital part in determining their efficient use since during OPAC instruction users are instructed on the search and retrieval strategies and how to interpret search results.

A study regarding the effectiveness of OPAC among University of Nairobi students revealed that about 54% of students encountered challenges during formulation of search queries. This made it hard for them to retrieve needed information resources using OPAC (Njoki, 2019). The literature reviewed shows that OPAC is not easy to use. From the literature reviewed it is evident OPAC does not possess intuitive features that would enable users to use it easily on their own without training. Most of the literature reviewed does not deal specifically with the ease of use of KOHA OPAC but OPAC in general. The researcher sought to examine the ease of using KOHA OPAC by undergraduate patrons for information retrieval at TU-KL.

2.6 Time Taken to Complete Information Search and Retrieval Activities during Usability of KOHA OPAC

The time taken by a user to search and retrieve needed information resource is a critical aspect for OPAC usability. Efficiency of information retrieval ought to be enhanced by OPAC. ILSs will be able to minimize costs and facilitate efficiency of library operations hence their importance in managing library functions (Khatun, 2014). From the time that OPACs emerged in the mid-1970s, it was only during the start of the 1980s that many libraries migrated from card catalogue to OPAC. OPACs became the favourite information retrieval system for users since they were able to do away with time wasting and the tedious task of searching through crammed drawers where filing cards of the card catalogue were stored. Compared to the card catalogue, OPAC seemed to offer greater efficiency over counter productivity that was the hallmark of the card catalogue (Khatun, 2014). This study endeavours to determine the time taken to achieve information retrieval during usability of KOHA OPAC by undergraduate patrons in TU-KL.

A study on development of a modern OPAC adopted a Retrieval Experiment of Virginia Tech OnLine Catalogue (REVTOLC). It involved an immense trial run in 1987 and a vast, controlled inquiry in 1990. The study found out that OPACs aren't always that useful, efficient, or effective. This is partly because of the unique features of the issue domain. The OPAC is required to cater for a diverse range of users that are sporadically active and have intricate relationships between their goals and actions, in addition to challenging knowledge retrieval tasks. The inability to extend query results, excessive retrieval and null retrieval, awkward presentations, and underutilization of system features are some common shortcomings of the systems in use today. These grave issues jeopardize the capacity of the library to maintain free

and open access to knowledge for all (Fox, France, Sahle, Daoud & Cline, 1993). This study features a usability test administered to a sampled population of undergraduate patrons in TU-KL to determine usability of KOHA OPAC in retrieval of information resources.

Slone (2000) used a qualitative technique to investigate how user search behaviour, confidence, and other emotions differed depending on known-item search, unknown-item search, and area search during a research on interactions with OPAC. An area search involved searching OPAC to identify a library section that contains a collection of books about a specific author or topic. When the area search was evaluated, it was discovered that 5 out of 8 (62%) area searchers stood when they had the option to sit, indicating confidence in their ability to locate what they needed quickly using OPAC. Nevertheless, this study applied quantitative approach to determine time taken for retrieval of information resources using KOHA OPAC as opposed to the qualitative technique adopted by (Slone, 2000) hence the outcome might be different.

16 students, 8 undergraduates and 8 graduate students in library and information science participated in an exploratory study using a qualitative methodology to examine how university students view and use internet search engines in comparison to OPACs. The participants searched both a university OPAC and Google. Although most students thought they had the necessary skills to search the Web, most believed they needed additional training to use the catalogue efficiently. This was a result of people taking longer to locate information resources due to inexperience with the library catalogue (Fast & Campbell, 2005). This research in contrast to (Fast & Campbell, 2005), endeavours to utilize a survey method to find out the time taken to complete information retrieval activities during usability of KOHA OPAC in TU-KL.

During a usability test for KOHA OPAC interface at a private university in Bangladesh, the user population was categorized into two groups of novice and expert users. Novice users were subjected to two tests, with the first test conducted without subjecting the novice users to training and the second test conducted after subjecting the novice users to training. It was established that during the first test, novice users spent a lot of time searching for information using KOHA OPAC since they had not undergone instruction on utilization of KOHA OPAC. However, on the second test conducted after training, novice users spent less time and made very few mistakes during information retrieval (Khatun & Ahmed, 2018). Nevertheless, this study contrary to Khatun & Ahmed 2018 will be conducted in Nairobi Kenya a different geographical location.

Research conducted in Lagos University and Kenneth Dike University Libraries revealed that OPAC enhanced timely access to information resources located outside the library (Adenike, Omoike & Akin, 2014). Information retrieval systems are regarded efficient when they facilitate timely information retrieval. It is necessary for the library to be able to have a mechanism that will be able to link the user with the needed information quickly. However, it should be noted that for a library to determine the time taken for users to search and retrieve information resources using OPAC, there is need for usability testing.

Eserada & Okolo (2019) point out that with introduction of OPAC, patrons and library professionals have been able to find and retrieve library materials quickly thus saving their time and energy. This was earlier on confirmed by (Sankari et al., 2014) who claimed that adoption of OPAC by library users has elevated the speed of retrieving information resources, more so library materials housed within the library. However, (Doris & Felicia, 2013) argue that although many academic libraries man-

aged to move from the card catalogue to OPAC, finding information is still problematic. This is because library users spend too much time searching for information resources and yet still they do not obtain what they need, even when such information resources are within the library.

Osborne & Cox (2015) employed 18 semi-structured interviews as part of a study to find out how students and academic librarians felt about the characteristics of next-generation OPACs. It was noted that StarPlus OPAC at the University of Sheffield Library has an e-shelf feature that is useful because it enables users to save search queries, write notes, email, print bibliographic details and attach the information on reference management tools. A sample population of students and librarians were in agreement that the e-shelf feature on the StarPlus OPAC was convenient and a time saver. However, librarians involved in the study pointed out that for users to make good use of the e-shelf attribute, they need to be subjected to training on how to use the feature. Dissimilar to (Osborne & Cox, 2015), this study will adopt a questionnaire for data collection as opposed to interviews.

38 postgraduate students enrolled at the Benue State University Library participated in a study on perceived influence of OPAC on efficient retrieval of information resources by postgraduate students at Benue State University, Makurdi. It was reported that postgraduate students at Benue State University in Makurdi have a strong perception of OPAC's influence in their ability to effectively retrieve information resources. This is due to the fact that OPAC enables patrons to employ search tactics beyond those of card catalogues, providing users with faster access to information, saving them time, and assisting in refining their search as it relates to public access catalogues in libraries (Ternenge, Dorcas & Terwase 2020). This research intends to ascertain time taken to complete information retrieval ventures

during usability of KOHA OPAC in TU-KL unlike (Ternenge, Dorcas & Terwase, 2020) study which determined speed of information retrieval using OPAC in comparison to the card catalogue.

Krubu & Osawaru (2011) established that at Cape Coast University's Sam Jonah Library, users avoided to use OPAC because they did not have the skills needed to perform search and retrieval tasks. Fati & Adetimirin (2015) enhanced this when they opined that for effective information search and retrieval, there is need for the user to familiarize with OPAC features and computer skills. Additionally, (Fati & Adetimirin, 2015) claimed that having the requisite skills for searching OPAC will save the time the user spends on travel to the library to determine whether a given library material is available. However, (Peter et al., 2019) carried out research on the extent to which learners are cognizant of the presence of library services offered online and the effect of their use at the University of Nairobi where it was established that computer fluency skills of learners were not able to significantly influence the use of OPAC.

Access to the website hosting KOHA OPAC will accord the user an opportunity to conduct information search and retrieval. Time taken by OPAC to give feedback will depend on the state of the network involved including the speed of the computer device being used (Clark & Mischo, 1991). For Web based OPACs like KOHA OPAC, internet downtime on the server room will make KOHA OPAC unavailable. Low bandwidth will make the user spend more time in accessing the website hosting KOHA OPAC as well as slow down the search and retrieval process. This was clarified by (Msagati, 2016) during a study at the Open University of Tanzania which identified that low bandwidth contributed to lack of use of OPAC since it slowed down retrieval.

According to (Kwanya, Tom, 2017) in Kenya, TU-KL transitioned from a manual based card catalogue to KOHA OPAC. The adoption of KOHA OPAC was meant to save the users' time and energy since searching the manual catalogue was regarded as a tedious undertaking. However, there is no documented evidence on usability of KOHA OPAC based on the time taken by undergraduate users to complete search and retrieval activities in TU-KL which this study sought to ascertain.

2.7 Levels of User Satisfaction in the Usability of KOHA OPAC

Undergraduate students' satisfaction and usability levels with OPAC as an information retrieval system ought to be monitored because these crucial variables influence whether or not they will return to utilize the system (Akoun, Panle & Akhimien, 2021). Usability of library OPACs can be evaluated in large part by how satisfied users are. User satisfaction with KOHA OPACs in various libraries has been the subject of innumerable research. At the University of Lahore Library, for instance, (Asim & Arif, 2025) performed a study to assess user satisfaction with KOHA OPAC and discovered that while users were happy with the search feature, they had trouble locating pertinent materials. Igere (2022) also reported that considerable percentage of students moderately employ OPAC interface or do not use it at all, indicating a need for improvement to ensure accurate and relevant search results. Nielsen (1993) argued that asking people for their subjective opinion can be used to gauge success. This study sought to probe user satisfaction in usability of KOHA OPAC in TU-KL.

Gohain & Saikia (2013) used a survey approach and questionnaires to gather data in an effort to look into the frequency, purpose, and issues encountered by B.Tech students during utilization of OPAC. At the departments of Computer Science and Engineering’s 26.41% (103) respondents were very pleased with OPAC services' performance and quality. Civil engineering department was second with 24.36% (95),

Electronics and Communication Engineering with 23.33% (91), and Mechanical engineering with 18.46% (72) respondents. Due to a lower overall student population than other departments, the Food Engineering and Technology department's satisfaction rating was just 7.44% (29) lower than that of the other departments. This study tries to analyze levels of user satisfaction in the usability of KOHA OPAC by undergraduate patrons drawn from all departments in TU-KL. As opposed to (Gohain & Saikia, 2013), this study will not focus on specific departments that use KOHA OPAC in TU-KL but it will attempt to establish generalized levels of user satisfaction among undergraduate users representing all the departments in TU-K.

Akoun, Panle & Akhimien (2021) conducted research to determine undergraduate students' satisfaction levels with OPAC in the libraries of the Federal University of Agriculture and the University of Ibadan. According to the study, undergraduates reported the following issues with OPAC use in their respective libraries: insufficient OPAC Terminals/Workstations; poor search skills; erratic power supply; absence of library personnel near OPAC Terminals; OPAC takes longer duration to provide search results; hostile and complex OPAC interface. Despite OPAC's numerous academic advantages, participants categorically perceived it as a difficult information retrieval system. As a result, majority of undergraduate students' satisfaction levels were impacted because they expressed dissatisfaction with the utilization of OPAC. This study endeavors to determine levels of user satisfaction in usability of KOHA OPAC.

Research carried out on Web OPAC end user satisfaction from library Science and information system perspectives, adopted an integrated satisfaction criteria between Library and Information System Expectation Disconfirmation Theory (EDT) (Zainal & Ab Razak Bin, 2013). Zainal, Hussin, and Sa'don (2013) went on to say that a

comprehensive and wide-ranging viewpoint should be available from an integrated approach of library science and information science to assess Web OPAC end user satisfaction. To find out how well undergraduate users find KOHA OPAC useful for information retrieval at TU-KL, this study is centered on adopting usability testing of KOHA OPAC followed by administration of questionnaires to study participants.

During a survey initiated at the University of Toronto regarding user satisfaction during the use of OPAC, it was established that faculty and graduates had higher levels of overall satisfaction than undergraduates. Taking everything into account, it was reported that as a primary method of learning how to use OPAC, the clientele were satisfied with pamphlets and OPAC tutorials. The most satisfied users were those who utilized OPAC more than 19 times (Cherry & Clinton, 1989; as cited by Kumar, 2014). This indicated that OPAC instruction and continuous use of OPAC for information retrieval instilled a sense of appreciation and acknowledgement which eventually led to high levels of user satisfaction.

