

**INFORMATION RETRIEVAL KNOWLEDGE OF USERS USING THE  
NATIONAL EARTH SCIENCE AND ENERGY INFORMATION CENTRE  
DATABASES**

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BY

HILYA PANDULENI ROBERT (AMWENYO)

STUDENT NUMBER: 200408933

Main Supervisor      Prof Kingo Mchombu, Department of  
Information and Communication Studies,  
University of Namibia

Co-supervisor:        Mr. W. Yule, Department of  
Information and Communication Studies,  
University of Namibia

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## **ABSTRACT**

This study investigated the information retrieval knowledge of the users of the National Earth Science and Energy Information Centre (NESEIC). The purpose of the study was to establish the gaps in the information retrieval knowledge of NESEIC users and the information skills NESEIC users require to search and locate relevant information from the NESEIC library systems. The study utilised a mixed method research design. Data was collected through interviews, observation and questionnaires from the NESEIC users and NESEIC librarians. A sample of 100 NESEIC users responded to the questionnaire. Thirteen NESEIC users were observed. Ten NESEIC users and two NESEIC librarians were interviewed. The Descriptive Statistical Analysis was used to analyse quantitative data from the questionnaires, a Chi-square test was used to explore relations between variables and SPSS was used as a programme for data entry. Furthermore, cross check was ensured through assigned codes for all questionnaires in the SPSS programme. Content analysis was used to analyse qualitative data from the interviews. The ethics of this study honoured voluntary participation, confidentiality and informed consent.

The literature reviewed in this study suggests that, there is an increasing gap in libraries' user knowledge and retrieval of information. The main findings of the study established that, a lack of information literacy skills is the major problem limiting NESEIC users from independently searching, accessing and using the resources effectively in the NESEIC library. The study's findings also established that most NESEIC books are wrongly catalogued and shelved, thus some NESEIC

users fail to retrieve the relevant information. The findings of the study are similar to that of the literature reviewed; this study found poor information use in the NESEIC library caused by lack of information literacy skills.

The study made recommendations which included the recommendation for the NESEIC library to introduce user education and information literacy skills training programs that will help in training users on how to access and use the library's collection, facilities and services more effectively.

**Keywords:**

Information retrieval, information need, information search process model, knowledge and information, information literacy skills

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**Dedication**

I dedicate this thesis to my husband and my grandmother Linea Gwaashiyana for providing me with love, care, advice and encouragement during the completion of my thesis. They were consistently there for me, even during the hard times I experienced with this thesis.

**Declaration**

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Hilya Panduleni Robert (Amwenyo)

Date: 11 December 2015

**Abbreviations and acronyms**

- ASK - Anomalous States of Knowledge
- EDND - Earth Data Namibia Database
- EPL - Exclusive Prospecting Licence
- FF - Focus Formulation
- GIS - Geographical Information System
- IC - Information Collection
- IL - Information Literacy
- ILM - Information Literacy Model
- ILPN - Information Literacy at the Polytechnic of Namibia
- ILS - Information Literacy Skills
- IN - Information Need
- IR - Information Retrieval
- IS - Instructional Strategy
- ISPM - Information Search Process Model
- KC - Knowledge Conversion
- KNUST - Kwame Nkrumah University of Science and  
Technology
- LIST - Library and Information Skills Training
- NAMDED - Namibia De Beers
- NESEIC - National Earth Science and Energy Information Centre
- OPAC - Online Public Access Catalogue

- PE - Prefocus Exploration
- PEL - Petroleum Exploration License
- RP - Research Process
- SC - Search Closure
- STP - Searcher's Thinking Process
- TI - Task Initiation
- TS - Topic Selection
- UE - User Education
- WINISIS - Windows Integrated Set of Information Systems

## CHAPTER ONE: INTRODUCTION

### 1.1 Introduction

This chapter discussed the orientation of this study (1.2), statement of the problem (1.3), questions of the study (1.4), significance of the study (1.5), limitations of the study (1.6), literature review (1.7), methodology and research design (1.8), clarifying key concepts (1.9), thesis outline (1.10) and ended with a chapter summary (1.11).

User information retrieval knowledge is that know-how that one requires in order to actively locate and retrieve information or material necessary to meet a specific information need. Sturges and Feather (2003) define knowledge as “the information evaluated and organised in the human mind so that it can be used purposefully” (p.341). Every user of any library is required to have information retrieval knowledge, in other words the skills to search for, locate and retrieve information in libraries. Kuhlthau (1996), Manning, Raghavan and Schütze (2009) point out that for the user to actively and successfully make use of libraries, one must have the ability to make use of the searching tools as a filter to find the required information as well as to limit the final set of results to include only the highest quality resources that will address the information need.

Library users have unique ways in which they access materials in the libraries, such as; the decision they make on which material to access; the queries they pose to the

librarians on how to utilise the Online Public Access Catalogue (OPAC), the knowledge and the skills they have on how to get materials from the shelves and the Boolean operators they use to search for materials in the libraries' databases and on the Web. All are an important part of the users' information retrieval knowledge needed for effective utilisation of library materials, which is the focus of this study. The library exists to provide and support the reading as well as the research needs of its users, through the provision of better services to its clients to make sure that information sources, services and resources are utilised for the best of its clients' benefits (Suleiman, 2012 ; Clarke, 1999).

### **1.2 Orientation of the study**

Similar user information retrieval knowledge studies (Agyen-Gyasi, 2008; Grobler and Chanetsa, 2009) identified gaps in user knowledge and retrieval of information. Grobler and Chanetsa (2009) studied the way students at the Polytechnic of Namibia retrieve materials at the Polytechnic of Namibia library and the skills they apply to access materials. Grobler and Chanetsa (2009) found that not all students were able to locate and retrieve materials from the library systems and recommended the need for information literacy skills. California Media and Library Educators Association (1994) define information literacy as the "ability to access, evaluate and use information from a variety of sources" (p. 2). Agyen-Gyasi (2008) studied the library of Kwame Nkrumah University of Science and Technology (KNUST) in Ghana and established that it faced challenges in providing adequate resources and efficient services to its patrons. The major problem faced by KNUST library was a lack of user education and limited number of professional librarians.

Every user accessing and retrieving materials in any library requires a set of skills to access such materials; these skills assist the user in making well-informed decision on when to access such materials, how to choose the right keywords to use when searching for materials, and which information to store as knowledge. Effective library usage requires users to have that knowledge, which is why this study on user information retrieval knowledge for NESEIC is important.

This study was guided by Kuhlthau's 1991 model of the information search process (ISP) (Kuhlthau, 1996). Kuhlthau (1996) argues that people engage in an information search experience holistically, with an interplay of thoughts (cognitive), feelings and physical (actions). This means that, when people search for information, they go through different stages in searching for the right materials that will solve a specific information problem: some experience anxieties, for some it's stress and for others, the burden to go through a process of searching for information.

Melnik and Roberts (2002) define a model as a systematic description of a theory or phenomenon that shares important characteristics for such theory or phenomena. The ISP model was important for this study as it gave information on the method, such as observation and what to observe, as well as provided information on the methodology such as the questions to be asked in interviews and questionnaires. For users to get what they are actually looking for from the library systems, they should have relevant knowledge of how to access the right information, when to access such information and the right keywords or queries to use in accessing information depending also on

the user friendliness of the library system. Therefore, the study aimed and purposed to establish if this is what happens to NESEIC users when searching for information.

### **1.3 Statement of the problem**

This particular section outlines the statement of the problem for this study and the main research question.

Anwar, Ansari and Abdullah (2004); Grobler and Chanetsa (2009); Agyen-Gyasi (2008) found gaps in user information retrieval knowledge. Anwar, Ansari and Abdullah studied the information seeking behaviour of Kuwaiti Journalists and found out that Journalists faced a problem in retrieving information from Kuwaiti library which should solve their information need. The problem identified was lack of support from library staff and lack of training in information use skills. Grobler and Chanetsa found that not all students were able to locate and retrieve materials from the library systems due to lack of information literacy skills. Agyen-Gyasi found that KNUST library faced challenges in providing adequate resources and efficient services to its clientele due to lack of user education and a limited number of professional librarians. This study seeks to ascertain if problems identified by Anwar, Ansari and Abdullah (2004); Grobler and Chanetsa (2009); Agyen-Gyasi (2008) affect users of NESEIC when they are actively searching, locating and retrieving information from the library's manual and electronic systems. The main research question of this study was: "To what extent does the NESEIC users' knowledge allow them to effectively find and retrieve information in the NESEIC library"?

#### **1.4 Sub-Questions of the study**

The main research question of the study above was achieved through the following research sub-questions:

1. What are the knowledge levels of users at NESEIC?
2. Do differences in knowledge levels of users at the NESEIC library relate to their ability to locate and retrieve relevant information?
3. What skills are required by users of NESEIC for them to actively locate and retrieve the relevant information?
4. What are the challenges facing NESEIC users in accessing the relevant information?
5. What can the NESEIC library do to enhance user knowledge?

#### **1.5 Significance of the study**

The study was significant because it sought to establish the skills and retrieval knowledge of NESEIC library users that would enable them to search for, locate, access and evaluate information from the manual and electronic library systems. The study also sought to provide recommendations to assist in the policy on NESEIC information retrieval knowledge and skills needed for searching for, and retrieving relevant information.

## **1.6 Delimitation of the study**

This research was delimited to NESEIC users only which means that the study does not represent other users in different Namibian libraries as information systems might differ. Ruthven (2008) points out that skills learned using one type of system do not always transfer to simply searching a different type of system.

## **1.7 Literature review**

This section outlines the literature review in this study.

The literature review in this study was related to the subject of user information retrieval knowledge in connection with searching for, locating, accessing and evaluating the right information from libraries manual and electronic systems.

The literature review enabled the researcher to understand the topic on users' knowledge and retrieval of information. Fox and Bayat (2007) state that the literature review "provides a sound theoretical overview of the existing research findings, theories and models in terms of the specific research problem; indicates that the researcher is familiar with recent related developments and provides insight into previous work" p.35). Moreover, when conducting a literature review (Bui, 2009) remarks that "a researcher gets new ideas for his or her study" (p.47).

The literature reviewed includes sources from the Internet; monographs; journal articles as well as workshop proceedings-conference research paper reports. Bui

(2009); Glatthorn and Joyner (2005); Fox and Bayat (2007) urge that, good researchers should not rely on secondary sources but they should search for and retrieve the primary source. This is because, secondary sources may at times distort the findings of the primary sources and might not provide sufficient detail as they ought to.

From the research questions of the study, the following concepts were discussed in the literature review: information retrieval, information need, information search process model, knowledge and information as well as information literacy skills.

Information retrieval is seen to be a fundamental component of human information behaviour. Kuhlthau (2004) points out that when one notices the need for information and decides to search for information to solve the information need, he or she tends to engage in and experience a number of thoughts, feelings, anxieties, as well as actions. Kuhlthau developed six stages of an information search process that focuses on three different areas of the search experience: affective (feelings), cognitive (thoughts) and physical (actions). The six stages are Initiation, Selection, Exploration, Formulation, Collection and Presentation. One is required to make a decision on how to choose a system or a resource to search in the first place, before encountering any information. These decisions may be complicated because skills learned using one type of system do not always transfer simply to searching a different type of system (Ruthven, 2008).

Furthermore, the information encountering process may be seen as complicated in the sense that an individual gets to involve a combination of knowledge, cognitive, affective and behavioural processes that may be applied as a human being sees

information, and examines, uses, shares and store information that is deemed to be worth saving (Godbold, 2006; Wilson, 2007).

Cognitive in this study is seen in a broad sense as knowing, in other words, how a person obtains, uses, remembers, mediates and develops knowledge. De Coster et al. (2009) used the word cognition to refer to some kind of activities, including perception, memory storage, retrieval, and analysing. Cognition is important when it comes to understanding human behaviour in searching for the right information and it helps with understanding the individual mental activities such as thinking, imagining, remembering, as well as problem solving. Moreover, it is used in making the right decision when one is information literate.

An information literate person will be firm in finding, retrieving, analysing and using the right information (Grobler & Chanetsa, 2009). Even when using the Online Public Access Catalogue (OPAC), cognition plays an important role because a user is engaged in searching for the right information, with the hope of finding the right sources of that information. In this case, such a user has to apply mental activities in searching and making the right decision on which sources to consult, what is relevant and what is not relevant and what keywords to use in searching for the information they need. When an individual uses information systems, he or she gets to learn and understand at least some of the acquired information and also interpret what was learned on the basis of earlier knowledge in memory, as well as engage in solving problems and making decisions.

The literature reviewed was relevant to the study as it demonstrated the users' information retrieval knowledge and the skills needed for one to actively find, analyse and retrieve the right information. The literature review addresses research questions 1, 2 and 3.

Grow (1996) states that people struggle to retrieve the information they require, to solve a specific information need because of lack of strategies useful in approaching new information, for example the specific source of information the user needs to consult to meet the specific information need. Some users may perhaps know what they are looking for, but the problem for them is getting what is relevant. Some users may see the Online Public Access Catalogue (OPAC), but may not know where to start, what keywords to type in, how to retrieve that information from the library's physical shelves. (Grobler and Chanetsa, 2009) found out that such users who experience difficulties in searching for the right information lack information literacy skills and the right knowledge.

In this study, knowledge is understood as information that has been integrated into the existing knowledge base of a human being. A knowledge base is that total sum of knowledge a person has. This knowledge helps the individual to manage the surrounding world.

According to Davenport and Prusak (1998), knowledge derives from information through knowledge-creating activities within and between human beings. This transformation happens through methods beginning with the letter C: "Comparison:

how does information about this situation compare to other situations that we have known? Consequences: what implications does the information have for decisions and actions? Connections: how does this bit of knowledge relate to others? Conversations: What do other people think about this information?" (Davenport & Prusak, 1998, p.6).

This part of the literature review was important and relevant for this study because it highlighted the challenges users faced concerning relevant knowledge needed in locating and retrieving the relevant information and acquiring that information from the relevant sources to solve specific problems. This section of the literature review specifically addressed research question number 4.

### **1.8 Methodology and research design**

This section outlines the methodology and research design of the study. (This section is discussed in detail in Chapter three).

Punch (2005) defines research design as the tools, procedures and instruments for gathering data and the population to be studied. This study's research design was mixed method. Mixed method research refers to "combining qualitative research exploring the meaning and understanding of constructs and quantitative research assessing magnitude and frequency of constructs" (Vogt, Gardener and Haeffele, 2012, p.344). Quantitative research using the survey method and qualitative methods using participative observation and interviews for data collection were employed for this study. Survey research is a method of gathering data in an orderly manner outlining from whom and

how (Bailey, 2007). Creswell (2009) defines quantitative research as a means of testing objective theories by examining the relationship among variables. These variables are said to be measurable on instruments so that numbered data can be analysed using statistical procedures. Sarantakos (1998) and Mertens (1998) point out that “qualitative research involves an interpretive approach to its subject matter” (p.45) and (p.11). This means that qualitative research studies things in their natural settings, attempting to make sense of phenomena in terms of the meanings people bring to them.

A survey in the form of questionnaire was used to collect information from users of NESEIC regarding their information retrieval knowledge, focusing on how they search for, locate and retrieve their information in the library. While participative observation was employed to gather data from NESEIC users as they interacted with manual and electronic library systems; observing the search formulations the users use to search for information; how users utilise the card catalogue; the level of knowledge applied by NESEIC users in searching for information, especially the usage of the Earth data Namibia to load historic data for various exploration licences, in accessing and locating drill holes, deposits and geochemistry data; and observing the way users pose their queries to librarians on how to go about locating information in the NESEIC library system (see appendix H). Interviews were conducted to collect data from ten users and two librarians. Two librarians were chosen for the interviews because the NESEIC library is a special library which consists of not more than two librarians. Ten users were purposively selected as adequate for the study and these excluded people such as the cleaners who would not have been able to give much information to meet the purpose of this study.

The population of NESEIC consisted of approximately 400 users and two librarians. Population refers to the well-defined collection of individuals or objects who share a set of common characteristics for the research. A sample of 100 users and 2 librarians was chosen.

Sampling refers to the working plan that selects or specifies the sample size as well as sample selection of the study from the population. In quantitative research, probability sampling was used to obtain the sample size of the population for this study. This includes simple random sampling. Vaus (2002) defines simple random sampling as a form of probability sampling which selects a sample from a homogeneous population. With this technique, every member of the population has an equal chance of being selected for the sample. In drawing probability samples, simple random sampling was used to gather information from a sample of 100 NESEIC users drawn from the NESEIC population of 400 through the use of questionnaire. In qualitative research, the sampling method used and applied in this study was the non-probability category which employed purposive sampling. Two NESEIC librarians and ten users were purposively selected as the respondents for the interviews. This is because NESEIC library is a special library consisting of not more than two librarians. Ten users were purposively selected as adequate for the study and these excluded the population such as the cleaners who would not been able to give much information to meet the purpose of this study.

A participative observation checklist and a structured questionnaire with open ended and close ended questions were used to collect data from the users. Semi-structured interview guides were used by the researcher to interview the two librarians and ten users.

The study addressed validity and reliability through piloting in another similar specialised library, which made sure that the questions and language used to gather data were clear and understandable. Jargon was avoided in the questionnaires. Interview guides and observation checklists were adhered to in order to allow the researcher to keep track of what she was supposed to do and manage her time well. Validity was also ensured through triangulation of research instruments. Triangulation was used for this study to assist the researcher in gathering both facts and perceptions of NESEIC users' information retrieval knowledge.

The researcher followed a procedure in conducting the research. Permission was sought from the Permanent Secretary of the Ministry of Mines and Energy. NESEIC falls under the Geological Survey of Namibia Directorate within the Ministry of Mines and Energy, therefore permission was also sought from the Director of the Geological Survey of Namibia and the librarian of NESEIC. Questionnaires were self-administered meaning that they were distributed to every participant who wished to provide answers and was willing to be studied for this research. No participant was forced to participate. Questionnaires were distributed within one week and only during working hours. Participants were given two weeks to fill in the questionnaires. Participants were also informed face to face on the importance and purpose of this research. Once the

participants finished filling in the questionnaires, they were instructed to submit the questionnaires at the NESEIC library for the researcher to collect them.

The researcher conducted observations at NESEIC by actively participating with the users as they were engaging with the library manual and electronic systems. This included observing how NESEIC users were searching for materials using WINISIS database as well as earth database and how they were locating materials from the library physical shelves. Participative observation was conducted for two weeks during working hours 8H00-12H00 as well as 14H00-16H00. This depended on the researcher's satisfaction with observed data, because once the researcher was satisfied with the information observed within the two weeks, as per the observation check list, the researcher could end the observation. Thirteen NESEIC users were observed.

Content analysis was used to analyse open ended questions, the observation and interview data. The analysed data was then used to present findings upon which conclusions and recommendations were based. Descriptive Statistical Analysis was used to analyse quantitative data from the questionnaires, specifically used bivariate descriptive statistical analysis in analysing categorical as well as scale variables. Chi-square statistical analysis was used to test and analyse dependency variables and SPSS was used as a programme for data entry. All the questionnaires were given a code (Q1, Q2, Q3, Q4 up to Q100) in order to assist the researcher with the cross checking of data entry in the SPSS programme. For categorical variables, cross tabulation was used to present the data in a table (Bailey, 2006). Moreover, column and row percentages were also employed to present the data categorically.

This study addressed the ethical rule of social research by ensuring that the data collection techniques used by the study did not cause harm to research subjects. The study honoured voluntary participation; confidentiality and the issue of informed consent by informing the participants about the study and their role in taking part. Both Babbie (2004) and Vaus (2002) define research ethics as conforming to the standards of conduct of a given profession or group.

## **1.9 Clarifying key concepts**

This section gives contextual meanings of the key concepts as informed by the literature and how they are used in the context of this study. These key concepts are discussed in detail in Chapter Two.

### **1.9.1 Knowledge**

Knowledge is the basic intellectual resource which is extended, modified and updated through information. Knowledge is information evaluated and organised in the human mind so that it can be used purposefully (Eriksson-Backa, 2003).

### **1.9.2 Information retrieval**

Information retrieval is the process that enables an individual to systematically retrieve the records and contents contained therein (Manning, Raghavan and Schütze, 2009).

### **1.9.3 Library users' skills: information literacy skills**

Library users' skills are those skills that enable an individual to locate the right information in the library or in any other information resource centres.

Information literacy skill is the skill, which an individual needs in order to be able to easily locate, retrieve, evaluate and use information (Grobler and Chanetsa, 2009).

### **1.9.4 Challenges facing library users**

These are information problems that users of libraries face when manipulating the library systems (physical and electronic systems).

### **1.9.5 Enhancing user knowledge**

This is a way of improving and developing a user's relevant knowledge in order to search for, locate and retrieve the right materials in a comprehensive manner from the library electronic and physical systems.

## **1.10 Thesis outline**

This section of the thesis outlines the chapters of this study as follow:

**Chapter 1: Introduction** presents the background information of the entire study. It highlights the orientation of the study, statement of the problem, questions of the study, significance of the study, delimitations of the study, literature review, research design and methodology. The study seeks to explain how NESEIC users search for, locate, retrieve and evaluate information retrieved from the library's manual and electronic

systems, the search process they go through and the challenges they encounter when searching for the right information in solving specific information needs.