Khatun & Ahmed (2018) did a study on usability testing of KOHA open source ILS where the sample was divided into novice users and experienced users. Usability tests demonstrated that there were no significant differences in satisfaction ratings between novice and expert patrons. This goes to prove that one can be an expert in using an information retrieval system but still harbour a dislike for the system and vice versa. In contrast to the study conducted by (Khatun & Ahmed, 2018), this study will not determine satisfaction levels of novice and experienced users but levels of user satisfaction in usability of KOHA OPAC among undergraduate patrons in TU-KL.

Guha & Saraf (2005) used the verbal protocol method to investigate whether patrons of British Council Library in Kolkata were satisfied, dissatisfied or confused as they

interacted with OPAC during searches. According to the findings, majority of users felt displeasure and uncertainty while using OPAC. Users that were satisfied with OPAC had not used it for a long time while those that were dissatisfied had been using OPAC for a long time. However, (F. & & I. Mbawaki, 2011) used a questionnaire to measure satisfaction among experienced users of OPAC (librarians and students of Library and Information Science) to evaluate different traits of the Makula OPAC as they identified the call numbers of different information resources in the library. They found that 95% of users were satisfied with Makula OPAC and 100% would recommend it to other users. The high rate of satisfaction was occasioned by ease of finding needed information using Makula OPAC. This study endeavours to determine levels of user satisfaction in usability of KOHA OPAC for information retrieval by undergraduate patrons in TU-KL which differs from Mbawaki (2011) who determined satisfaction of OPAC using a sample population of experienced users only.

Msagati (2016) conducted research to ascertain patron satisfaction in Tanzania's Open University where descriptive survey design was used. A stratified selection strategy was employed to choose 300 students from a target population of 6000 undergraduate and postgraduate students. Only about 21% were satisfied with usage of OPAC in retrieving information resources, while about 79% were satisfied in some way. Low bandwidth, limited computer access, and poor search skills were blamed for the low level of satisfaction.

In Kenya, most studies on user satisfaction revolve around use of ILSs. The studies do not go further to investigate usability of specific modules within ILSs such as the OPAC module. For instance (Otieno, 2016) undertook a study on performance of features of open source software in Nairobi where levels of user satisfaction

investigated was limited to library services offered in selected libraries. Otieno (2016) does not establish satisfaction levels of patrons concerning usability of KOHA OPAC. This study intended to ascertain levels of user satisfaction on usability of KOHA OPAC by undergraduate patrons for information retrieval in TU-KL.

2.8 Summary and Literature Gaps

This study investigated usability of KOHA OPAC by undergraduate users for information retrieval in TU-KL. The literature discussed and reviewed in this study included; overview of usability concept, usability testing, interface design, design of user centred OPAC, GUI, ease of use, time taken and levels of user satisfaction among undergraduate patrons in usability of KOHA OPAC.

Usability is an important concept in the development and assessment of ILS, especially KOHA OPAC as an information retrieval instrument. The literature reviewed has emphasized the significance of usability with regard to KOHA OPAC, highlighting a number of usability problems and suggesting frameworks and recommendations for enhancing the usability of library systems. To continuously improve usability of KOHA OPAC and to give library users the best possible experience, more study and assessment is required.

Despite existing research on usability of OPACs in libraries, there is no evidence pointing out that any research has been conducted on usability of KOHA OPAC by undergraduate ptrons for information retrieval in TU-KL. This is an indication that there exist voids that must be filled. The study findings were used to inform the necessary changes to be made on the interface of KOHA OPAC so as to enhance usability.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This division discussed research design, and methodology, study location, target population, sampling procedures, sample selection, sample size, research tools and data processing methodologies.

3.2 Research Design

Descriptive survey design was adopted. Quantitative method was employed in the survey to analyse usability of KOHA OPAC based on usability testing, interface design, time taken, ease of use and user satisfaction**.** Quantitative data was gathered using Post-Study System Usability Questionnaire (PSSUQ).

3.2.1 Location of the Study

The study was undertaken at TU-KL in Nairobi Central Business District (NCBD). TU-KL was selected since it has adopted KOHA ILS. Since the study focused on how attributes of usability facilitate use of KOHA OPAC, TU-KL was considered a suitable locale for the study. TU-KL was also used as the location of the study because of a diverse undergraduate student population representing 66 different undergraduate degree programmes, the highest among universities that have adopted KOHA ILS in NCBD which ensured minimal instances of bias.

3.2.2 Study Variables

This study investigated usability of KOHA OPAC by undergraduate users for information retrieval in TU-KL. This section illustrated the variables involved in this research;

Independent Variables

Independent variables for the research involved usability attributes investigated in the study; usability testing, interface design, ease of use, time taken and user satisfaction.

Dependent Variables

The dependent variable was information retrieval.

3.3 Target Population

The study population was undergraduate students of TU-K. The target population of the study was 8,328 registered undergraduate students drawn from 66 degree programmes in TU-K.

3.4 Sampling Techniques and Sample Size

Stratified random sampling was adopted, which aided determination of patrons who required instruction in the application of KOHA OPAC prior to usability testing. The population of TU-KL undergraduate patrons was subdivided into two mutually exclusive portions based on application of KOHA OPAC for information retrieval. Patrons previously tutored on OPAC were classified as experienced users whereas those who had never been trained were classified as beginners. Patrons were also classified by year of study. A pre-session interview questionnaire was administered to participants at TU-KL prior to data collection. A simplified formula developed by (Yamane, 1967) was adopted to calculate sample size;

$$n = \frac{\mathbf{N}}{\mathbf{1+N(e)^2}}$$

$$n = \frac{\mathbf{8328}}{\mathbf{1+8328(0.05)^2}}$$

n = 382

Where n = sample size

N = population size (8328)

e = precision level (0.05)

This formula was employed on undergraduate population of TUK at 95% confidence level. The sample size of each strata was determined by proportionality as depicted below;

$$f = \frac{\textbf{sample}}{\textbf{target population}} \times \text{strata}$$

$$f = \frac{\mathbf{382}}{\mathbf{8328}} \times \textbf{strata}$$

$$f = 0.046$$

Where f = chance for selection of each member of the population. To generate the corresponding sample group, each strata within the population was multiplied by this fraction (Orodho et al., 2016).

Table 3.1 Technical University of Kenya Student Population

1st and 2nd year	**3rd and 4th year**
3751	4577

Summing the sub-sample offered a clear proportional image of undergraduate students in TU-K by categories of beginners and experienced patrons. Samples were chosen from the nominal role of TU-K undergraduate students. Table 3.2 illustrates 382 users.

Table 3.2 Summary of the Study Sample Size

Year of Study	**Sample Size**
1st and 2nd	172
3rd and 4th	210
Total	**382**

3.5 Research Instruments

The instruments below were adopted;

3.5.1 Pre-Task Questionnaire

This questionnaire was assigned to respondents before the usability test. It had 7 questions which needed replies from participants. It aided the researcher to classify participants based on their information retrieval skills using KOHA OPAC ranging from beginner to advanced level. This aided the researcher to develop categories of beginner and experienced patrons. The information gathered was meant to aid the researcher to ascertain patron category that needed instruction on application of KOHA OPAC for information retrieval prior to the usability test.

3.5.2 Usability Test

Tasks were allocated to participants in TU-KL. Every participant was given brief instructions of task procedures to be observed. Each respondent was obliged to do assigned tasks individually.

3.5.3 Post-Study System Usability Questionnaire (PSSUQ)

PSSUQ is a 16 term standardized instrument which measured satisfaction levels of undergraduate users in TU-KL. After the usability test was conducted, the researcher evaluated KOHA OPAC using PSSUQ rating system. PSSUQ gauged patron satisfaction on a 3 point Likert scale. Questions asked on PSSUQ focused on interface design, ease of use, time taken, and levels of user satisfaction during application of KOHA OPAC for information retrieval.

3.6 Piloting Study

A pre-test for the Pre-Task Questionnaire was conducted in Jomo Kenyatta University of Agriculture and Technology (JKUAT) NCBD Campus Library and thereafter, tasks

were administered to selected participants. JKUAT Library NCBD Campus was selected for piloting of this study because it uses KOHA ILS to manage library functions. Similar procedures that applied during the actual study were adopted during the trial run. PSSUQ was not adopted in the pilot study since it was a standardized tool.

3.6.1 Reliability of Research Instruments

Creswell & Creswell (2018) argue that reliability implies whether internal consistency (i.e., are item answers constant across constructs?), and consistency across time (test-retest correlations), and whether test administration and scoring are consistent. A Pre-Task Questionnaire was pre-tested at JKUAT NCBD Campus Library since both libraries use KOHA OPAC. This assisted the researcher to put in place necessary adjustments on the instrument to achieve reliability. Table 3.3 provides reliability findings.

Table 3.3 Reliability Statistics

Variable	**Alpha Values**
Interface Design	0.52
Ease of using the KOHA OPAC	0.71
Time Taken to Complete Search and Retrieval	0.85
Level of user Satisfaction	0.71
Retrieval of information	0.67
Aggregate Reliability	**0.70**

From Table 3.3, the study found all the variables had reliability above 0.5 with aggregate reliability for the instrument being 0.70. Mohajan (2017) observes that reliability values are between zero and one. Values that are closer to 1 are considered strong while values that are closer to zero are deemed weak. Moreover, (Nanyonjo et al., 2024) claimed that reliability values above 0.5 are deemed appropriate hence 0.52 (interface design) and 0.67 (retrieval of information) are applicable. The author further suggests that Cronbach alpha values that are 0.7 and above should be accepted in the research. From the findings, the reliability value was 0.7 hence considered acceptable for analysis.

3.6.2 Validity of Research Instruments

Is the extent to which a measuring apparatus presents sufficient coverage of the subject under investigation. Instrument content validity is sound if it contains a representative sample of the entire universe. It makes majority of its decisions with regards to judgment and intuition. It is never expressed numerically, but it may be ascertained by a panel of persons who will examine whether the measuring device meets requirements (Kothari, 2014).

Content validity for the research instrument with no numerical mechanism to represent was judged by the supervisor who determined how well the measuring tool fulfils standards. The instrument used took into consideration all participants represented in the sample population in order to have content validity.

3.7 Data Analysis

This process was done after data was gathered. Quantitative data was assembled using questionnaires. The researcher organized each questionnaire form filled by respondents and thereafter ascertained that each form had been answered with the

answers properly recorded. Statistical Package for Social Sciences (SPSS) was employed to analyse quantitative data using descriptive statistics.

3.8 Logistical and Ethical Considerations

The study's ethical considerations entailed submitting a research proposal at Kenyatta University Graduate School for ethics review after which an ethics approval letter was issued to the researcher which was used to obtain research approval from the National Commission for Science and Innovation (NACOSTI). This document was used to undertake this research at TU-KL. Notice was given to office of the Deputy Vice Chancellor- Academics, Research, and Students at TU-K, which supervises TU-KL and Resource Services, via a direct pre-visit to the university. The researcher then notified the University Librarian of the planned study, including the data collection techniques to be employed.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This study purposed to probe usability of KOHA OPAC by undergraduate patrons in TU-KL with a view of enhancing information retrieval. Five objectives guided the study; to determine usability of KOHA OPAC by undergraduate users for information retrieval with respect to usability testing, interface design, ease of use, time taken to retrieve information resources and user satisfaction. Data was gathered using PSSUQ from a sample of 382 undergraduate users. Descriptive statistics assisted in analysing the relationship between variables and establishing the effect of usability of KOHA OPAC concerning information retrieval. Presentation was done in tables.