**Chapter 2: Literature review** discusses literature relevant to this study. The discussion is focused on the subject of information retrieval knowledge in the context of users engaging and interacting with the library manual and electronic systems. The discussion also includes important topics of information literacy skills, information need and information search process. As related literature on Namibia though limited, the study expanded further to review literature from other African countries such as Ghana, Kenya, Nigeria and South Africa, along with other literature from developed countries such as Finland, the United States of America, United Kingdom and other European countries.

**Chapter 3: Research design and methodology** presents the research design and methodology of the study. Mixed method was chosen; employed quantitative research approach using the survey method and questionnaire for data collection as well as qualitative research approach using participative observation and interviews for data collection.

**Chapter 4: Data analysis and presentation of research data** presents the research data from questionnaires, interviews, and observation and organises them according to the thematic areas of the study. The researcher firstly analysed data based on pre-determined thematic areas in line with the study's research questions in the questionnaire. Data are presented in Figures and Tables.

**Chapter 5: Discussion and interpretation of research findings** discusses and interprets the findings of the study as well as integrates the study's findings into theories and the purpose of the study. The interpretation of research data is organised according to research questions and the respective research question is answered at the end of each section. This chapter addresses whether the main research question of the study was answered, discussing the main findings of the study incorporating the literature.

**Chapter 6: Proposal model for setting up a user education program and information search process in NESEIC library** presents one of the recommendations of the study which is a model for setting up a user education program in the NESEIC library.

**Chapter 7: Summary, conclusions and recommendation** summarises and concludes the research and makes some recommendations. The chapter is in three parts: the summary, conclusions and recommendations. The summary is arranged according to the main thematic areas, within which data was presented. The conclusion is organised according to the study's research questions. The recommendations include a number of related recommendations as well as areas for further research.

**References:** Includes a list of all the sources cited within the text. The American Psychology Association 6<sup>th</sup> version (APA) style of referencing was used.

**Appendices:** Permission letters, Interview guides, consent form, data gathering protocol, observation checklist and language editing certificate are attached.

### **1.11 Summary**

The chapter gave the introduction and orientation of the study, highlighting the importance of user knowledge in searching for, locating and retrieving relevant information from libraries. The statement of the problem acknowledged the gaps in information storage and retrieval. The chapter also discussed research design and methodology, clarifying key concepts and the research outline.

The next chapter, which is chapter 2, is the literature review.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter summarised issues from the literature that are relevant to this study. Fox and Bayat (2007) inform that the literature review “provides a sound theoretical overview of the existing research findings, theories and models in terms of the specific research problem; it indicates that the researcher is familiar with recent related developments and provides insight into previous work” (p.35). This chapter starts with a definition of knowledge (2.2); information retrieval (2.3); library users’ skills: information literacy skills (2.4); challenges library users face (2.5); enhancing users’ knowledge (2.6); and a summary (2.7). This chapter summarise what is already known about users’ information retrieval knowledge and assisted the researcher to focus on important issues and variables that have a bearing on the research question.

The literature reviewed in this study enabled the researcher to clearly understand the research topic. Furthermore it identifies relevant sources of what has been researched on the topic, and assessed and critiques these sources, identified gaps which could be filled by the researcher’s own study. Glatthorn and Joyner (2005); Fox and Bayat (2007) as well as Bui (2009) point out that by reviewing the literature, one gains insight into ways in which to conduct one’s own study, such as helping the researcher determine what the best research methods and techniques are, what problems were encountered, what mistakes were made and what successes were achieved in previous studies.

Blanche, Durrheim, & Painter (2006) further stress that:

A literature review involves more than merely citing as many sources as possible. It should highlight pertinent literature and contribute to the field by providing a novel and a focused reading of the literature. Do not include in the literature review every source that comes across. (p.21-22).

The literature reviewed in this study helped the researcher to focus on important issues and variables that have a bearing on the research question. The literature reviewed includes sources from the Internet; monographs; journal articles as well as workshop proceedings of conference research paper reports.

As related literature on library user information retrieval in Namibia though limited, other African countries such as South Africa, Ghana, Zimbabwe, Kenya and Nigeria proved to have plenty of studies available on the topic. Many sources from developed countries such as Finland, the United States of America, the United Kingdom and other European countries were reviewed.

**Table 2.1 Databases and keywords used**

<b>Databases used</b>	<b>Keywords used</b>
Internet resources, e-Books, e-Journals, digital libraries materials, e-Bulletins, e-dictionaries	Information Retrieval (IR), Information Need (IN), Information Search Process Model (ISPM), cognitive and knowledge, knowledge and information, Information Literacy (IL), Information Literacy Skills (ILS)

## 2.2 Knowledge

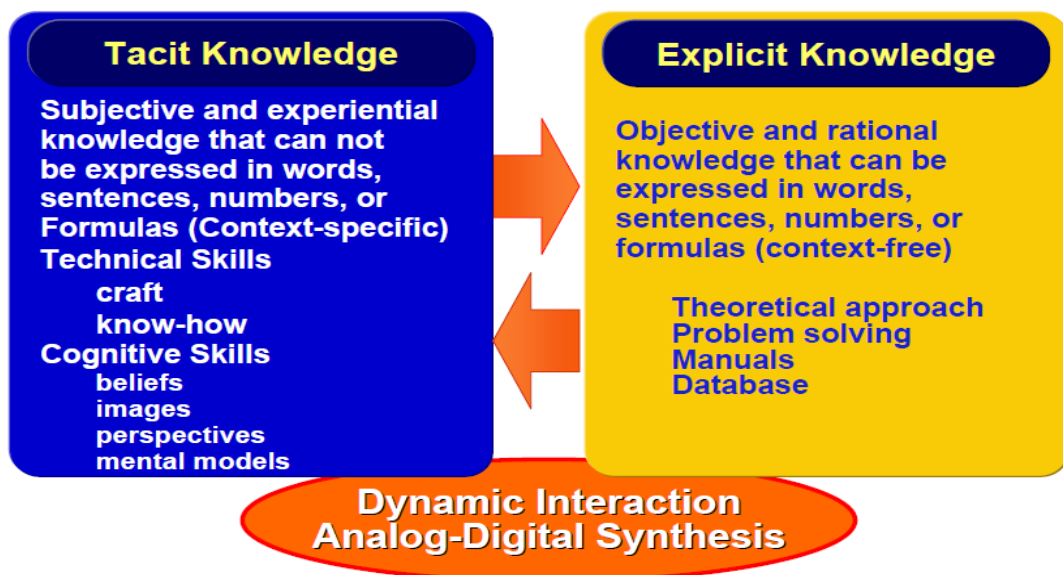
Nonaka (2006) defines knowledge as “the dynamic human process of justifying personal belief towards the truth” (p.6). Knowledge is referred to in this way because it resides in a part of the human mind and constitutes the basis of understanding and knowing of an individual.

Christian faith has also explored the word knowledge. Christian faith believes that knowledge is “truth” (Fleischer and Vos Savant, 2009, p. 181). Tracy (1993) investigated the word ‘knowledge’ from a philosophical context and found that:

“Knowledge is the ingredient of success and it goes hand in hand with inner happiness and outer achievement of understanding the forces that shaped human character from earliest childhood on how to react

and respond to people and situations which help an individual to move forward”(p.30).

Manhaj (2004) argues from a religious perspective that “knowledge is clear and does not need a definition because it is moral wisdom” (p.6). Manhaj further comments that knowledge is the most virtuous action and the most glorified act of worship that is done voluntarily as long as one knows what is right and wrong, when to act and when not to act, when to talk and when not to talk. Nonaka (2006) further explores the definition of knowledge by distinguishing clearly between tacit and explicit knowledge as it can be seen from figure (2.1) below. This discussion was relevant to this study because this study was investigating the information retrieval knowledge of NESEIC users in searching for, locating and accessing the right information from NESEIC library systems.



**Figure: 2.1 Types of knowledge**

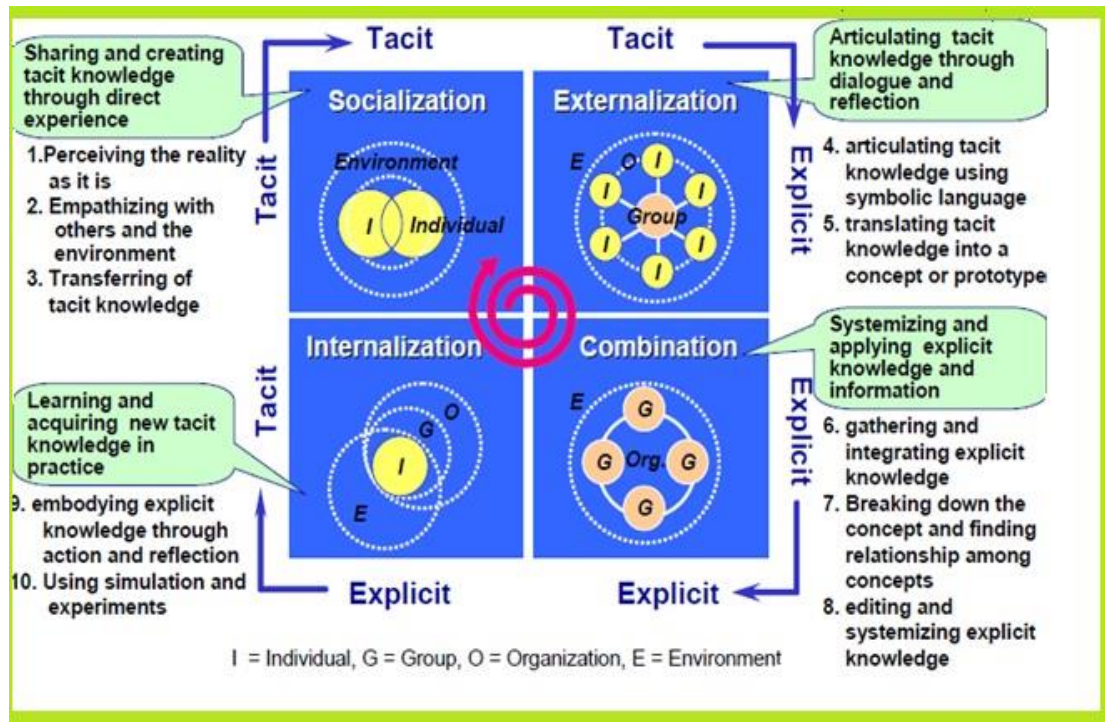
**Source:** (Nonaka, 2006, p.7)

Tacit knowledge is the knowledge that people accumulate in their minds and makes it difficult to access. Explicit knowledge is what is documented or codified and can be transferred easily to others. Das (2013) gives an example of the tacit knowledge of someone conducting a web-based training for the first time. The trainer may read the instructions on how to conduct the training but lack the know-how based experience. Moreover, if the trainer has not conducted the web training before, but based on what he or she has read or heard from others, he or she may know the exact sequencing of steps to log in to a web session and conduct the training and this is an example of explicit training.

Furthermore, Nonaka (2006) states that tacit knowledge is subjective and it cannot be expressed in words, sentences, numbers or formulas often because it is context specific. This also includes cognitive skills such as beliefs, images, intuition and mental models as well as technical skills such as craft and know-how. Explicit knowledge is objective and rational knowledge that can be expressed in words, sentences, numbers or formulas (context free). It includes theoretical approaches, problem solving, manuals and databases.

### **2.2.1 Knowledge Conversion (KC) model**

There are four knowledge conversion by Nonaka. Nonaka (2006) asserts that knowledge models transfer as a spiral process. It starts with a 2x2 matrix, in which existing knowledge can be in either tacit or explicit form and the objective of knowledge transfer can be to convey either tacit or explicit knowledge. Each modes of transfer operates differently as it can be seen from the figure (2.2):



(NB: This figure was directly quoted and used American English but within the discussion of this study the “Z” has been changed to “S” (British English) example ‘socialization’ to ‘socialisation’

**Figure 2.2 Knowledge Conversion model**

**Source:** (Nonaka, 2006, p.9)

Each type of knowledge can be converted. When viewed as a learning process, the model becomes a clockwise spiral and individual learning depends on initiating and sustaining the learning spiral. Nonaka (2006) advises that “the model is a spiral and not a cycle because as one learns around the cycle, understanding moves to deeper and deeper levels” (p.9). The process that transfers tacit knowledge in one person to tacit knowledge in another person is called **socialisation**. It is experiential and active involving capturing knowledge by walking around and through direct interaction with

people. This depends on having shared experience and results in acquired skills. Socialisation is a process between individuals (De Jong, De Hoog and Schreiber, 2010) and (Nonaka, 2006).

**Externalisation** is the process of making tacit knowledge explicit. Nonaka (2006) points that this is, the articulation of one's own tacit knowledge (ideas, images, metaphors or analogies). During face-to-face communication, people share beliefs and learn to better articulate their thinking, through instant feedback and simultaneous exchange of ideas. Externalisation is a process among individuals within a group (Nonaka, 2006).

**Combination** is a process through which explicit knowledge is transferred. Toffler (2012) informs that, this is the area where information technology is most helpful because through this process "explicit knowledge can be conveyed in documents, emails and databases" (p.2). Moreover, Lancaster (1991); Stacey and Stacey (2004) backed up by Toffler (2012), acknowledge the industrial revolution of the 19<sup>th</sup> and 20<sup>th</sup> century whereby the first digital computer was invented which drastically affected the way human communicated, stored and retrieved information and this making it easier for explicit knowledge to be transferred in a much faster and comprehensive manner. In this process of combination, an individual has to follow key steps in collecting relevant internal and external knowledge, disseminating and editing or processing such knowledge to make it more usable. Combination allows knowledge transfer among groups across organisations (Nonaka, 2006).

Furthermore, Nonaka (2006) says that **internalisation** is the process of understanding and absorbing explicit knowledge into tacit knowledge held by the individual. Additionally, internalisation is largely experiential in order to actualise concepts and methods, either through the actual doing or through simulations.

### **2.2.2 What is cognitive and knowledge?**

Cognition can be defined in a broad sense as knowing, that is “how a person obtains, uses, remembers, meditates and develops knowledge” (Eriksson-Backa, 2003, p. 41). De Coster et al. (2009) used the word cognition in order to refer to certain kinds of activities, including perception, memory storage, retrieval, and encoding, decoding, analysing, combining, transforming and pattern completion. As far as this study is concerned, cognition is important when it comes to understanding the individual mental activities such as thinking, imagining, remembering, as well as problem solving (Allen, 1991). Moreover, it is used in making the right decisions when one is information literate.

Cognition plays important role even when an individual is using the Online Public Catalogue (OPAC). This is because an individual or user will be engaged in searching information relevant in solving their information need, focusing on finding the right sources of the required information. Such user has to apply mental activities in searching and making the right decision on which sources to consult and what is relevant and what is not relevant as well as to put into consideration the types of keywords to use in searching for the right information. Fiske and Taylor (2013) further say that “understanding cognition helps to predict a person’s behavioural

tendencies and motivation predicts whether the behaviour will occur” (p.5). Cognitive processes shape cognitive elements, for example, schemata or attributes, as these elements are formed, used, and modified over time (Fiske & Taylor, 2013). According to Allen (1991) these mental activities such as thinking, imagining, remembering and problem solving are used when searching and finding information through an information system.

Specific cognitive processes can also be analysed to find their effects on information searching behaviour. When people use information systems, they learn and understand at least some of the acquired information. They also interpret what they learn on the basis of earlier knowledge in memory, and engage in solving problems and making decisions (Eriksson-Backa, 2003).

### **2.2.3 What is knowledge and information?**

Knowledge is very important for an individual when searching for information. One may find that, when an individual has the relevant knowledge on how to search for, locate, and retrieve information from the information system, he or she tends to have a higher chance of getting good results after the search than the one with poor knowledge. This section of the literature review discusses the relationship between knowledge and information.

Knowledge and information are two different terms. Devlin (2001) defines information “as a substance that can be acquired, stored, possessed either by an individual or jointly by a group and transmitted from person to person or from group to group” (p.15). Additionally, Davenport and Prusak (1998) and Devlin (2001)

showed how information and knowledge are related by looking at knowledge which is the basic substance in an individual knowing, through the information he or she receives.

One could therefore argue that, knowledge and information are different because knowledge is cognitively structured. Knowledge is the basic substance in an individual knowing and information is its manageable form. Knowledge is the basic intellectual resource which is extended, modified and updated through information, which is subsequently incorporated in the old layers of knowledge (Eriksson-Backa, 2003).

The word information has a dual meaning; it diminishes the receiver's uncertainty (Cole, 1993); (Shannon & Weaver, 1998) as well as increases the receiver's knowledge. To obtain information about something is easy, but to acquire information in the sense of potential knowledge is a complex, mental procedure. Information has to be transformed into knowledge.

Eriksson-Backa (2003) distinguishes knowledge from information by saying that, "knowledge is information which has been assimilated into a person's mind, whereas information is a message outside of that person" (p.47). Moreover, with information, the separate data structures are linked to each other in such a way that connections, interpretations and meanings are formed between them, for example statistical databases or articles.

Furthermore, Mchombu (2012) points that information is the “ingredient to the individual development” (p. 77). Development is what helps an individual to act in a certain way upon received information. Information becomes knowledge when a human being has processed it to make it a part of his own knowledge structure (Eriksson-Backa, 2003). When knowledge is separated from its context, it becomes information. Knowledge is, thus, information which has been processed by a human mind, and has been assimilated through learning. Knowledge derives from information through knowledge-creating activities within and between human beings. “This transformation happens through methods beginning with the letter C” (Davenport & Prusak, 1998, p.6) as follows:

- Comparison: how does information about this situation compare to other situations that we have known?
- Consequences: what implications does the information have for decisions and actions?
- Connections: how does this bit of knowledge relate to others?
- Conversation: What do other people think about this information?

Hjørland (2000) used the words ‘tangible’ and ‘intangible’ to describe information. Knowledge as tangible refers to information as a thing such as documents and data. Information as intangible refers to opinions or ideas (Hjørland, 2000).

### **2.3 Information retrieval**

Greengrass (2000) and Boom (2004) define information retrieval as the activity that deals with retrieval of unstructured data. Information retrieval is the process that enables an individual to systematically locate and access a record as well as the contents contained therein. Thus, such information retrieval serves as a selective aid that is capable to find and select that specific literature and information which can solve a specific information problem or question(s) the user has at a particular time. Greengrass (2000) states that when a user with a given query retrieves the correct document from the collection of information resources, document one is higher ranking with respect to a given query, than document two and may be interpreted to mean that document one is more likely to satisfy that given query than document two. This could also mean that, document one is more precisely focused on the need expressed by the given query than document two.

Maybury and Kowalski (2000) argue that “highly advanced information retrieval is composed of four major functions” (p.2) as follows:

1. Item normalisation
2. Selective dissemination of information
3. Archival document database search
4. Index database search along with the automatic file built process that supports Index files.

Item normalisation is the information system which provides logical restructuring of an item. Moreover, these are additional operations in the information system which

are needed to create a searchable data structure during item normalisation. In this case, items or library materials are catalogued or stored logically in a library database either by subject, geographical area or content which makes it easier for a user to retrieve material from the library collection. Selective dissemination of information provides the capability to dynamically compare newly received items in the information system against standing statements of interest of users and deliver the item to those users whose statement of interest matches the contents of the item. The document database search process provides the capability for a query to search all items received by the system.

Yerkey (1991) defines a database as a systematic collection of logically linked data files. In an index database search when an item is determined to be of interest once it is retrieved, a user may want to save it for future reference, that is through filing it. In an information system, this is achieved via the indexing process. In this process, the user can logically store an item in a file along with additional index terms and descriptive text the user wants to associate with the item. In this case, information retrieval is seen to be a fundamental component of human information behaviour.

Furthermore, Mancini (2010) information retrieval backbone is Information Communication and Technology (ICT). Toffler (2012) acknowledges the industrial revolution of the 19<sup>th</sup> and 20<sup>th</sup> century which affected the way humans communicated, stored and retrieved information. In that era, the first digital computer was invented and was able to carry out complex computations. People can store, access and retrieve information in an easier and faster manner by using a computer. Moreover, computers

created a platform for a global flow of information, ideas and knowledge (Sheeja, 2010).

### **2.3.1 Information need**

Matsveru, Nengomasha and Yule (2014) define information need as the “recognition that knowledge is inadequate to accomplish a task” (p.99). No user can visit an information service without developing a need to do so. It can be a need to fulfil some kind of pleasures, or a need to do a school assignment or do research or to search for a research topic or to browse through the Internet. The lack of information is what leads to a need for information. Wilson (2006) summed up human needs in three categories:

- Physiological needs
- Affective needs that are also called psychological needs such as the need for attainment
- Cognitive needs for example a need to plan or learn skills (Wilson, 2006).

These three categories are related, according to Wilson (2006), the physiological needs can cause affective needs and the affective needs can give rise to cognitive needs. The attempt to satisfy these needs may lead to an information-searching behaviour caused by the need itself or by the importance of satisfying the need. Stevenson (2002) in contrast, identified at least four different needs that were related to culture and communication that lead an individual to search for information:

1. The need for knowledge about the operation of expert cultures

2. The need for an understanding of the desires demands and need interpretations of others who are distant in time and space.
3. The need to understand ourselves as a social community
4. The need for aesthetic and non-instrumentally defined cultural experiences (p.198).