4.2 Response Rate

382 questionnaires were issued to the target population to gather primary data with a view of supporting research objectives. Nevertheless, only 196 questionnaires were completely filled and returned giving a feedback rate of 51%. Response rates above 50% should be regarded in a research study (Richardson, 2005). Nulty (2008) further stated that adequate response rate is determined by the objective of the research. For instance, if the findings are to be used to improve learning, then even a single response matters. The study achieved slightly above 50% response rate which was accepted as adequate. Additionally, the target population was university undergraduate students where the study sought to understand how KOHA OPAC helped undergraduate students in retrieving needed information resources hence above 50% feedback rate was considered suitable for use in this research.

4.3 Participant's Characteristics

The research sought to analyse participant attributes to ascertain; year of study, prior training on KOHA OPAC, experience and skills. This was done so as to ascertain whether some patrons needed instruction in application of KOHA OPAC for information retrieval to enable participation in the usability test. Prior to starting the usability test, beginners underwent a 10 minute tutorial regarding functionalities and interface design of KOHA OPAC. Outcomes were showcased below.

4.3.1 Year of Study

The study endeavoured participants' year of study with outcomes presented in Table 4.1. This data was imperative because the purpose of study was to probe usability of KOHA OPAC by undergraduate users in TU-KL in order to promote retrieval of information resources. This implied that the researcher had to ascertain usability KOHA OPAC by all undergraduate patrons in TU-KL regardless of their year of study, department or degree programme. This sought to curb biasness.

Table 4.1 Year of Study

Year of Study	Frequency	Valid Percent
Third year/Fourth year	105	53.6
First year/Second year	91	46.4
Total	**196**	**100**

Table 4.1 established that about 54% of participants were third and fourth year students whereas, about 46% were in their second and first year of study. The findings represented a mix of all categories of undergraduate participants from first year to fourth year which presented diversity. Diverse patrons give significant feedback

during usability tests and adopting such feedback enhances interface design for all patrons (Lazar, 2007). The availability of diverse feedback from the participants provides a variety of options for system designers to choose during customization of KOHA OPAC interface facilitating retrieval of information resources.

4.3.2 KOHA OPAC Training

The research sought to ascertain whether participants had been instructed on how to use KOHA OPAC for information retrieval. This was carried out in with a view to determine whether there were participants who had never been instructed in the application of KOHA OPAC. This assisted the researcher to identify and train them so as to prepare them for the usability test. Findings were displayed in Table 4.2.

Table 4.2 OPAC Training

Previous OPAC Training	Frequency	Percent
No	119	60
Yes	77	40
Total	**196**	**100**

Table 4.2, identified that more than 50% respondents had not undergone KOHA OPAC instruction whereas less than 50% had been trained. This finding could deter efficient usability of KOHA OPAC for information retrieval in TU-KL owing to absence of advanced information retrieval skills which ought to be relayed during KOHA OPAC instruction. Chauhan (2018) noted that for effective application of OPAC in information retrieval, it is a requirement for users to be trained in order to enhance their proficiency in using OPAC. Chewe & Chitumbo (2018) advocated for the need of OPAC instruction to enable patrons to comprehend how to retrieve

information resources effectively. Lack of KOHA OPAC training affects its usability since untrained users will most likely encounter difficulties in performing faceted and advanced information searches.

4.3.3 Previous Use of OPAC

This research purposed to initiate whether respondents had applied KOHA OPAC before with a view to ascertain whether they will require instruction in the application of KOHA OPAC to facilitate participation in the usability test. Results were displayed in Table 4.3

Table 4.3 KOHA OPAC Previous Use

Previous Use	Frequency	Percent
Yes	76	39
No	120	61
Total	**196**	**100**

Table 4.3 demonstrated that over 60% of respondents had never used KOHA OPAC whereas, less than 40% had used KOHA OPAC previously. Results revealed that majority of respondents lacked experience in using KOHA OPAC hence increasing the likelihood of encountering challenges in their attempt to retrieve information resources. The researcher adopted a pre-task questionnaire to classify respondents based on previous use of KOHA OPAC. Prior to starting the usability test, a 10 minute tutorial regarding functionalities and interface design of KOHA OPAC. This training was granted to participants who had never used KOHA OPAC before. This was required as it would have been difficult for the participants who had never used KOHA OPAC before to undertake the usability test which required information

retrieval using KOHA OPAC. Khatun (2014) initiated two usability tests to novice users. During the first test, novice users performed search and retrieval activities without training and during the second usability test, the novice users performed search and retrieval activities after training. The usability test revealed that novice users were unable to perform successful search and retrieval activities prior to KOHA OPAC training. The researcher saw it necessary to subject participants that had never adopted KOHA OPAC before to training to find out whether TU-KL users will be satisfied with usability of KOHA OPAC in information retrieval post training.

4.3.4 Levels of Skills in KOHA OPAC

This research determined to establish levels of participant skills in using KOHA OPAC during information retrieval to establish participant's skill set. This was necessary since there might be users who undertook KOHA OPAC training but since then, they have not been using KOHA OPAC for information retrieval. Such users, just like users that have never used KOHA OPAC before may require retraining. Table 4.4 presented results.

Table 4.4 Level of Skills in KOHA OPAC

Skills	Frequency	Percent
Beginners (1-3)	82	41.8
Basic (4-5)	65	33.1
Advanced (6-7)	49	25.1
Total	**196**	**100**

Table 4.4 noted that about 42% considered their OPAC skills as beginners, about 30% noted that their skills were basic while a quarter had advanced skills in application of KOHA OPAC for information retrieval. Considering that about 75% of the participants had beginner and basic skills, they would most likely encounter usability challenges since employing KOHA OPAC for information retrieval requires advanced skills. This was confirmed by Khatum & Ahmed (2018) who showed how novice users in the Private University of Bangladesh spent more time retrieving information due to poor skills. Besides, it was proven that learners at Cape Coast University circumvented OPAC because they lacked adequate skills needed to assist them perform effective information retrieval (Krubu & Osawaru, 2011). Since most participants in this study were beginners and going by the Private University of Bangladesh and University of Cape Coast findings, it means they could be avoiding KOHA OPAC.

4.3.5 Usability Test

The study investigated participant's experience in employing KOHA OPAC to retrieve information resources. Patrons were required to locate KOHA OPAC, perform information retrieval tasks and locate a help feature in the interface of KOHA OPAC. This intended to ascertain how the interface design, ease of use, time taken and user satisfaction determined usability of KOHA OPAC in retrieval of information resources. This was considered important. The findings were presented as follows;

4.3.5.1 University OPAC Home Page

This study sought to ascertain whether participants could locate TU-KL website hosting KOHA OPAC. This was necessary because it is impossible to use KOHA OPAC without the ability to determine where its location. Respondents used their

laptop computers, smart phones and tablets linked to TU-KL Wi-Fi (Wireless Fidelity) to do this task. Results were recorded in Table 4.5.

Table 4.5 KOHA OPAC Home Page

Location of OPAC	Frequency	Percent
Yes	158	80.6
No	38	19.4
Total	**196**	**100**

From Table 4.5, it was established that about 81% of the participants located KOHA OPAC from TU-KL website whereas about 19% could not locate KOHA OPAC in TU-KL website. Since about 19% participants could not find KOHA OPAC, it implies that it was not visible to them hindering accessibility. Ruzegea (2012) noted that about 47% of participants at the Malaysian International University were unable to access OPAC owing to its design attributes which made navigation difficult. Lack of a strategic location for KOHA OPAC in the TU-KL website deters usability since it becomes hard to find. Nevertheless, this research found that most participants (about 81%) were able to locate KOHA OPAC which is an improvement from earlier findings.

4.3.6 Basic Search

The usability test required a search task to be done by participants. Participants were required to employ the basic search of KOHA OPAC to search for three information resources as indicated in basic search 1, 2 and 3 respectively.

4.3.6.1 Basic Search 1

The study intended to establish participant ability to retrieve information resources using the basic search bar of KOHA OPAC. Respondents were asked to find a book titled “a handbook of human resource management practice” using their laptop computers, smart phones or tablets linked to TU-KL Wi-Fi. Results were recorded in Table 4.6.

Table 4.6 Basic Search 1

Action	Frequency	Percentage
Found	148	76
Not Found	48	24
Total	**196**	**100**

Table 4.6 showed that in excess of 75% respondents performed successful search whereas about 25% were not able to find the information resource. Some respondents that were unable to find the information resource lacked appropriate search skills which ought to be instilled during KOHA OPAC instruction. Other respondents that experienced search failures only entered the keyword of the information resource “human resource management” thereby broadening the search hence resulting in too many search results. Other respondents keyed misspelt the search term in the basic search bar of KOHA OPAC resulting to “no results found”. Fast & Campbell (2005) discovered that university students perceive OPAC to be difficult compared to other information retrieval systems like Google. Kumar, Rajinder, and Singh (2017) examined OPAC use at university libraries in Delhi and found that, of the 191 library users at Jamia Milia Islamia University, 35% had trouble using OPAC because they

did not understand its features. KOHA OPAC in TU-KL in its present state is not easy to utilize, especially for users who are yet to undergo instruction regarding the usability of its search mechanisms and features.

4.3.6.2 Basic Search 2

Participants were instructed to use the basic search bar of KOHA OPAC to find a book authored by "Rosenak Sidney" and note down its call number. Respondents executed this task using laptop computers, smart phones and tablets connected to TU-KL Wi-Fi. Results were displayed in Table 4.7.

Table 4.7 Basic Search 2

Action	Frequency	Percentage
Found Book call number TK6165	106	54
Did not find	69	35
Found but did not notice the call number	21	11
Total	**196**	**100**

Table 4.7, relayed that over 50% of participants searched and noted down the call number of the book, slightly more than 10% noted that they got results but did not notice the call number whereas 35% indicated that they did not find the information resource. Those who located the book but could not identify the call number indicated that they were unaware of it, they could not see it and they did not have any idea of what a call number was. While usability of KOHA OPAC basic search option facilitated search and retrieval of the information resource, the process from the catalogue to the shelves becomes difficult when patrons lack adequate knowledge regarding the call number. O'Brien, (2000) observed how searching for information

resources has been made difficult due to adoption of call numbers which most patrons are unfamiliar with. Study findings noted how slightly over 10% participants did not comprehend what call numbers were hence they failed in retrieving information using KOHA OPAC. Results also meant that even the over 30% of participants who were unable to locate the book could have failed due to lack of awareness of call numbers. The study also affirmed Ndumbaro (2018), who reported that patrons are unable to retrieve information resources owing to their lack of knowledge of call numbers hence failure in retrieving information since searches are initiated without call numbers. More than 30% of participants who were not successful in finding the information resource were affected due to lack of awareness of call numbers which made it impossible to retrieve the information resource since books in TU-KL are organized by Library of Congress call numbers. This deters the effective usability of KOHA OPAC in TU-KL because patrons unfamiliar with its attributes which making it hard for application in information retrieval.

4.3.6.3 Basic Search 3

Another usability test was administered using KOHA OPAC basic search where respondents were instructed to search and retrieve an eBook by downloading it in either PDF or EPUB file format. Respondents executed this task using laptop computers, smart phones and tablets linked to TU-KL Wi-Fi. Results were recorded in Table 4.8.

Table 4.8 Basic Search 3

Action	Frequency	Percentage
Not able to download	100	51
Downloaded	96	49
Total	**196**	**100**

Table 4.8 showcased that a little in excess of 50% participants were unable to download the eBook while 49% located and downloaded it. This implied that although over 49% participants were able to access KOHA OPAC to search and locate the eBook, they were unable to download it. Respondents that were unable to download the eBook cited lack of visibility of the link which facilitates access to eBooks. Poor visibility of the eBook link obstructed effective navigation and retrieval since whenever patrons got to the results page, they became stranded since they were unable to find the eBook link that ought to take them to the download page. During a usability study on the functionality of OPAC, (Johnson & Craven, 2010) noted that participants needed to execute search and retrieval functions using OPAC but since some OPAC attributes like the link to Google books were not visible, participants felt that OPAC did not support them in their quest to retrieve information resources. Poor visibility of the eBook link implied that usability of KOHA OPAC for retrieval of eBooks in TU-KL is not effective since respondents were unable to apply it to locate the link that ought to take them to the download page to initiate the download process.