The need for information, as well as for its drivers- defined as any factors which lead to a person's perception of need- is one of the three elements of information behaviour, according to Wilson (1997). The other elements are the factors which affect the response to the perception of need, and the processes or actions which are involved in this response.

Dervin (1992) used the term information-need situation and defines it as a situation where an individual's internal sense has "run out" and because of this, a new sense must be created. A sense maker is stopped in a situation by a gap, either a question or a question set. Any available kind of help must then be used by the sense-maker to bridge this gap (Dervin, 1992). During sense-making, one may need to move through time and space until a certain point of satisfaction is reached, or they run out of time or perhaps something else catches one's attention (Solomon, 1997).

Information needs may occur on either an individual or group level (Allen, 1997). Human behaviour can be seen to be influenced by both individual and situational influences. One perspective uses a cognitive model of information needs. This perspective is concerned with individual influences on the individual behaviour, and in particular how a person's knowledge structures influence behaviour. This is because, an individual's knowledge structure is derived from past experiences. An

individual will experience different needs in identical situations, because of their different understanding of the situation. Unless past experiences have given a person the right knowledge structures, the person will not see what is happening in a completely new situation. When the perceived reality does not correspond to the experienced reality, a person may become aware of an anomaly in knowledge (Allen, 1997).

(Hjørland, 1997) emphasises that the information behaviour of an individual is affected by their “social life” (p.169). (Hjørland, 1997) further argues that “thinking and doing are not individual, but functions of social life and that consciousness as a whole is social in nature” (p.169). Thinking and doing are two sides of the same thing. When an individual is busy doing something, and is suddenly confronted him with a problem that stops him/her from continuing with the activity, thoughtfully action is developed which includes the following five stages:

1. Puzzlement, confusion, and doubt which can be attributed to the fact that one has ended up in a situation that is not yet clarified.
2. An anticipatory idea based on guesswork that is, an attempt to analyse the consequences that the elements of the situation are assumed to lead up to.
3. A careful inspection (investigation, inspection and research analysis) of all accessible information that might define and illuminate the problem in a question.
4. A final formulation of the anticipatory idea with the goal of making it more precise and consistent, since it is now adapted to a large number of facts.

5. Adhering to the idea as a plan of action that is being used in the current situation with the goal of bringing about the anticipated result and hence being able to test the idea (Hjørland, 1997, p.169).

### **2.3.3 Information search process model**

When people search for information, they go through different stages in searching for the right material that will solve a specific problem; to some experience anxieties, some stress, and some, the burden of having to go through the process of searching for information (Dervin, 1992). This is because, at times the information someone is looking for is not easy to locate. This might be due to their lack of knowledge on the type of query to use in the library's database or the information searching system (Allen, 1997).

This study is guided by Kuhlthau's 1991 model of the information search process (ISP) (Kuhlthau, 1996). Kuhlthau (1996) argues that people engage in an information search experience holistically, with an interplay of thoughts (cognitive), feelings (affective) and physical (actions). The model of the information search process focuses on six stages: Task Initiation, Topic Selection, Prefocus Exploration, Focus formulation, Information Collection and Search Closure. Palmquist and Kim (1998) argues that the information searching and retrieval behaviour of an individual depends on what stages of the information searching process he or she is and not necessarily their knowledge in searching for information. This is because an individual can retrieve information with their perception toward information he or she think is valuable to them (Eriksson-Backa, 2003). Grobler and Chanetsa (2009) point

out that a user need information literacy skills to have the right knowledge and skills in order to be able to search for, and retrieve the correct information from the right information source that can solve a specific information need.

### **2.3.3.1 Stage 1: Task Initiation (TI)**

The first stage in the information search is task initiation. Kuhlthau (2004) points out that, at this stage, a person first recognises the lack of knowledge or a need for information to solve a specific problem, for example information that will be needed to complete an assignment or research project (see table 2.2). Hjørland (1997) agrees that at the “first stage of information search, an individual notices a conscious need for the information” (p.163). A person at this stage expresses feelings of uncertainty and apprehension (Kuhlthau, 1994). He or she thinks over the assignment to comprehend the task before them, to recall previous projects in which they have gathered information, and to locate possible alternative topics. Actions involve discussing possible topics and approaches.

**Table 2.2 First Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 1 Task Initiation**

Preparing to make a decision for selection a topic	Contemplating assignment Comprehending task Relating prior experience and learning Considering possible topics	Apprehension at work ahead Uncertainty	Talking with others Browsing the library systems Visiting OPAC (Online Public Access Catalogue) Or other databases such Earth Namibia database	Noting down possible topics Brainstorming Tolerating Uncertainty	Primarily Invitational
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**Source:** Adapted from Kuhlthau (2004, p.44)

In the early stage of the search process, uncertainty is very common. Kuhlthau (1999) points out that a user's uncertainty occurs during the searching process due to one expecting the likelihood of encountering uniqueness (new information) to be high and redundancy (familiar information) to be low. Uncertainty includes situations like redundancy, mood, prediction and interest. Another occasion where uncertainty is high is at the beginning of the search process due to invitational mood built-up the individual to new ideas which leads the individual to summarise, organise and present existing ideas. Furthermore, interest is also associated with uncertainty. This happens at the beginning of the search process, at some point when uncertainty ceases, interests frequently increases along with personal knowledge. These critical shifts in

interest and the relation to motivation and incentive may be important factors to put into account in designing user-centered information retrieval systems. Complexity is also associated with uncertainty. Complexity is important for understanding the experience of uncertainty in the information search process. Kuhlthau (1999), Kuhlthau (1993) and Kuhlthau (1994) argues that it is an individual's perception of the complexity of the task that determines his or her experience of the process and degree of uncertainty. Kuhlthau (1999) further points out that since it is the perception of the complexity, and not the complexity inherent in the task, tasks cannot be labelled in advance as complex or simple. Another concept associated with uncertainty is what Kuhlthau (1999) called enough. Enough concerns the deceptively simple question of, 'what is enough?' one can understand it as essential for making sense of the information available to an individual. Kuhlthau further explains that to apply the concept of enough in each stage of the search process, systems may be developed that:

- Accommodate the ability to recognise an information need
- Explore information on a general topic, formulate a specific focus
- Gather information pertaining to a specific focus, and
- Prepare to share what has been solved, learned or created.

#### **2.3.3.2 Stage 2: Topic Selection (TS)**

When a general topic or problem is identified, (Kuhlthau, 1996) points out that initial uncertainty often gives way to a brief sense of optimism and a readiness to begin the search. Kuhlthau (2004) stresses that during topic selection, the task involved is to identify and select a general topic to be investigated and the approach to be pursued.

In this stage, feelings of uncertainty often give way to optimism after the selection has been made, and there is readiness to begin the search. Thoughts center on weighing prospective topics against the criteria of personal interest, assignment requirements, information available and time allocated. Kuhlthau (2004) points out that during this stage, actions may include making a preliminary search for information available, skimming and scanning for an overview of alternative topics and talking to others about possibilities. When, for whatever reason, selection is delayed or postponed, there are high feelings of anxiety which are likely to intensify until the choice is made. See the following Table 2.3

**Table 2.3 Second Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 2 Topic Selection**

To decide on topic for research	Weighing topics against criteria of personal interest, project requirements, information available, and time assigned  Prediction outcome of possible choices  Choosing topic with potential success	Confusion sometimes anxiety  Brief elation after selection  Anticipating of prospecting task	Consulting with informational mediators  Making preliminary search of library  Using reference collection	Discussing possible topics  Predicting outcome of choices  Using general sources for overview of possible topics	Primarily indicative
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**Source:** Adapted from Kuhlthau (2004, p.46)

### **2.3.3.3 Stage 3: Prefocus Exploration (PE)**

This is the most difficult stage for an individual in the information search process. Kuhlthau (2004) informs researchers that, there are high feelings of confusion, uncertainty, and doubt during this stage. The task here aims to form a focus by investigating information on the general topic to increase personal understanding. Thoughts focus on becoming oriented and sufficiently informed about the topic to form a personal point of view.

Wilson (2007), Godbold, (2006) and Kuhlthau (2004) point out that at this stage, information encountered from different sources, commonly seems inconsistent and incompatible which leads to an individual finding the situation very complicated, challenging, discouraging and, threatening, causing a sense of personal inadequacy as well as frustration with the search system. This situation will at some point cause an individual to abandon the search. Communication between the user and the system also get challenging and awkward as the individual will fail to identify the exact information he or she is looking for. Actions in this stage aim to locate information about the general topic, reading to get informed on existing knowledge. (See the following Table 2.4)

**Table 2.4 Third Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 3 Prefocus Exploration (PE)**

To investigate information with the intent of finding a focus	<p>Seeking focus on information on the general topic</p> <p>Identifying several possible focuses</p> <p>Inability to express precise information needed</p> <p>Becoming informed about the general topic</p>	<p>Confusion</p> <p>sometimes challenging and threatening</p> <p>Doubt</p> <p>Uncertainty</p>	<p>Locating relevant information</p> <p>Reading to become informed</p> <p>Taking notes on facts and ideas</p> <p>Making bibliographic citations</p>	<p>Reading to learn about the topic</p> <p>Tolerating inconsistency and incompatibility of information encountered</p> <p>Intentionally seeking possible focuses</p> <p>listing descriptors</p>	Primarily indicative
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**Source:** Adapted from Kuhlthau (2004, p.47)

**2.3.3.4 Stage 4: Focus Formulation (FF)**

Focus formulation is the fourth stage in the information search process. Kuhlthau (2004) points out that “focus formulation is the turning point of the information search process when feelings of uncertainty diminish and confidence increases” (p.48). The task is the information encountered aimed to form a focus. Thoughts aim at identifying and choosing ideas in the information from which to form a focused

perspective of the topic. Kuhlthau (1999) further points out that the success of possible concentrations is predicted within the criteria of personal interest, assignment requirements, information available, and time allotted. Strategies for selecting a specific concentration within the general topic are, reading over notes for themes and reflecting, talking and writing about themes and ideas. The topic becomes more personalised during this stage if construction occurs. Although a focus may be formed in a sudden moment of insight, it is more likely to emerge gradually as constructs become clearer. During this moment, a change in feelings is commonly noted with increased confidence and a sense of clarity. Kuhlthau (2004) points out that “when an individual does not form a focus during the search process, he or she commonly experience difficulty throughout the remainder of the search and when he or she begin to write or present findings, a clear focus enables a person to move on to the next stage” (p.48).

**Table 2.5 Fourth Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 4 Focus Formulation**

To formulate a focus from the information encountered	<p>Predicting outcome of possible foci using criteria of personal interest, requirements assignment availability of materials and time allocated</p> <p>Identifying ideas in information from which to formulate a focus</p> <p>sometimes characterised by a sudden moment of insight</p>	<p>Optimism</p> <p>Confidence in ability to complete task</p>	Reading notes for themes	<p>Making a survey of notes</p> <p>listing possible foci</p> <p>Listing a particular focus while discarding others</p> <p>Combining several themes to form one focus</p>	Primarily Indicative
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**Source:** Adapted from Kuhlthau (2004, p.48)

**2.3.3.5 Stage 5: Information Collection (IC)**

Information collection is the fifth stage in the information search process. At this stage, the user or individual is sure of his or her success in the search process. For instance, a user accessing information from the Namibia Earth Database is now sure of what key word to use and where exactly to get the information from the library's physical shelves. He or she at this point is sure what question to ask the librarian regarding their search for information. Kuhlthau (2004) states that "at this stage,

interaction between the user and the information system functions most effectively and efficiently” (p. 49). The task here is to gather information regarding the focused topic and the thoughts focus on defining and supporting the focus. Actions includes selecting information pertaining to the focused topic and taking detailed notes on what specifically deals with the topic; general information is no longer relevant after formulation. Uncertainty diminishes and confidence within an individual is high because, the individual knows exactly what he or she is looking for and there is good communication between the individual and the system.

**Table 2.6 Fifth Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 5 Information Collection**

To information that defines, extends, and supports the focus	Seeking information to support focus  Defining and extending focus through information  Gathering pertinent information  Organising information in notes	Realisation of extensive work to be done  Confidence in ability to complete the task  Increased interest	Using library to collect pertinent information  Requesting specific sources from librarian  Taking detailed notes with bibliographic citations	Using descriptors to search out pertinent information  Making comprehensive search of various types of materials example, reference periodicals, and bibliography  Using indexes requesting assistance of librarian	Combination of indicative and invitational
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**Source:** Adapted from Kuhlthau (2004, p.49)

### **2.3.3.6 Stage 6: Search Closure (SC)**

Search closure is the last stage in the information search process and it is the presentation of results. It presents two things either disappointment or satisfaction. This means that if the search has gone successfully, there is satisfaction in the results but if the search failed or went wrong be it in the system or elsewhere, there will be disappointment in the presentation of results. The search at this stage, can be closed or ended for different reasons such as, if an individual is satisfied with the information retrieved. Other people end the search when they encounter diminishing evidence. Kuhlthau (2004) says “assuming a deadline, many people cease collecting information, not because they have exhausted the available sources but because they need time to synthesise and prepare their final product before the due date” (p.50).

**Table 2.7 Sixth Stage of the Information Search Process**

<b>TASK</b>	<b>THOUGHTS</b>	<b>FEELINGS</b>	<b>ACTIONS</b>	<b>STRATEGIES</b>	<b>MOOD</b>
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**Stage 6 Search Closure**

To conclude the search	Identifying need for any additional information  Considering time limit  Diminishing relevance  Increased redundancy	Sense of relief  Sometimes satisfied  Sometimes disappointed	Rechecking sources for information initially overlooked  Confirming information and bibliographic citations	Returning to library to make summary search  keeping books until completion of writing to recheck information	Indicative
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**Source:** Adapted from Kuhlthau (2004, p.50)

**2.4 Library users' skills: information literacy skills**

Locating the right information in the library or in any other information resource centres is not as easy as people thought so because one need to have the skills on how to do so. Users of any library must be literate on how to use the library and how to locate information in the library. Suleiman (2012) and Clarke (1999) advise that the library should support the reading and research needs of its users through the provision of information services that will best meet the users' needs.

The California Media and Library Educators Association (1994) defines information literacy as the "ability to access, evaluate and use information from a variety of sources" (p. 2). Moreover, an information literacy skill is the skill that an individual

needs in order to be able to easily locate, retrieve, evaluate and use information. Furthermore, acquiring information literacy skills helps the individual to make good decision and develop critical thinking skills. At many institutions, one may find that these skills are taught within the library, such as user education. The California Media and Library Educators Association (1994) explains in detail the meaning of an information literate person accessing, evaluating and using information as follow:

An information literate person accessing information

- Recognises the need for information.
- Recognises that accurate and complete information is the basis for intelligent decision making.
- Formulates questions based on information needs.
- Identifies potential sources of information.
- Develops successful search strategies.
- Accesses print and technology-based sources of information.
- Is a competent reader.

An information literate person evaluating information

- Establishes authority.
- Determines accuracy and relevance.
- Recognises point of view and opinion versus factual knowledge.
- Rejects inaccurate and misleading information.
- Creates new information to replace inaccurate or missing information as needed.

An information literate person uses information to:

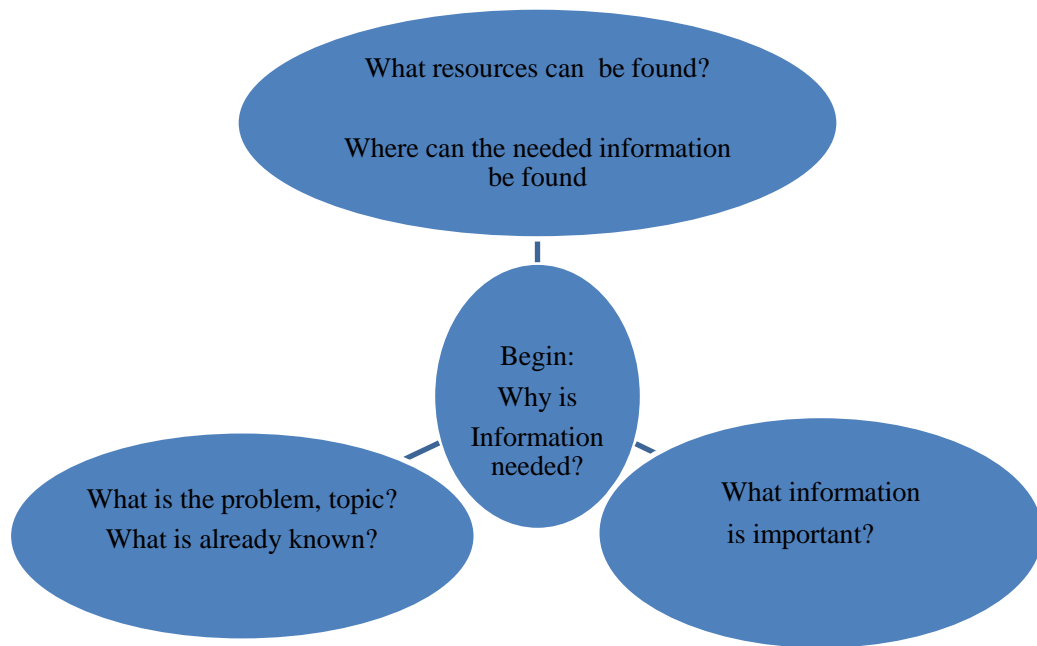
- Organise information for practical application.
- Integrate new information into an existing body of knowledge.
- Apply information in critical thinking and problem solving (California Media & Library Educators Association, 1994, p.2-3).

#### **2.4.1 Information Literacy Model (ILM)**

A model on information literacy might be viewed from three different perspectives: firstly, “the searcher’s thinking process; secondly, stages of the research process and lastly, instructional strategy” (California Media and Library Educators Association, 1994, p.4). Each of the components are interdependent, that is, each stimulates the other.

#### **2.4.2 The Searcher’s Thinking Process (STP)**

The first component takes into account what an individual might be thinking when confronting an information problem. The thinking pattern can be seen as follows in Figure 2.3



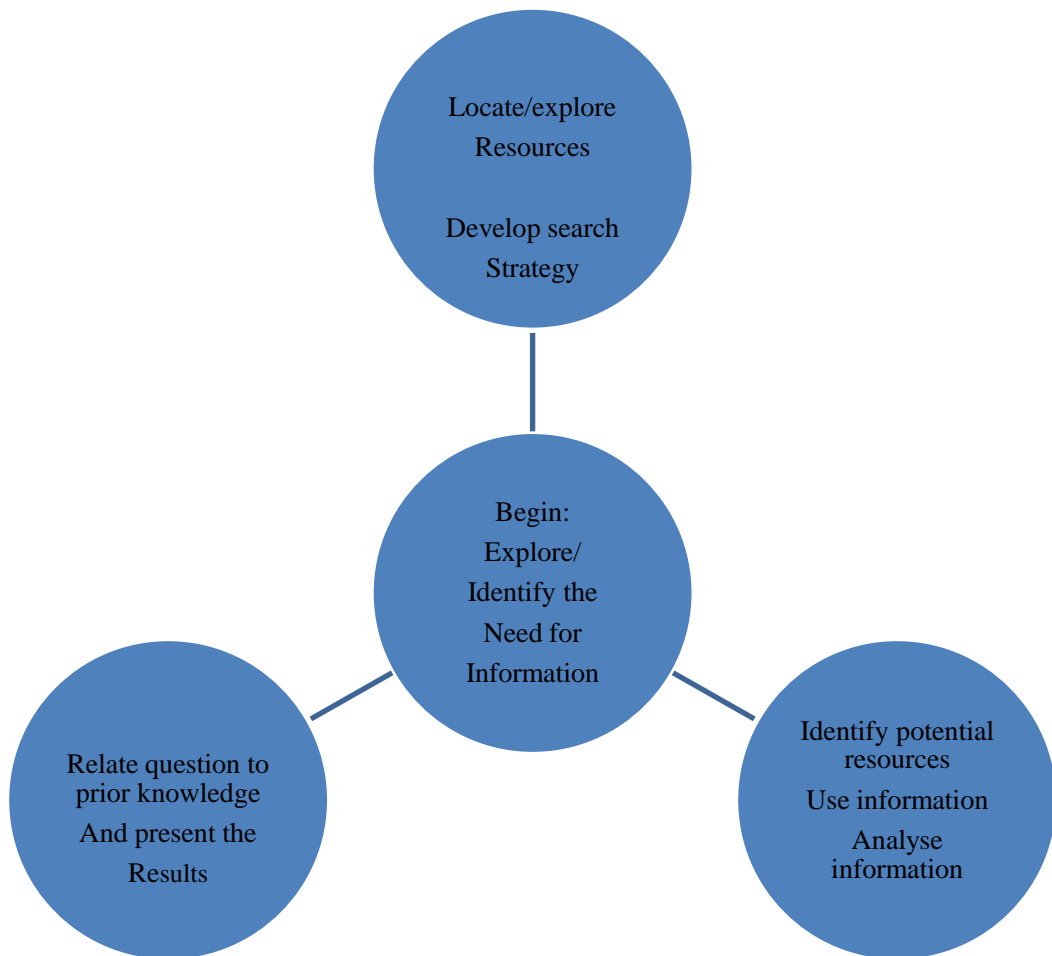
**Figure 2.3: The searcher's thinking process**

**Source:** (California Media and Library Educators Association, 1994, p.5)

The searcher's thinking process involves issues and question an individual must ask him or herself: Why is the information needed? What is the information problem? Where can the information be found? What sources of information are available?