4.3.7 Advanced Search

A usability test to probe respondent's ability to utilize the advanced search of KOHA OPAC involving the application of Boolean Search Operators was carried out.

Respondents were required to retrieve a book titled “Business Accounting 2” authored by “Wood, Frank”. Participants were required to apply the default Boolean Operator “and” with a view to narrow down results and enhance specificity and accuracy. Respondents executed this requirement using laptop computers, smart phones and tablets connected to TU-KL Wi-Fi. Results were recorded in Table 4.9.

Table 4.9 Advanced Search Using Boolean Search Operators

Action	**Frequency**	**Percentage**
Not Found	103	53
Found	93	47
Total	**196**	**100**

Table 4.9 showed that over 50% patrons were unable to apply Boolean Operators in the advanced search of KOHA OPAC to facilitate retrieval of the book. Less than 50% of participants located the book. Participants that were unable to apply the advanced search of KOHA OPAC utilized a single search term in all the three default search boxes generating hundreds of results which made it difficult to retrieve “Business Accounting 2” authored by “Wood Frank”, failure to select appropriate access points from the drop down menus while some used two search terms on a single search box yielding nil results. These results demonstrate that participants (53%) who were unable to utilize the advanced search of KOHA OPAC effectively faced difficulties that may be attributed to the interface design of KOHA OPAC and absence of information search strategies using Boolean Operators meant to facilitate effective retrieval of needed information resources. According to (Khatun & Ahmed, 2018), regular user instruction and interface customization that presents a small screen

layout seamlessly integrating basic and advanced searches aids patrons utilization of basic and advanced search. This implies that usability of the advanced search options of KOHA OPAC in TU-KL does not enhance efficient retrieval of information resources to most patrons since they are unable to utilize Boolean Operators to enhance retrieval of information resources. Inability to apply the advanced search option of KOHA OPAC effectively undermines its usability as an information retrieval instrument for utilization in retrieval of information resources in TU-KL.

4.3.8 Help Features

A usability test to probe whether respondents had the ability to identify help attributes in the interface of KOHA OPAC was carried out. Participants executed this task using laptop computers, smart phones and tablets linked to TU-KL Wi-Fi. Results were recorded in Table 4.10.

Table 4.10 Help Features

Action	Frequency	Percentage
I can find help	60	31
No Help	136	69
Total	**196**	**100**

Table 4.10 shows that about 70% respondents could not locate a help feature on the interface of KOHA OPAC whereas about 30% noted that they could locate a help feature on the interface of KOHA OPAC. Participants (about 70%) who could not find a help attribute on the interface of KOHA OPAC cited lack of visibility of the help attribute. Participants found it difficult to identify the help feature on the interface of KOHA OPAC since it had been presented as a Frequently Asked

Question (FAQ) thereby lacking clarity. Ruzegea (2012) listed visibility as a major barrier to usability of interface attributes of OPAC. Lack of clarity and poor visibility of the help attribute on the interface of KOHA OPAC in TU-KL interferes with its usability as an application that ought to aid patrons facing challenges during utilization of KOHA OPAC for retrieval of information resources.

4.4 Interface Design in Information Retrieval

The research sought to analyse the interface design of KOHA OPAC with a view to determine its usability for information retrieval among undergraduate students in TU-KL. This was required in order to establish whether the interface design of KOHA OPAC in TU-KL facilitates retrieval of information resources. The study analysed; icons, search box and standard terminology used in the interface of KOHA OPAC in order to determine whether they facilitate retrieval of information resources. Outcomes were recorded in Table 4.11.

Table 4.11 OPAC Interface Design

Statement about interface design in information retrieval	Strongly disagree Percentage		Strongly Agree		Agree		Total			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Mean	SD
The KOHA OPAC interface provides icons with clear activation that makes it obvious when the next operation can be started	56	28.6	86	43.9	54	27.6	196	100	1.846	0.839
I am able to access e-books, e-journals and theses using the KOHA OPAC search box	111	56.6	60	30.6	25	12.8	196	100	2.265	0.906
KOHA OPAC presents a search box fitted with access points with standard terminology	37	18.9	135	68.9	24	12.2	196	100	2.500	0.794

This research sought to determine whether icons made it easy for patrons to navigate KOHA OPAC interface during information retrieval with a view to establish whether icons facilitate usability. Analysis of icons on the interface of KOHA OPAC revealed that the mean score was 1.846 which represented an average level of agreement among patrons regarding clarity of activation icons and usability of KOHA OPAC interface design. The mean suggested that, on average, users inclined towards agreement that KOHA OPAC had an interface fitted with icons that made it obvious when the next operation will be initiated. The interface of KOHA OPAC presented a search bar with a drop down menu consisting 8 access points. A “Go” button that activated information retrieval was present on the interface of KOHA OPAC search box which prompted action from the user following query formulation. This compelled patrons to express a high level of satisfaction with the clarity of activation icons and interface usability. The standard deviation value of 0.839 indicated variability of users' responses around the mean. A higher standard deviation suggests more variability among user opinions and experiences. In this case, the standard deviation of 0.839 indicated a relatively higher variability, suggesting differing perceptions and experiences among patrons. This meant that some participants (about 29%) found icons difficult to identify hence they struggled to know when to initiate the next operation. Other participants (about 71%) found them to be clear and simple to utilize. This variation could be due to unfamiliarity with the KOHA OPAC interface. This made it difficult for about 29% of respondents to identify icons hence restricting their ability to utilize KOHA OPAC effectively for information retrieval.

Fati & Adetimirin (2015) argued that user understanding of OPAC attributes, computer fluency, OPAC system, and language proficiency, are crucial for successful online catalogue searches. According to (Kline & Barlow, 2006; Xie & Matusiak,

2016) interfaces of ILSs enable patrons to easily navigate and access resources in our technologically driven world by serving as mediums of vast amounts of information. Nevertheless, this study established that although most respondents (about 71%) were able to employ icons of KOHA OPAC to navigate the interface, there are other patrons (about 29%) who were unfamiliar with the interface of KOHA OPAC hence failing to identify icons which obstructed navigation. This has a negative influence on usability of KOHA OPAC for information retrieval.

This research also examined usability of KOHA OPAC's search box in facilitating access to electronic resources. The mean for accessing e-resources through the search box was 2.265 representing an average degree of consensus among patrons regarding their ability to access e-resources using KOHA OPAC. The average score showed that patrons are inclined towards a moderate level of agreement. In this case, the standard deviation of 0.906 indicated a relatively higher variability, suggesting differing perceptions and experiences among patrons in terms of their ability to access e-resources. The researcher recorded poor visibility of the e-resources link as a barrier to effective navigation since when patrons got to the results page, they were unable to proceed to the next page as they could not locate the e-resources link. This represented about 57% of participants who claimed that KOHA OPAC search bar led them to the results page where they were unable locate the online link to e-resources. About 43% of the participants suggested that KOHA OPAC facilitated retrieval of e-resources. In a usability study on the functionality of OPAC, (Johnson & Craven, 2010) noted that respondents needed to execute functions of OPAC but because certain OPAC attributes like a link to Google books lacked visibility, they felt that OPAC did not support them during their quest to retrieve information resources. By considering the mean score and standard deviation, it becomes apparent that there was

a moderate level of agreement among users regarding their ability to access e-resources using the search box of KOHA OPAC in TU-KL. However, the high standard deviation suggested a significant variability in users' opinions and experiences. Majority of users (about 57%) strongly disagreed with the effectiveness of the search box in facilitating access to e-resources. This finding revealed that majority of TU-KL patrons are unable to utilize the KOHA OPAC link that initiates download of e-resources. This exhibits that usability of KOHA OPAC as an instrument for accessing e-resources was not effective since most users could not be able to find the link that would enable them to download e-resources.

The study also analysed the availability of access points with standard terminology in the drop down menu of KOHA OPAC search box. This analysis enabled the researcher to understand whether participants could use access points availed in KOHA OPAC drop down menu search box for effective information retrieval. The mean value of 2.500 represented an average level of agreement among patrons regarding the presence of a search box with access points that contained standard terminology. The mean showed that, on average, patrons leaned towards agreement. This implied that users expressed a moderate to high level of contentment with the presence of standardized access points on KOHA OPAC. The standard deviation of 0.794 showed a moderate level of variability, submitting divergent opinions and experiences among patrons in terms of the effectiveness of standardized access points in facilitating information retrieval. This meant that some participants found that access points in KOHA OPAC were helpful in retrieving information resources while other participants found the access points to be confusing. In terms of percentages about 19% strongly disagreed whereas about 69% strongly agreed and about 12% agreed that KOHA OPAC presented a search box with access points that have

standard terminology. Participants who strongly disagreed (about 19%) pointed out that they did not understand the “call number” access point.

Kumar, Rajinder & Singh (2017) clarified that application of OPAC at University Libraries in Delhi revealed that out of 191 library users at the Jamia Milia Islamia University, 35% of patrons’ encountered problems while using OPAC because they could not understand OPAC attributes. Considering the mean and standard deviation, it can be concluded that, on average, the majority (about 81%) agreed that there is a search box fitted with access points that have standard terminology. However, there is still a moderate level of variability in users' opinions and experiences. While a majority of users strongly agreed with the presence of access points with standard terminology, about 19% strongly disagreed. This finding shows that some users may find it hard to utilize KOHA OPAC for information retrieval since they lack understanding to some of its features such as the “call number”. This hinders effective usability of KOHA OPAC for retrieval of information resources.

4.5 Usability With Regard To Ease of Use of KOHA OPAC

This research wanted to initiate whether KOHA OPAC in TU-KL was easy to use during information retrieval to determine simplicity. This was realized by analysing usability with respect to simplicity of using KOHA OPAC. Table 4.12 provides insights into the ease of use of KOHA OPAC based on participants' responses. Mean and standard deviation provided additional insights into the data to understand the distribution and variability of users' responses regarding the ease of using KOHA OPAC for information retrieval.

Table 4.112 Ease of Use of KOHA OPAC

Statement about usability with regard to ease of use	Strongly disagree Percentage		Strongly Agree		Agree		Total			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Mean	SD
All in all, getting KOHA OPAC to accomplish what I wanted was simple	76	38.8	61	31.6	58	29.6	196	100	2.086	0.845
There is online help feature on the KOHA OPAC interface	64	32.7	110	56.1	22	11.2	196	100	2.219	0.926
It is simple to do search and retrieval using KOHA OPAC without written instructions	75	38.3	65	33.2	56	28.6	196	100	2.051	0.845
It is easy for me to learn how to search for information using KOHA OPAC	137	69.9	42	21.4	16	8.7	196	100	1.505	0.832

In terms of the statement regarding simplicity of accomplishing tasks with KOHA OPAC, the mean value of 2.086 indicated an average degree of consensus among patrons regarding simplicity of using KOHA OPAC for searching and retrieving information resources. This indicated that, on average, participants inclined towards agreement that the interface was relatively simple to use. In this case, the standard deviation of 0.845 suggested a moderate level of variability in users' perceptions towards simplicity of accomplishing tasks using KOHA OPAC as majority of participants (about 62%) agreed that it was simple to accomplish search and retrieval tasks using KOHA OPAC in TU-KL while others (about 38%) disagreed. Since the mean value of 2.086 is near the middle of the scale and the standard deviation of 0.845 is average, then there was a moderate level of agreement among users regarding simplicity of KOHA OPAC use. About 38% of participants strongly disagreed since they found it difficult to retrieve information resources using KOHA OPAC hence terming it unusable. This showed that they (about 38%) encountered difficulties in their attempt to achieve their desired outcomes because they could not use KOHA OPAC effectively for information retrieval.

Eserada and Okolo (2019) noted that low usage of OPAC among students from South-South Nigerian universities was due to challenges within the OPAC environment facilitated by lack of familiarity with navigational tools, leading to search failures. While a significant portion of users strongly agreed that KOHA OPAC enabled them to get needed information easily, a notable number strongly disagreed, indicating the need for improvement. The moderate standard deviation highlighted diversity regarding ease of getting information. Outcomes of this study demonstrated that a significant number of patrons found utilization of KOHA OPAC for information retrieval to be a difficult undertaking. This implies that a significant

user population found the usability of KOHA OPAC for information retrieval to be challenging since they are not able to retrieve required information resources easily.

The statement regarding presence of an online help attribute on KOHA OPAC interface had a mean value of 2.219 calculated for the agreement levels and a standard deviation of 0.926 indicating moderate degree of variability, suggesting availability of an online help attribute. In the context of usability, a higher standard deviation indicated a wider range of user perspectives. About 33% of participants who could not locate the help feature on KOHA OPAC interface cited lack of visibility. This was a serious claim since one cannot use what he/she is not able to see. Lack of visibility of the help feature on the interface of KOHA OPAC made it difficult to access and use in case of challenges regarding information retrieval.

Ruzegea (2012) listed visibility a major obstacle to usability of interface attributes OPACs. Additionally, (Malak, 2008) pointed out that a support system is a crucial component of any online service. Though accessible through virtually any text-based system (telnet session, for example), the OPAC support system is absent from the web version. However, OPACs' search systems differ from what consumers are used to from Internet search engine interfaces, thus this kind of assistance appears to be readily available on OPAC websites. Overall, the mean and standard deviation provided valuable statistical measures that complemented the frequency and percentage data, enabling a more comprehensive understanding of users' expressions on KOHA OPAC usability with respect to availability of an online help feature. This finding revealed that some users (about 33%) failed to find a help attribute on KOHA OPAC interface because it was not visible. This implies that users who have never used KOHA OPAC will find it complex to employ for information retrieval. Given if users face problems during application of KOHA OPAC for retrieval of needed

information resources, they will struggle to find assistance. This complicates usability of KOHA OPAC for retrieval of information resources.

Regarding ease of performing search and retrieval activities without written instructions, the mean of 2.051 indicated an average degree of agreement among patrons regarding the simplicity of performing search and retrieval tasks without written instructions using KOHA OPAC. This mean suggested that, on average, participants tilted towards agreement that the interface is moderately simple to use for search and retrieval tasks. In this case, the standard deviation of 0.845 suggested a moderate level of variability since some participants agreed that it was simple to execute retrieval tasks using KOHA OPAC without written instructions whereas others disagreed. About 38% of participants who strongly disagreed felt that KOHA OPAC was hard to employ and one required adequate training to employ it effectively for information retrieval. This implied that a considerable number of participants found it challenging to perform search activities without additional guidance.

Eserada and Okolo (2019) observed how students from Nigerian universities found it difficult to access information materials that they needed due to their lack of knowledge and unfriendly features of OPAC, resulting in low usage. Bukirwa et al. (2018) also conducted research on utilisation of OPAC at International Health Sciences University Library in Uganda. The study revealed that about 70% of library users lacked adequate knowledge and skills for utilizing OPAC for retrieval of information resources. Results of this study established that about 38% of participants found it hard to apply KOHA OPAC for information retrieval without written instructions. This implied that usability of KOHA OPAC by undergraduate users for in retrieval of information resources is not easy.

With regard to the statement learning how to search for information using KOHA OPAC yielded a mean of 1.505 showing an average degree of consensus among patrons. The mean advocated that, on average, patrons were inclined towards strong disagreement, indicating that the learning process is perceived as challenging. The standard deviation of 0.832 suggested a moderate level of variability among participant expressions on the ease of learning to search for information using KOHA OPAC. The standard deviation implied that participants had varying opinions with regards to learning how to search for information resources using KOHA OPAC with some participants finding it harder than others. About 70% of the respondents strongly disagreed that it was easy to learn to use KOHA OPAC meaning that it would take time for one to learn to use KOHA OPAC effectively.

This showed that KOHA OPAC is considered complex. This also proved that usability of KOHA OPAC in TU-KL, in terms of learning to search for information, is perceived negatively by the majority of users. Mohammed and Saka (2016) previously indicated that Nigerian students experienced problems during information retrieval due to inadequate ICT skills, awareness and indifference library staff. Since the majority of users (about 70%) found it difficult to learn how to utilize KOHA OPAC for information retrieval, it was consequently considered as having failed to meet the usability principle of ease of use.

Rogers' (2003) Diffusion of Innovation theory emphasized that technology should not be complex to learn and use in order to enhance usability. The findings indicated that KOHA OPAC is perceived to be difficult to learn, which may hinder its full adoption, especially among the majority who may struggle with learning how to apply it for retrieval of information resources.

4.6 Time Taken to Complete Search and Retrieval

The study analysed time taken by participants to discharge search and retrieval functions using KOHA OPAC. Researcher wanted to establish whether KOHA OPAC enabled timely information retrieval. Researcher sought to ascertain whether search and retrieval was achieved timely using KOHA OPAC, participant ability to get quickly to the website hosting KOHA OPAC, participant ability to save time and energy during KOHA OPAC use and the efficiency of applying KOHA OPAC for retrieval of library materials. Table 4.13 presented the information.

Table 4.13 Time Taken to Complete Search and Retrieval Table 4.13 Time Taken to Complete Search and Retrieval

Statement about time taken to complete search and retrieval	Strongly disagree Percentage		Strongly Agree		Agree		Total			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Mean	SD
All in all OPAC was very efficient in the retrieval of library materials.	79	40.3	61	31.1	56	28.6	196	100	2.107	0.849
I saved time and energy when I used OPAC to search and retrieve information.	68	34.7	76	38.8	51	26.5	196	100	1.969	0.870
I am able to search and retrieve information very quickly using KOHA OPAC.	112	57.1	60	30.6	24	12.2	196	100	1.734	0.900
I am able to get quickly to the website that hosts KOHA OPAC.	112	57.1	49	25.0	35	17.9	196	100	1.648	0.907

From Table 4.13, a mean of 2.107 indicated an average degree of agreement among clientele regarding the efficiency of KOHA OPAC in retrieving library materials. Since the mean value was greater than 2, it implied that most participants were inclined towards agreement, which indicated a moderate insight towards KOHA OPAC's efficiency during information retrieval. Standard deviation of 0.849 showed moderate level of variability among participants' responses with regards to the efficiency of KOHA OPAC in completing search and retrieval tasks. This represented about 40% of the participants who strongly disagreed that KOHA OPAC was efficient in the retrieval of library materials since they found it difficult to use and they had a hard time navigating to the website that hosted KOHA OPAC. However, KOHA OPAC was viewed as efficient by the majority of participants (about 60%) who agreed that it had the ability to facilitate retrieval of information resources efficiently.

Research by Eserada and Okolo (2019) on application of OPAC among universities in South-South Nigeria established that OPAC users were able to quickly retrieve information hence saving more time and energy. Similarly, (Ruzegea, 2012) also established that about 67% of users at IIUM agreed that they were able to navigate the OPAC interface faster. However, (Fox et al, 1993) found out that OPACs aren't always that useful, efficient, or effective. Outcome of this research show that some patrons (about 40%) do not regard KOHA OPAC as an efficient instrument for usability in retrieval of information resources since they spend more time trying to find KOHA OPAC in website of TU-KL. This hinders utilization of KOHA OPAC and it may prompt users to adopt alternative information retrieval tools. Fast & Campbell (2005) indicated that even though OPAC was offering quality searches, there was lack of knowledge among users on how to navigate and access information

and as such, most users preferred to use web search engines like Google as they were perceived to be faster than OPAC.

The study also analysed time saved during application of KOHA OPAC for information retrieval by undergraduate patrons as shown in Table 4.13. The mean of 1.969 indicated an average degree of consensus among participants concerning time and energy saved during use of KOHA OPAC in TU-KL. The mean implied that, on average, patrons are inclined towards consensus that most participants (about 65%) saved time and energy when they adopted OPAC to search and retrieve information. Standard deviation of 0.870 meant, while some participants agreed time was saved during use of KOHA OPAC for information retrieval, others disagreed.

About 35% of the participants strongly disagreed that they saved time and energy when they used KOHA OPAC to search and retrieve information because they spent too much time trying to navigate to the website that hosted KOHA OPAC, they had difficulties in formulating search query using the advanced search, the help feature was not visible to them and they could not find the online link to enable download of e-resources. Doris & Felicia (2013) indicated that OPAC was difficult to use in retrieving information as compared to card catalogue since students were taking longer durations to search and retrieve information resources. Outcome of this study indicated that some patrons may decide not to utilize KOHA OPAC for retrieval of information resources because the retrieval process takes more time. This deters effective usability of KOHA OPAC for retrieval of information resources owing to lack of efficiency.

The study also analysed whether respondents searched and retrieved information resources quickly using KOHA OPAC as presented in table 4.13. A mean of 1.734 indicated an average degree of consensus among patrons concerning the ability to search and retrieve information quickly using KOHA OPAC. The mean showed that, on average, patrons leaned towards disagreement, indicating a moderate approach regarding the interface's efficiency with reference to quick search and retrieval. Standard deviation of 0.900 demonstrated that usability of KOHA OPAC based on quick search and retrieval was expressed with some variation among users. About 57% of participants strongly disagreed with the statement, indicating that they do not view the interface as efficient in facilitating quick search and retrieval. This result was propelled by lack of a term suggester on the basic and advanced search bars of KOHA OPAC since whenever participants misspelt a single character of a search term they ended up with nil results meaning they had to re-type the entire search term again with the correct spellings for them to retrieve the needed information resources. However, about 31% strongly agreed and about 12% agreed that they saved time and energy when they used KOHA OPAC for information retrieval. This suggested that there were users who found the interface effective in supporting quick information retrieval. This was backed by (Sankari et al., 2014) who argued that adoption of OPAC by library patrons has accelerated retrieval of information resources, particularly library materials kept on-site.

Nevertheless, because the study findings demonstrated that (about 57%) participants strongly disagreed that they could search and retrieve information resources quickly using KOHA OPAC, most users might ignore to utilize KOHA OPAC. KOHA OPAC failed to save users' time thereby hindering its usability. Absence of a term suggester on the search box of KOHA OPAC implied that users did not get alternative search or

suggested queries, they also spent more time looking for the help feature and the link that facilitated download of e-Books. This hinders usability of KOHA OPAC as an information retrieval instrument that ought to enhance timely information retrieval.

This research also analysed ability of participants to get quickly to the website that hosted KOHA OPAC as shown in table 4.13. The average degree of participant agreement regarding the ease with which they accessed the website hosting KOHA OPAC was represented by the mean value of 1.734. The mean implied that majority of participants (about 57%) strongly disagreed with the statement regarding their ability to get quickly to the website that hosted KOHA OPAC. This suggested that users frequently encountered difficulties or delays when they tried to access the website that hosted KOHA OPAC. Participant replies showed variability around the mean with a standard deviation value of 0.907. The standard deviation indicated that while the minority (about 43%) suggested that it was easy getting to the website that hosted KOHA OPAC, majority (about 57%) found it difficult.

In terms of percentages, 25% strongly concurred that they could easily access the website that hosts KOHA OPAC. This showed that about a quarter of users regarded access to the website as simple. About 18% of participants concurred that they could easily access the website that hosts KOHA OPAC. Even though this percentage is lower than the level of "strong agreement," it nevertheless shows that some participants think the procedure for accessing the website is quick. The statement that users may easily access the website hosting KOHA OPAC was disagreed strongly by about 57% of participants. This was linked to absence of URL dedicated to KOHA OPAC. KOHA OPAC in TU-KL was accessible via the library website (library.tukenya.ac.ke) or through the university website (tukenya.ac.ke). Most participants spent time trying to navigate from TU-K website to the library website

where KOHA OPAC was hosted. Ones they got to the library website, they had to scroll up and down the crowded webpage looking for KOHA OPAC which was situated on the header of TU-KL website. It involved considerable amount of time to find KOHA OPAC in TU-KL website making it difficult to navigate and access.