### **2.4.3 The Research Process (RP)**

The second component of the information literacy model describes the research process. At this point, a systematic way of approaching an information problem is displayed as it can be seen in the following Figure 2.4



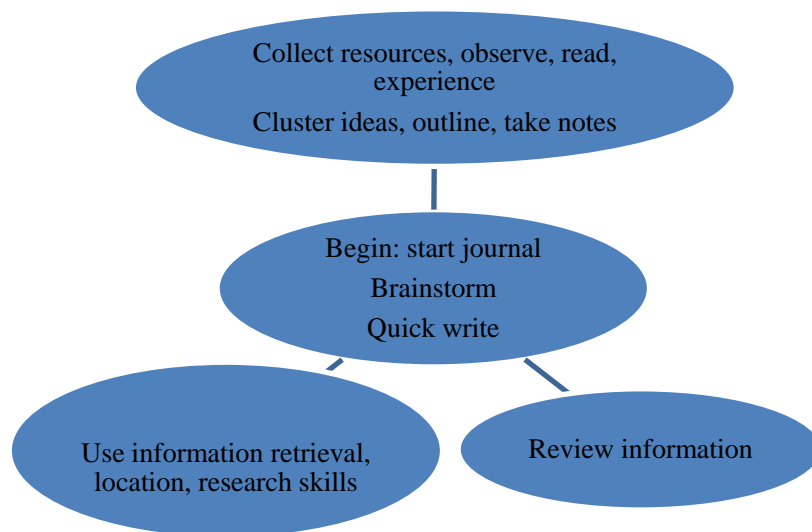
**Figure 2.4: The Research process**

**Source:** (California Media and Library Educators Association, 1994, p.6)

Once the information need has been identified, one can then develop a search strategy on how to search information from the library manual or electronic system, what keyword(s) to use, and what Boolean operators to use to ensure retrieval of quality relevant information that will solve one's information need or information problem.

#### 2.4.4 Instructional Strategy (IS)

The third component of the information literacy model is instructional strategy. These are some of the strategies that might be generated in response to the searcher's needs during the research process. At this stage, the individual locates the information, evaluates the information retrieved and takes notes of the important information that is deemed valuable to his or her information need. See the following Figure 2.5.



**Figure 2.5: Instructional Strategy**

**Source:** (California Media and Library Educators Association, 1994, p.7)

## **2.5 Challenges facing library users**

Library users face various challenges while searching for, locating and retrieving the right materials from library systems (physical and electronic library systems). Dhammananda (2014) noted that “all people face problems, it is a nature of life but problems can be solved” (p.6). Okiki and Omotosho (2012) studied library users in Nigeria and found that users face problems in accessing current materials, low patronage, lack of trained personnel and inadequate funding. Furthermore, Okiki and Omotosho (2012) found that most libraries in Nigeria face resource constraints because of the lack of funds and lack of time for staff to promote the library’s resources and services to the community.

Moreover, Okiki and Omotosho (2012) state that, the Nigerian libraries facilities in key research and education sectors are not very impressive; no widespread usage of digitisation is visible in those libraries. Nwokocha (1998) points out that, although most libraries have staff that are trained in generalised skills, such as the use of electronic resources in the library, that can be made responsive to the needs of the user community, the majority of libraries do not have a staff members who have received training in serving different needs of patrons.

Agyen-Gyasi (2008) studied the library of Kwame Nkrumah University of Science and Technology (KNUST) in Ghana and established that it faced challenges in providing adequate resources and efficient services to its patrons. The major problem the KNUST library faced was a lack of user education and a limited number of professional librarians. On the other hand, (Grobler and Chanetsa, 2009) studied the

way students at the Polytechnic of Namibia they retrieve materials in the Polytechnic of Namibia library and the skills they apply to access the right materials. Grobler and Chanetsa found out that, not all students were able to locate and retrieve materials from the library systems and recommended the need for information literacy skills. Information literacy is a set of skills that one needs to acquire in order to be able to locate and retrieve information. Moreover, Anwar, Ansari and Abdullah (2004) studied the information seeking behaviour of Kuwaiti journalists and found out that journalists faced a problem in retrieving information from Kuwaiti library which should solve their information need. The problems found were lack of support from library staff and lack of training in information use skills.

## **2.6 Enhancing user knowledge**

Users of libraries need their knowledge enhanced in order to be able to search for, locate and retrieve the right materials from the libraries' systems in a comprehensive manner. The American Library Association (2013) points out that, enhancing user knowledge works on satisfying users' needs and improving the services better offered by the library. When the library is not able to provide a user with needed information, the library must refer the user's questions to other information resource centres that can provide the needed information.

Grobler and Chanetsa (2009) inform that, the Polytechnic of Namibia library enhances users' knowledge through information literacy skills programmes as follows (section 2.6.1):

### **2.6.1 Information Literacy at the Polytechnic of Namibia (ILPN)**

Information literacy training at the Polytechnic of Namibia library was introduced in 2007 (Grobler and Chanetsa, 2009). It was introduced through user education, library and information skills training (LIST). Fleming (1990) defines user education as various programmes of instruction, education and exploration provided by any library to users to enable them to make more effective, efficient and independent use of information sources and services provided by the library.

“User education was introduced in order to assist patrons to use the library services, resources and facilities to the fullest” (Grobler and Chanetsa, 2009, p.48). The library user education consists of:

1. Library orientation: this takes place on the first Saturday of the semester of the academic year, after first year student registration is completed. Through orientation, the Chief Librarian or User Services Librarian gives a briefing to incoming students, about the library’s collections, services and facilities.
2. Library tours: these are part of the library’s orientation activities, which can also be arranged at other times on request. During a library tour, Library Assistants take groups of students around the library, physically and orally introducing them to all that is on offer.
3. Online guides: to further strengthen user education, various guides, developed by the chief Librarian, have been posted on the library’s website, thus making them available for consultation by library patrons. These guides cover topics such as the Library’s classification system, how to access and use the Library’s

Online Public Access Catalogue (OPAC), and how to access and use the library's electronic resources (Grobler and Chanetsa, 2009).

### **2.6.2 Library and Information Skills Training (LIST)**

The LIST programme was launched at the Polytechnic of Namibia in order to assist the users to optimally use the technologies and the information that comes with the advances of information and communication technology in the library. The LIST programme is carried out in a number of different ways: Group training in an electronic classroom where students are trained in computer laboratories and are expected to practically apply what they are taught. When the LIST programme started, classes were at first offered to students only if and when a lecturer requested them. However, by 2008 an agreement had been reached with the English Communication, Nature Conservation and Land Management Departments as follows: Students taking Communication Skills classes must attend LIST sessions once a week for six weeks during each semester. First year Nature Conservation students must attend LIST classes once a week, for the 13 weeks of the first semester. Second and third year Land Management students must attend LIST sessions once a week for six weeks in the first semester. Other groups of students continue to attend LIST classes by prior arrangement between the Subject Librarians and their Lecturers. The reference interview: Subject librarians conduct in-depth reference interviews with staff members and students (mainly 4<sup>th</sup> years) on request, in order to assist students with literature searches, referencing and other research issues. Individualised training: training is given to individual staff members and students as and when required or requested.

Guides: electronic and print guides have been compiled to assist users with the information search and retrieval process. These include guides for distance learners, guides for new staff members, online user guides for various electronic databases and citation guides. Topics covered in the LIST classes include, accessing and using the library's collections, facilities and services, accessing and using the library's Online Public Access Catalogue (OPAC), online searching and retrieval, preparing and following a search strategy, utilising search tools, evaluating internet sources, as well as citing sources (Grobler and Chanetsa, 2009).

## **2.7 Summary**

The literature reviewed in this chapter was related to the subject of information retrieval knowledge in the context of users engaging and interacting with library manual and electronic systems. Literature reviewed includes sources from the internet, monographs, journal articles, proceedings of conference research paper reports, e-books, and e-Journals. Information retrieval is the process that enables an individual to systematically retrieve the record and contents contained therein. Information retrieval serves as a selective aid that is capable of selecting and finding specific literature and information which can solve specific problems or questions that the user has at a particular time.

It was the industrial revolution of the 19<sup>th</sup> and 20<sup>th</sup> century which affected the way human communicated, stored and retrieved information (Toffler, 2012). In that Era, first digital computer was invented and was able to carry complex computation. People could store, access and retrieve information in an easier manner by using a computer. Moreover, it created a platform for a global flow of information, ideas and knowledge (Toffler, 2012) . This revolution has made a profound impression on storage, accessing and retrieval of information. This chapter also reviewed literature on user studies carried out at various libraries and their challenges. Moreover, this chapter reviewed literature on the information search process model, information literacy model and the importance of information literacy skills training in the information resource centres.

The next chapter, which is chapter three, is the research design and methodology.

## **CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY**

### **3.1 Introduction**

This chapter discusses this study's research design and methodology (3.2), research population and sampling (3.3), data collection instruments (3.4), reliability and validity (3.5), pilot testing (3.6), data analysis process (3.7), data collection procedure (3.8), research ethics (3.9), evaluation of the research methodology (3.10) and ends with a chapter summary (3.11).

### **3.2 Research methodology and design**

Research methodology is a scientific process of studying a phenomenon or event and a systematic way to solve the research problem (Simon and Burstein, 2003). Through research methodology, the researcher studies various steps that are adopted in studying the research problem along with the logic behind the methods used in the context of the study. The research methodology also includes an explanation of why a particular design or techniques was used and why others were not considered suitable. In the research, methodology stage, the researcher must ask themselves these questions: What is the population to be investigated? How will a sample be drawn from the population, and how large should the sample be? Where and when will the study be conducted? What are the operational definitions of the variable relevant to the research problem? How will the needed research data be collected and analysed? (Welman, Kruger and Mitchell, 2005).

Research design is defined as the plan or structured framework of how one intends to plan or structure the research process in order to solve the research problem (Babbie and Mouton, 2001). Creswell (2009) defines research design as the plan or proposal to conduct research, which puts into account the philosophical worldview assumptions of the study, the strategy of inquiry relating to the worldview, the specific methods and procedures of research that translate the approach into practice. Research design is the plan that guides the arrangement of conditions for collection as well as for the analysis of data. Painter, Durrheim and Blanche (2006) define research design as the “strategic framework for action that serves as a bridge between research questions and execution or implementation of the research” (p.34). Painter, Durrheim and Blanche (2006) further point out that when one is developing a research design, the researcher must make a series of decisions along dimensions of the purpose of the research, the theoretical paradigm informing the research, the context or situation within which the research is carried out as well as the research techniques employed to collect and analyse the data.