Khatum (2014) indicated that OPAC helped in minimizing costs due to its improved efficiency for librarians. This confirms that cost minimization only applies to librarians since they are able to save time during administrative duties. However, from the findings, it is evident that users do not save costs as they spend more time using KOHA OPAC to get information materials. It also showed that the more time they spend in accessing the website hosting KOHA OPAC, the longer they take in retrieving information from KOHA OPAC and the higher they spend on internet bundles especially among users who use KOHA OPAC remotely. Sankari et al. (2014) reported how time taken in retrieving information had significant effect through enhanced speed of search activities on the OPAC module. The current study confirms Sankari et al. (2014) that time taken to complete search and retrieval tasks has significant effect on retrieval of information resources.

Outcome of this study reveal that users have a difficult time locating KOHA OPAC since TU-KL does not have URL dedicated to KOHA OPAC but instead, it is hosted on the TU-KL website. The TU-KL website is populated with text that is not relevant to KOHA OPAC thereby presenting a navigation challenge for users attempting to locate it on the crowded website. The challenge of locating KOHA OPAC might deter users from utilizing it thus impeding usability of KOHA OPAC by undergraduate users for retrieval of information resources in TU-KL.

4.7 Levels of User Satisfaction

The researcher sought to investigate levels of user satisfaction based on preference, pleasantness and overall satisfaction in application of KOHA OPAC for information retrieval. This was important since understanding users' opinion regarding KOHA OPAC was necessary to identify areas that require customization to enhance information retrieval. Outcomes were showcased in Table 4.14.

Table 4.124 Level of User Satisfaction

Statement about levels of user satisfaction	Strongly disagree Percentage		Strongly Agree		Agree		Total			
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Mean**	**SD**
I prefer KOHA OPAC whenever I need to retrieve information	160	81.6	19	9.7	17	8.7	196	100	2.734	0.625
All in all, I am pleased with the results of my KOHA OPAC searches	78	39.8	64	32.6	54	27.6	196	100	2.173	1.023
KOHA OPAC is pleasant to use	102	52.0	59	30.1	35	17.9	196	100	1.765	0.886
I am happy that KOHA OPAC is simple to use	118	60.2	57	29.0	21	10.8	196	100	1.673	0.897

From Table 4.14, the statement regarding preference to use KOHA OPAC whenever there is need to retrieve information had a mean value of 2.734 which represented an average degree of consensus among patrons concerning KOHA OPAC as their preferred information retrieval tool. The mean indicated that, on average, patrons tilted towards disagreement. This implied that majority of users do not prefer KOHA OPAC as their information retrieval tool of choice. Standard deviation value of 0.625 showed a relatively low variability, which suggested a consistent trend among users regarding their preference to KOHA OPAC.

Majority of participants (about 82%) who expressed disagreement to KOHA OPAC as their preferred information retrieval tool cited the challenge of accessing e-Books, complexity of the advanced search, lack of term suggesters, poor visibility of the help attribute and navigation difficulties. This showed that KOHA OPAC is not being used to retrieve information resources. An earlier study by Fast and Campbell (2005) indicated that even though OPAC was offering quality searches, there was lack of knowledge among users on how to navigate and access information and as such, most users preferred to use web search engines like Google as they were perceived to be faster than OPAC. They also felt that using OPAC would require more training hence believed that they were not well trained to use it. This shifted their preference from the use of OPAC to web-based search engines. Similarly, Akoun, Panle & Akhimien (2021) conducted research to determine undergraduate students' satisfaction levels with OPAC in Federal University of Agriculture (FUNAAB) and the University of Ibadan (UI) libraries. It was determined that most undergraduate students' satisfaction levels were impacted because they expressed dissatisfaction with using OPAC.

Results of this research clearly demonstrate that most patrons do not like to use KOHA OPAC whenever they have a need to retrieve information. The disregard of KOHA OPAC for application in retrieval of information implies that patrons are confronted with lack of term suggester, learning difficulties, poor visibility of links, complex terminology and navigation links. This impedes usability standards which require users to accomplish their information retrieval tasks with high levels of satisfaction.

The study also analysed whether undergraduate students were pleased with the overall results of KOHA OPAC searches. From Table 4.14, it was found that the mean value of 2.173 suggested that on average, participants expressed a moderate level of contentment with the results of KOHA OPAC searches. This implied that some participants were not pleased with the results generated by KOHA OPAC. The standard deviation of 1.023 showed significant amount of dispersion among participant responses. This suggested that participant opinions varied widely. It's critical to note that the standard deviation of 1.023 was relatively large, indicating a wider spread of responses.

Based on the data provided, about 40% of respondents strongly disagreed that they were pleased with the overall results of their KOHA OPAC searches. This was attributed to poor of visibility of the e-Book link which impeded navigation and retrieval because when participants were at the results page, they were unable to locate the eBook link. Additionally, some participants were not familiar with call numbers which made it hard for them to retrieve information resources. This made the results of KOHA OPAC searches to become inaccessible thereby making it to become unusable to the participants (about 40%) that were not pleased with the overall search results.

According to (Johnson & Craven, 2010), users needed to execute OPAC activities but because certain attributes of OPAC like the link to Google books were invisible, users felt that OPAC failed to aid them in their quest to retrieve information resources. Lack of satisfaction among some participants (about 40%) implies that they are not contented with the search results generated by KOHA OPAC thereby hindering effective information retrieval. This demonstrates that usability of KOHA OPAC for information retrieval is unable to satisfy information requirements of some patrons.

This research also analysed whether undergraduate patrons in TU-KL find KOHA OPAC to be pleasant to use. Findings on table 4.14 indicated a mean of 1.765 representing an average degree of consensus among patrons concerning the pleasantness of using KOHA OPAC. The mean insinuated that, on average, patrons inclined towards disagreement. This implied that users expressed a moderate level of dissatisfaction in terms of the pleasantness of using KOHA OPAC. Standard deviation of 0.886 showed a relatively higher variability, demonstrating different levels of pleasantness among users. About 50% of respondents who strongly disagreed noted that the advanced search of KOHA OPAC was difficult to utilize, links to e-books and help were not visible and the terminology applied on KOHA OPAC search bar was difficult to comprehend. These difficulties made KOHA OPAC to become unpleasant to most participants (about 52%) who may consider alternative information retrieval systems that use terminology that is simple.

During a usability test on a website at Kraemer Family Library within University of Colorado Springs, it was established that side bars on every web page were not effective as a result of low colour variation between the text and background and some links consisted of perplexing terminology that needed good labelling. Besides, presentation of certain links was not adequate making it hard for respondents to find

information. Results also showed that navigation bars were invisible to some respondents hence failure to utilize them (Kiruki, B W & Mutula, 2021; cited Chambers 2001). Lack of pleasantness will influence users to opt for other information retrieval tools that are more pleasant to use hence curtailing the usability of KOHA OPAC for retrieval of information resources.

This research also analysed whether users were happy that KOHA OPAC was simple to use. From Table 4.14, the findings presented a mean of 1.673 representing an average degree of consensus among patrons concerning the simplicity of using KOHA OPAC. The mean indicated that, on average, users disagreed. This implied that patrons expressed a moderate degree of dissatisfaction with the simplicity of using KOHA OPAC. Standard deviation of 0.897 demonstrated a relatively higher variability, suggesting different levels of satisfaction among users. About 60% of participants strongly disagreed that they were happy that it was simple to use KOHA OPAC for information retrieval. It implied that KOHA OPAC was not easy to use and one needed training for them to be proficient in using it effectively. Instruction concerning application of KOHA OPAC is necessary to enable users to familiarize themselves with terminologies used in the interface, to facilitate the use of Boolean Search strategies in the advanced search option and to ease navigation on the user interface. Chauhan (2018) posited that library users require training and retraining to become proficient in using OPAC to retrieve information resources.

Diffusion of innovation theory advanced by Rogers (1995) noted that for satisfaction to be realized, technology must be able to provide some tangible benefits to users. From the findings, it is clear that users do not see tangible benefits from KOHA OPAC as they take more time to find the website that hosts KOHA OPAC, spend long duration in accessing information required, find difficulties with understanding search

terminologies as well as not being able to locate the help feature. These issues might have prompted respondents to have low levels of satisfaction with KOHA OPAC hence they do not feel the need to use KOHA OPAC whenever they have information needs. Since most participants are not satisfied with the usability of KOHA OPAC, they may not utilize it for retrieval of information resources.

4.8 Retrieval of Information Resources

This study purposed to ascertain whether participants were able to find information through formulation of search queries, results matching search query, terminologies adopted in search and retrieval of relevant information. By understanding how users find information in KOHA OPAC, libraries can initiate changes to improve the Search Engine Results Pages (SERPs) and other features of KOHA OPAC. Table 4.15 presented findings.

Table 4.135 Retrieval of Information Resources

Statement about Retrieval of Information Resources	Strongly disagree Percentage		Strongly Agree		Agree		Total			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Mean	SD
I am able to formulate search query necessary for retrieval of information resources using KOHA OPAC	10	5.1	170	86.7	16	8.2	196	100	2.816	0.865
Terminology availed on the drop down arrow of KOHA OPAC is easy to understand	142	72.4	25	12.8	29	14.8	196	100	2.596	1.874
KOHA OPAC presents results that match the search query	55	28.1	12	6.1	129	65.8	196	100	2.219	1.788
All in all, KOHA OPAC facilitates retrieval of relevant information resources	12	6.1	36	18.4	148	75.5	196	100	1.877	1.102

From Table 4.15, the study found that the mean score for users' ability to formulate search queries necessary for retrieval of information resources using KOHA OPAC was 2.816 which indicated that, on average, participants consented that they were able to formulate search queries necessary for retrieving information resources using KOHA OPAC. The proportionately low standard deviation of 0.865 demonstrated that responses were not highly dispersed, indicating a relatively consistent agreement among participants regarding their ability to formulate search queries. About 5% of participants strongly disagreed that they are able to formulate search query necessary for retrieval of information resources using KOHA OPAC. This may be attributed to unfamiliarity with information retrieval system since formulating search queries in most online information retrieval systems including internet search engines is almost similar. However, about 87% and 8% respectively strongly agreed and agreed that they were able to formulate search queries necessary for retrieval of information resources using KOHA OPAC.

These findings align with previous research by (Kumar, 2014), which suggests that user difficulties in formulating search queries are often attributed to a lack of skills regarding the use of KOHA OPAC for retrieval of information resources. The results of this study indicated that most users (about 87%) were able to formulate search query. Since the default access point in the basic search box is “keyword”, the user enters the query (title/author/subject) and its application for information retrieval is enhanced. This finding demonstrates that there is great potential for the usability of KOHA OPAC in retrieval of information resources.

Analysis to determine whether terminology availed in the drop down menu of KOHA OPAC was easy to understand was conducted. The mean value of 2.596 suggested that, on average, participants had a moderate agreement that terminology in the drop-down menu of KOHA OPAC was easy to understand. However, the proportionately high standard deviation of 1.874 indicated a greater dispersion of responses which suggested that participants' opinions regarding the ease of understanding the terminology varied more widely. About 72% of participants strongly disagreed with the statement suggesting that terminology like call number, series, ISBN (International Standard Book Number) and barcode maybe alien to participants. Failure to understand terminology adopted on the search bar of KOHA OPAC may contribute to lack of usability since when a user selects a descriptor from the drop down menu and enters search query that does not correspond to it, search failure becomes inevitable.

Findings of this study align with earlier findings of (Ndumbaro, 2018) who found out that inability to retrieve records from OPAC was as a result of users' lack of knowledge regarding LCSH. Sadeh (2008) also observed that OPACs are more librarian-centred in their design since most terminologies adopted in the interface of OPAC can only be understood by library personnel thereby severely hampering the end user interface. The failure of KOHA OPAC to act as a discovery tool makes it hard to apply for information retrieval. The presence of 8 access points burdens the user in terms of memory load since the user has divided attention between the information need, query formulation and the access points. This makes usability of KOHA OPAC for information retrieval a cumbersome undertaking.