This study used the survey research method and employed the mixed method research design. Mixed method research refers to “combining qualitative research exploring the meaning and understanding of constructs and quantitative research assessing magnitude and frequency of constructs” (Vogt, Gardener and Haeffele, 2012, p.344). Survey research is a method of gathering data in an orderly manner outlining from whom and how (Bailey, 2007). The strength of survey research is that, it is easy and cost effective; the researcher can design questions specifically in the researcher’s area of study and send the questionnaires to a large population (Bailey, 2007).

The reasons why the researcher chose the mixed method (qualitative and quantitative research design approaches) for this study are as follow:

### **3.2.1 Qualitative research design approach**

The qualitative research design approach was used for this study to gather data on NESEIC user information retrieval knowledge. With this research approach, the researcher studied the users of NESEIC in depth and attempted to understand NESEIC users' information searching and retrieval behaviour. The researcher investigated details of the real world systems (manual and electronic) of the National Earth Science and Energy Information Centre users' information retrieval knowledge.

Sarantakos (1998) and Mertens (1998) point out that “qualitative research involves an interpretive approach to its subject matter” (p.45) and (p.11). This means that qualitative research studies things in their natural settings, attempting to make sense of phenomena in terms of the meanings people bring to them. With qualitative research, the researcher engages in the situation and attempts to make sense of it, as well as attempting to explain why and how something is taking place.

By using the qualitative research approach, the researcher was able to find out various reasons NESEIC users visit the library. Some users visit the library for the purpose of making copies of their documents, some visit the library to acquire information about mining and exploration of mineral resources in Namibia. Others visit the library to read daily newspapers, bind and scan their documents. Most NESEIC users visit the library to get historic information for their current EPL (Exclusive Prospecting Licences, GIS

(Geographic Information System) data from the Namibia Earth Database as well as to inquire about and study various geological maps.

Moreover, the qualitative aspect of the study explained further the usage of NESEIC databases, some respondents proved to be aware of the NESEIC databases and others were not. The researcher was able to also establish the level of knowledge of NESEIC users in retrieving information from the NESEIC library, be it electronic or manual. Through human observation, the researcher was able to find out how NESEIC users interact with manual and electronic library systems. This study used the qualitative inductive argument to draw conclusions from the data collected on NESEIC users' information retrieval knowledge.

### **3.2.2 Quantitative research design approach**

Quantitative research is the gathering and analysis of data that can be expressed in numerical form as well as data that is measurable such as statistical results, demographic data and financial results (Finance Dictionary, 2011; Fox and Bayat, 2007; Vaus, 2002).

The quantitative research approach was very important for this study because the researcher was prompted to study variables or factors in empirical investigations that can only be expressed numerically. Through quantitative research, the researcher was able to find out the age of respondents, the percentage of NESEIC users who are visiting the library, the percentage of NESEIC users who are aware of NESEIC databases and those who are not, the percentage of NESEIC users who make use of the card catalogue and those who use electronic databases to search for, and retrieve

information from NESEIC library systems. The researcher was also able to ascertain the duration of hours spent by the respondent(s) while in searching for information in NESEIC library.

### **3.2.3 The differences between quantitative and qualitative research for this study**

The distinction between quantitative and qualitative research marks a series of differences in approaches to this research. Quantitative research refers to elements in empirical investigation that can be quantified or expressed numerically. Qualitative research refers to factors that cannot be expressed numerically. Creswell (2009) define quantitative research as a means of testing objective theories by examining the relationship among variables. These variables are said to be measurable on instruments so that numbered data can be analysed using statistical procedures. Qualitative research is a means of exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research in qualitative research involves emerging questions and procedures, typically collected in the participant's setting, data analysis inductively building from particulars to general themes and the researcher making interpretations of the meaning of the data (Bui, 2009; Fox and Bayat, 2007; Creswell, 2009).

### **3.3 Population and sampling**

Vaus (2002) warns that “in sampling, researchers should not confuse population with the population of a country or a region” (p.69). Population in research has a technical meaning, therefore (Bailey, 2006; Vaus, 2002; Castillo, 2009; Dohert, 1994; Tongco, 2007 and Simon and Burstein, 2003) define population as the set of units that the sample is meant to represent. Sampling refers to “the process of selecting participants for the study” (Bui, 2009, p.142). In this study, population refers to the well- defined collection of individuals from which the sample was drawn.

#### **3.3.1 Research population**

The population consisted of approximately 400 NESEIC users and library staff consisting of 2 librarians. The researcher decided on the population based on the user statistics of NESEIC users who visit the library per month, a number of approximately 400. NESEIC only has 2 librarians, this is because NESEIC is a special library under the Ministry of Mines and Energy.

### **3.3.2 Sampling procedure**

#### **3.3.2.1 Sampling in qualitative research**

This study applied the purposive method which lies within the non-probability category in the qualitative research approach. Bui (2009) informs that “purposive sampling allows the researcher to select individuals who are considered representative because they meet certain criteria for the study” (p.143). The criteria could be the participants’ willingness and experience to contribute to the understanding of the research problem, issue or phenomenon being explored.

The researcher decided what was needed to be known regarding NESEIC information retrieval knowledge as well as the people who could and were willing to provide the information by virtue of knowledge and experience about NESEIC user information retrieval knowledge. This decision is also supported by Bernard (2002) who states that purposive sampling is exemplified through the key informant technique. Tongco (2007) defines key informants as the “observant, reflective members of the community of interest who know much about the culture and are both able and willing to share their knowledge” (p.147).

Furthermore, the researcher also defined the qualities to be possessed by the informants such as, reliability and competency. This was another vital step for the researcher because, much of the data quality rests on key informants. Godambe (1998) cautions the researchers to be critical so as to be certain of the knowledge and skill of the informant when doing purposive sampling, as inappropriate informants will render the

data meaningless and invalid. The researcher should also be careful for potential biases from informants (Creswell, 2014).

For the above reason, the researcher in this study purposively selected the two librarians and ten NESEIC users to participate in interviews for data gathering. They were purposively selected in order to supplement information gathered through questionnaires as well as observations. 13 NESEIC users were observed. In this study, interview results provided rich data in answering research questions as it can be seen in Chapter 4 and Chapter 5.

Miller (1991) reminds the researchers about the advantage of purposive sampling by pointing out that, it reduces the cost of preparing samples and fieldwork, as well as allowing the researcher the opportunity to use his or her research skills and prior knowledge to choose respondents. Purposive sampling also has disadvantages in the sense that, the researcher does not necessarily have a quota to fill from within various strata. Rather, the researcher uses his or her judgement about which respondents to choose, and picks only those who best meet the purpose of the study.

### **3.3.2.2 Sampling in quantitative research**

Simple random sampling was used in this study and this lies within the probability category. Dohert (1994), Miller (1991), Fox and Bayat (2007), Vaus (2002) and Castillo (2009) state that a probability sample is a sample in which each element in the population has a known and not-zero probability (chance) of being included in the sample. In drawing probability samples, simple random sampling was used.

Dohert (1994), Miller (1991), Fox and Bayat (2007) point out that a simple random sample is one that is drawn in such a way that every member of the population has an equal chance of being included. Simple random sampling was used to gather information from a sample of 100 NESEIC users drawn from the population of 400 NESEIC users. This was because, it was difficult for the researcher to study the entire entire population of NESEIC due to time, money limitations and the fact that the pilot study indicated that not every NESEIC user was willing to be studied.

Castillo (2009) further says that one of the best things about simple random sampling is the ease of assembling the sample. It is considered as a fair way of selecting a sample from a given population since every member is given equal opportunities of being selected.

Another positive aspect of simple random sampling is its representation of the population. The entire population of NESEIC of 400 could not be studied but a sample of 100 was selected which represented the whole population. 25% of the population was selected to represent the entire population as it was considered adequate in terms of professional such as geologists and mining engineers. This study in achieving its purpose, it excluded people such as cleaners who could not give much information. Castillo (2009) points out that, an unbiased sample selection and a representative sample is important in drawing conclusions from the results of the study, furthermore (Vaus, 2002) and (Castillo, 2009) emphasise that one of the main goals for any researcher is to be able to make conclusions pertaining to the population from the results obtained from the sample.

### **3.4 Data collection instruments and techniques**

This section discusses the data collection instruments used to gather the data for this study. Data collection instruments used included semi-structured interviews, participative observation as well as questionnaires. Bui (2009), Olsen (2004), Fox and Bayat (2007) stress that, the use of triangulation is very important in research whereby multiple methods of data collection are used to study one phenomenon. Olsen (2004) defines triangulation from a social science point of view as the mixing of data or methods so that diverse viewpoints or standpoints cast light upon a topic. Moreover, triangulation is used to explore and improve knowledge of the real world through the use of a variety of sources and resources which assist the researcher to build his or her strength upon them. Triangulation was important for this study because it minimised the weaknesses in data collection since the researcher was not relying on one single approach but used several types of data collection techniques.

#### **3.4.1 Semi- Structured interview**

The interviews were conducted face to face. Semi-structured interviews were used to obtain information from ten NESEIC users and the two librarians. Information obtained included respondents' general opinions and views on NESEIC user information retrieval knowledge to supplement information gathered from the questionnaires. The researcher used an interview guide during the interview process but there were also other questions that arose during the interviews. Vaus (2002), Fox and Bayat (2007) inform researchers that interviews must be conducted on a one-to-one basis, in an

informal and relaxed manner, the interviewer must be prepared regarding what questions to ask and in what sequence they should be posed.

#### **3.4.1.1 Interview guide**

An interview guide played an important role in this study throughout the interview process. An interview guide refers to the “list of question or issues to be explored during the interview” (Neale and Boyce, 2006, p.5). Kennedy (2006) points out the advantages of an interview guide in social research; it helps the researcher to know what to ask about, in sequence, how to pose questions, and how to pose follow-ups. It provides guidance to the researcher on what to do or say, after the interviewee has answered the last question. An example of the interview guide used in this study can be seen in appendix F and G.

#### **3.4.2 Participative Observation**

This study employed observation as a method of gathering data. An observation checklist was used as an instrument to collect data pertaining to NESEIC users’ information retrieval knowledge in searching for, and locating material from the library system. 13 NESEIC users were observed. Issues that were observed included the different stages of the search process as NESEIC users were interacting with the Earth Database, their need to search for information, their anxieties and stress, their skills and knowledge. Grow (1996) states that, when one searches for information or decides to search for information, he or she should have a working memory to not only predict what an article will contain but should have prior knowledge of what will be relevant to them and the strategies useful in approaching new information.

In this research, observation refers to observations which occurred as the researcher was observing NESEIC