The study also analysed whether users were able to produce results matching their search queries using KOHA OPAC. This was initiated so as to establish whether KOHA OPAC enables users to retrieve information resources that they need. From Table 4.15, the mean score of KOHA OPAC presenting results that match the user search query was 2.219. This mean showed that participants on average agreed that KOHA OPAC presented results that matched their search queries. However, the proportionately high standard deviation of 1.788 suggested a considerable variation among participant' responses. This indicated that some participants strongly agreed, while others disagreed or had mixed opinions regarding the extent to which the search results matched their queries. Some participants (about 28%) strongly disagreed that KOHA OPAC presented results that matched their search query. This was attributed to lack of knowledge regarding some KOHA OPAC terminologies such as the call number, poor visibility of the links to the help feature and online books. This made it hard for patrons to retrieve information resources hence making KOHA OPAC unusable to them.

Igere (2022) also reported that a considerable percentage of students moderately employ OPAC interface or do not use it at all, because of failure to obtain needed information resources. This means that those participants (about 28%) may in future opt for alternative information retrieval systems to access required information resources as demonstrated by (Igere, 2022) where about 38% of students are moderately using the OPAC interface while about 37% do not use OPAC at all. Lack of knowledge regarding call numbers presented a challenge to users of KOHA OPAC since it prevents users from retrieving the needed information resource from the library shelves. Lack of knowledge on call numbers is detrimental to usability of KOHA OPAC as it prevents retrieval of needed information resource. This deters

users from utilizing KOHA OPAC for information retrieval as they find it hard to utilize.

The research also analysed participant perception with regards to whether KOHA OPAC facilitated retrieval of relevant information needed to support learning as highlighted in Table 4.15. This was important in order to establish whether KOHA OPAC at TU-KL contains information resources that fulfil the information requirements of patrons. The mean value of 1.877 indicated that, on average, participants had a slightly positive agreement that KOHA OPAC enhances retrieval of relevant information resources. However, standard deviation of 1.102 suggested a moderate degree of variation among participant responses, indicating different opinions among participants regarding overall facilitation for retrieval of information resources using KOHA OPAC.

Majority of students (about 76%) agreed that, all in all, KOHA OPAC facilitated retrieval of relevant information resources. Furthermore, about 18% strongly agreed, while about 6% strongly disagreed. These findings indicated that, overall, the majority of respondents agreed or strongly agreed that KOHA OPAC is effective in facilitating retrieval of relevant information resources because hard copy books acquired by TU-KL are catalogued and availed via KOHA OPAC, e-books from online scholarly databases that have been subscribed by TU-KL are also accessible via KOHA OPAC. About 6% of participants that disagreed on the relevance of information resources in KOHA OPAC experienced difficulties during formulation of search queries resulting in search failures.

According to (Fresnido & Barsaga, 2019) analysis of Transaction Logs showed that users conducted searches using the basic search of OPAC the same way they normally do using Google search and presumably expected to get similar results as it happens on Google leading to search failures. Lack of effective search strategies during utilization of KOHA OPAC for information retrieval leads to search failures a situation compounded by the absence of term suggesting facilities in the search box of KOHA OPAC which is detrimental to the usability of KOHA OPAC for information retrieval.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This division outlined the study synopsis, its conclusion, and recommendations for policy, enactment and additional research. The study sought to probe usability of KOHA OPAC by Undergraduate Users for Information Retrieval in TU-KL. Specific objectives were; to determine usability of KOHA OPAC for information retrieval with regard to usability testing by undergraduate users at TU-KL; to analyse usability with regard to interface design of KOHA OPAC during information retrieval by undergraduate patrons in TU-KL; to examine usability with regard to ease of use of KOHA OPAC during information retrieval by undergraduate users at TU-KL; to determine usability of KOHA OPAC based on the time taken to complete search and retrieval of information resources by undergraduate users at TU-KL; and to establish usability based on levels of user satisfaction with KOHA OPAC in information retrieval by undergraduate users at TU-KL.

5.2 Summary

The general objective of the study was to investigate usability of KOHA OPAC by undergraduate users for retrieval of information resources in TU-KL. Specific objectives were; usability testing, interface design, ease of use, time taken and user satisfaction.

The study adopted a semi structured questionnaire to gather raw data where 382 participants received questionnaires. The researcher administered a 10 minute tutorial to participants that had never used KOHA OPAC and those that had never been trained on utilization of KOHA OPAC. It entailed a usability test where participants were given tasks to locate KOHA OPAC, search and retrieve information resources

using KOHA OPAC and to locate a help feature in the user interface of KOHA OPAC. Descriptive statistics was applied to analyse data. Presentation was done in tables. A response rate of 51% was realized. Participant enrolment for bachelor's degree programs was at 100%. The study revealed that about 54% of participants were third and fourth years while about 46% were first and second years. It was also established that about 61% of participants had not received training on KOHA OPAC while about 39% had been trained. On whether participants had previously employed KOHA OPAC, the study found that about 39% had used KOHA OPAC before while about 61% had never used KOHA OPAC previously. The study also sought to establish participants' skills where they were required to rate their skills. The study It was established that about 42% were beginners; about 33% had basic skills and about 25% believed they had advanced skills in using KOHA OPAC for retrieval of information resources.

The first objective of the study was to determine usability of KOHA OPAC in information retrieval with regard to usability testing by undergraduate users at TU-KL in Nairobi County. During the usability test, the study established that about 81% of participants could locate KOHA OPAC on the TU-KL website while about 19% were not able to locate KOHA OPAC on the TU-KL website. The study's basic search 1 revealed that about 76% were able to find "human resource hand book" while about 24% were unable to find it. Basic search 2 found that about 54% of participants were able to find the book and note down the call number, about 35% did not find the book while about 11% indicated that they found the book but did not notice the call number. The study's basic search 3 revealed that 51% of participants found the eBook but were unable to download it and about 49% found and downloaded the eBook. The study further noted that during the advanced search, about 53% of participants were

unable to find the information resource while, about 47% were able to find and retrieve the information resource using the advanced search of KOHA OPAC. It was also established that about 31% of participants found a help attribute on the interface of KOHA OPAC and about 69% could not find the help attribute.

The second objective was to analyse usability with regard to interface design of KOHA OPAC. It was established that about 44% of participants strongly agreed that the interface of KOHA OPAC had icons with clear activation that made it possible for users to know when the next operation starts, about 28% agreed to the statement while about 28% strongly disagreed. The study also found out that about 69% of participants strongly agreed that KOHA OPAC had a search box fitted with descriptors that contain standard terminology, about 12% agreed while about 19% strongly disagreed. On the issues of ability to download information resources using KOHA OPAC, about 57% strongly disagreed that they were able to download e-resources using KOHA OPAC, about 31% strongly agreed while about 13% agreed. This showed that even with clear icons and search boxes, patrons still felt that they were not able to perform successful information search and retrieval.

The third objective was to examine usability with regard to ease of use of KOHA OPAC. Here simplicity of using KOHA OPAC in retrieval of information resources, presence of online help features and the ease of learning to use KOHA OPAC for retrieval of information resources was analysed. Findings revealed that about 38% of users strongly disagreed that it was simple to do retrieval using KOHA OPAC without written instructions, about 33% strongly agreed while about 29% agreed. It was reported that about 38% of users strongly disagreed that getting KOHA OPAC to accomplish the task they wanted was simple, about 32% strongly agreed while about 30% agreed. It was also established that about 56% of users strongly agreed that

KOHA OPAC had a help feature on its interface while about 33% strongly disagreed. The study also observed that about 70% of KOHA OPAC users strongly disagreed that it was easy for them to learn how to perform information retrieval activities using KOHA OPAC, about 21% strongly agreed while about 9% agreed.

The fourth objective was to determine usability with regard to time taken to complete information retrieval using KOHA OPAC. Under this objective, the study analysed the speed of accessing the website hosting KOHA OPAC, time saving and efficiency during the application of KOHA OPAC for information retrieval. It was established that about 57% strongly disagreed that they were able to search and retrieve information very quickly using KOHA OPAC, about 31% strongly agreed while about 12% agreed. On time saving, about 38% strongly agreed that they were able to save time when using KOHA OPAC for information retrieval, about 27% agreed while about 35% strongly disagreed. It was also established that about 40% of participants strongly disagreed that KOHA OPAC was efficient in supporting retrieval of information, about 31% strongly agreed while about 29% agreed to the statement.

The fifth objective was to establish usability based on degree of patron satisfaction with KOHA OPAC. The study analysed whether KOHA OPAC was pleasant to use and the levels of user satisfaction with KOHA OPAC were also analysed. It was revealed that about 52% of users strongly disagreed that KOHA OPAC was pleasant to use, about 30% strongly agreed while about 18% agreed. It was also established that about 40% of users strongly disagreed that all in all, they were pleased with the search results of KOHA OPAC, about 33% strongly agreed while about 27% agreed. On the level of satisfaction, the study noted that about 60% of the users strongly disagreed that they were satisfied with KOHA OPAC, 29% strongly agreed while about 11% agreed.

This research also established retrieval of information resources using KOHA OPAC was a challenge since about 5% of participants strongly agreed that they encountered difficulty during formulation of search queries, about 8% agreed and about 87% strongly disagreed. The researcher also established that about 66% of users noted that KOHA OPAC presented results that matched their search queries, about 6% strongly agreed and about 28% strongly disagreed. Regarding the ease of understanding the terminologies presented in the drop down menu of KOHA OPAC, about 72% strongly disagreed, about 13% strongly agreed and about 15% agreed. About 76% agreed that KOHA OPAC facilitated retrieval of relevant information resources, about 18% strongly agreed while about 6% strongly disagreed.

5.3 Conclusion

The first objective which determined usability of KOHA OPAC in information retrieval with regard to usability testing in TU-KL revealed that both strengths and areas for improvement are in the system's design and functionality. Findings demonstrated that most participants were able to pinpoint KOHA OPAC in the university website, demonstrating the visibility and accessibility of KOHA OPAC. However, some participants faced challenges in effectively utilizing KOHA OPAC for information retrieval. This indicates that some users may not opt to utilize KOHA OPAC for information retrieval due to inability to use basic and advanced search, poor visibility and clarity of the online help attribute and the link that ought to facilitate retrieval of e-resources. It concludes that failure to conduct successful information search and retrieval is a setback to usability of KOHA OPAC as an information retrieval tool.

The second objective analysed usability of KOHA OPAC with regard to interface design. The study concluded that the interface of KOHA OPAC was fitted with icons

that have been made clear to enable users to know when the next activity begins. Conclusion was also made that KOHA OPAC search box had descriptors with standard terminology. It was concluded that, on average, users tended to agree with the presence of a search box fitted with descriptors that contained standard terminology. However, it was concluded that despite clear icons and search boxes, some users were still unable to use KOHA OPAC to retrieve e-Books, e-journals and other information resources. The study concludes that some users may not utilize the KOHA OPAC interface to satisfy their information needs owing to failure in facilitating retrieval of e-Books, lack of understanding of terminologies on the drop down menu of KOHA OPAC and poor visibility of icons. This puts the usability of KOHA OPAC in jeopardy since its interface design is not effective in enabling retrieval of both physical and e-resources.

The third objective focused on the ease of using KOHA OPAC in retrieval of information resources, the study concluded that it was simple to access information resources using KOHA OPAC without written instructions. The study also concluded that there existed a challenge of using KOHA OPAC that made it difficult for other users to access information resources. Conclusion was also made that the KOHA OPAC interface had a help feature that provided assistance to users during search and retrieval activities. Conclusion was made that the online help attribute was not visible enough to some users hence they did not get help when they needed it. It was concluded that using KOHA OPAC was not easy because participants could not use the advanced search effectively, they could not locate the help feature and they were unable to get needed results after using KOAHA OPAC. The study concludes that as a result of poor visibility of the online help attribute and inability to combine search queries using Boolean Operators in the advanced search contributes to lack of

utilization of KOHA OPAC for information retrieval. The study concludes that since some users encounter difficulties when using KOHA OPAC, the usability principle of ease of use does not apply in KOHA OPAC.

The fourth objective was about the time taken to complete search and retrieval tasks using KOHA OPAC. This study concluded that KOHA OPAC did not facilitate timely retrieval. The study made conclusion that users of KOHA OPAC were not able to get quickly to the website that hosted KOHA OPAC. The study concluded that even though some users felt that they saved time by retrieving information using KOHA OPAC, it was still not enough to satisfy them. The study concluded that users of KOHA OPAC encountered some challenges that reduced its efficiency during retrieval of information resources. The study further concludes that the difficulty of finding the website that hosted KOHA OPAC contributed to consumption of participants' time and effort during their attempt to locate KOHA OPAC. This depicts lack of efficiency during usability of KOHA OPAC for information retrieval.

In the fifth objective regarding levels of user satisfaction, it was concluded that KOHA OPAC was not pleasant to use. It was concluded that KOHA OPAC results are pleasant as they offer quality information resources. It was decided that users of KOHA OPAC interface were not satisfied due to its complexity in terms search and retrieval of information resources employing both basic and advanced search boxes. The low approval ratings following utilization of KOHA OPAC for information retrieval indicates that users may prefer to adopt other information retrieval instruments that satisfy their information needs easily and timely. Since most participants found KOHA OPAC not pleasant to use for information retrieval, it derails its usability.

The study concluded that some patrons encountered difficulties during formulation of search quarries using KOHA OPAC. It concluded that KOHA OPAC presented some results that matched search queries. The difficulty experienced by most participants during query formulation using either the basic or advanced search serves as a deterrent to utilization of KOHA OPAC for information retrieval. The study concluded that usability of KOHA OPAC for information retrieval is not feasible since it is not easy to utilize.

5.4 Recommendations

The researcher offers these recommendations in light of the evidence that the study presented.

i. The researcher recommended that TU-KL should regularly conduct usability tests on KOHA OPAC to gather feedback and insights from users in order to identify areas of improvement for effective information retrieval. Feedback gathered from usability tests will also provide information regarding user likes and dislikes in order to enhance a user centred approach for guiding interface customization.

ii. The interface of KOHA OPAC should be improved to provide clearer and more descriptive icons that adopt user-friendly terminology that is easily understood. Such changes will enhance user comprehension, expedite information search activities, and facilitate seamless access to e-resources and other needed information resources. The interface of KOHA OPAC should also be customized to improve the visibility of online links that facilitate retrieval of e-Books. Customization of KOHA OPAC interface should also focus on placing the help feature in conspicuous location, such as the header, making it more visible and easily accessible to users. This strategic placement

will provide crucial support to users who may encounter difficulties during information retrieval, thereby promote successful retrieval of information resources.

iii. The researcher recommended that TU-KL should enhance training on KOHA OPAC use by collaborating with faculty members and departments to integrate KOHA OPAC training into the curriculum. This guarantees that students will receive necessary training and guidance in using KOHA OPAC effectively. Creation of a content section in the website hosting KOHA OPAC with brief description of terminologies used on the search box of KOHA OPAC will enhance ease of use.

iv. The researcher recommended that TU-KL should design user paths that streamline the search process, enabling users to quickly and intuitively navigate the interface of KOHA OPAC. By optimizing user paths, users will be able to undertake search activities efficiently, reducing the time required to find and access the desired information resources. This improvement will facilitate increased downloads and enhanced accessibility to materials that users need. Implementing user-friendly search paths will contribute to a more streamlined and time-efficient search experience on KOHA OPAC, ultimately benefiting users through quick access to desired library materials.

5.4.2 Recommendation for Further Research

i. Study Population

The study concentrated on usability of KOHA OPAC targeting undergraduate users for information retrieval in TU-KL. Future research should focus on postgraduate users to determine their experience as well as levels of satisfaction with KOHA OPAC.

ii. Information Retrieval System

The study was centred on KOHA OPAC, an open source information retrieval system. There is need to conduct a usability study on the OPAC system of proprietary ILSs.

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APENDIX I: PARTICIPANTS RECRUITMENT FLYERS

Participate in Usability

Test Session!

The Session will:

Take place at The Technical University of Kenya Library

The session will take At most 20 minutes

- **You will be required to perform tasks and answer questions regarding your experience using OPAC**
- **Receive a free gift of an e-book on the subject of your choice upon completion**

To participate, kindly send me an email to nyambaka.steve@ku.ac.ke

APENDIX II: PRE-TASK QUESTIONNAIRE

Thank you for accepting to engage in this study. Kindly respond to the questions below about yourself:

Instructions:

1) Fill in the blanks or check the boxes to indicate your answers. Programme (Bachelor's): _____
2) Field of study (e.g. Bachelor of Library and Information Science):

   _____
3) Kindly indicate Year of Study: □ First/Second Year □ Third/Fourth Year
4) Have you ever undergone OPAC Instruction/Training before? □ Yes □No
5) Have you ever used OPAC before? Yes □ No □ (If 'no', do not answer question 6)
6) How do you rate your skills of using OPAC to retrieve information resources

   1 2 3 4 5 6 7

   (1-3 beginner) (4-5 basic) (6-7 advanced)

APENDIX III: TASK ASSIGNMENT SCENARIO USING KOHA OPAC (TU-KL)

Kindly perform the tasks listed below;

1. Find the homepage of your university OPAC using the URL (address), on a browser of your choice. Are you able to locate OPAC? _____ (yes/no)
2. Do you think it is easy to find the location of OPAC? _____ (yes/no)
3. Using the basic search bar of OPAC, search for a book titled:

i. **a handbook of human resource management practice**

ii. Search for a book whose author is **Rosenak Sidney**. Note down the call number of the book.

4. Kindly utilize the advanced search feature of OPAC to retrieve a book titled **Business accounting** whose author is **Wood**, **Frank**.
5. Kindly identify any help features or search aids on the user interface of OPAC

   Can you find any? _____
6. Conduct a basic search for an eBook titled **Lead-Free Soldering**. Download the eBook in PDF/EPUB file format

APENDIX IV: POST-STUDY SYSTEM USABILITY QUESTIONNAIRE ON USABILITY OF KOHA OPAC

This questionnaire aims to give you an opportunity to inform the researcher how you rate the performance of KOHA OPAC. As you answer these questions, consider the previous information search and retrieval exercises you completed on KOHA OPAC.

Instructions:

Please read each question and mark a number on the scale to show how strongly you agree or disagree with it. Tick N/A if a question is not applicable to you. You are urged to add details to your answers in the form of comments. Thank you very much.

SECTION I: INTERFACE DESIGN

NB: The keyboard, mouse, screens, icons, and language are all part of the interface, which you apply to communicate with KOHA OPAC.

1. The OPAC interface provides icons with clear activation that makes it obvious when the next operation can be started

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

2. OPAC presents a search box fitted with descriptors with standard terminology

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

3. Amount of information displayed on the OPAC interface is adequate to facilitate retrieval of information

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

4. I am able to access e-books, e-journals and theses using OPAC search box

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

SECTION II: USABILITY WITH REGARD TO EASE OF USE OF KOHA OPAC

1. It is simple to do search and retrieval tasks using OPAC without written instructions

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

2. There is online help feature on the OPAC interface

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

3. It is easy for me to learn how to in using OPAC

Strongly Agree Agree Strongly Disagree

1 2 3

Comments:

4. All in all, getting OPAC to accomplish what I wanted was simple

Strongly Agree Agree Strongly Disagree

1 2 3

Comments:

SECTION III: TIME TAKEN TO COMPLETE SEARCH AND RETRIEVAL

1. It was able to search and retrieve information very quickly using KOHA OPAC

Strongly Agree Agree Strongly Disagree

1 2 3

Comments:

2. I am able to get quickly to the website that hosts KOHA OPAC

Strongly Agree Agree Strongly Disagree

1 2 3

Comments:

3. I saved time and energy using when I used OPAC to search and retrieve information

Strongly Agree Agree Strongly Disagree

1 2 3

Comments:

4. All in all OPAC was very efficient in the retrieval of library materials

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

SECTION IV: LEVELS OF USER SATISFACTION

1. I always feel the need to use OPAC whenever I need to retrieve information

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

2. OPAC is pleasant to use

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

3. I am satisfied that OPAC is simple to use

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

4. All in all, I am pleased with the results of my OPAC searches

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

SECTION VI: RETRIEVAL OF INFORMATION RESOURCES

1. I am able to formulate search query necessary for retrieval of information resources using KOHA OPAC

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

2. KOHA OPAC presents results that match the search query

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

3. Terminology availed on the drop down arrow of the KOHA OPAC basic search is easy to understand

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

4. All in all, KOHA OPAC facilitates retrieval of relevant information resources

Strongly Agree	Agree	Strongly Disagree
1	2	3

Comments:

APPENDIX V: BUDGET

S.N	ITEM DESCRIPTION	ESTIMATED COST(Kshs.)
1.	Printing and Photocopying	4000
2.	Binding	3000
3.	Design of Recruitment Flyers	3000
4.	Transport	2000
5.	Internet Bundles	5000
6.	Research License Fee	1000
		TOTAL ESTIMATED COST
		18300

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 4150

Internal Memo

FROM: Dean, Graduate School

DATE: 19th May, 2022

TO: Steve Biko Nyambaka
C/o Library & Information Science.

REF: E65/CTY/PT/38042/2017

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board at its meeting of 4th May, 2022 approved your Research Project Proposal for the M.LIS Degree Entitled, "Usability of Koha Online Public Access Catalog by Undergraduate Users for Information Retrieval in Technical University of Kenya Library".

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

THE TECHNICAL UNIVERSITY OF KENYA

Haile Selassie Avenue, P. O. Box 52428, Nairobi, 00200, Tel: +254 (020) 343672, 2249974, 2251300, 341639,
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Office of the Deputy Vice-Chancellor

Academics and Student Affairs

REF: TUK/DVCARS/ ReKE/010/VOL...

June 27, 2022

Mr. Steve Biko Nyambaka,
P.O. Box 43844-00100,
NAIROBI.
Cell Phone No. 0720-796446

Dear Mr. Nyambaka,

REQUEST FOR PERMISSION TO COLLECT RESEARCH DATA AT THE TECHNICAL UNIVERSITY OF KENYA LIBRARY

Reference is made to the above matter and your letter of 14th June, 2022 addressed to the Vice-Chancellor, The Technical University of Kenya.

Your request for authority to collect data for your research paper on "***Usability of KOHA Online Public Access Catalogue (OPAC)***" has been carefully considered and approved by the Vice-Chancellor.

Further, the institution expects you to treat all information given with utmost confidentiality and anonymity and ensure that collected information is used purely for academic purposes. Please also note that, you are expected to submit a copy of the research output to the Technical University of Kenya. In the meantime, the undersigned takes this opportunity to wish you all the best in your academic pursuits.

Yours sincerely,

Prof. Paul M. Shiundu
DEPUTY VICE-CHANCELLOR – ACADEMICS & STUDENTS AFFAIRS AND PROFESSOR OF CHEMISTRY

Copy to: **Vice-Chancellor**
The Technical University of Kenya

PMS/ekm

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **909517**

Date of Issue: **13/June/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Steve Biko Nyambaka of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: USABILITY OF KOHA ONLINE PUBLIC ACCESS CATALOG BY UNDERGRADUATE USERS FOR INFORMATION RETRIEVAL IN TECHNICAL UNIVERSITY OF KENYA LIBRARY for the period ending : 13/June/2023.

License No: **NACOSTI/P/22/18219**

909517

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR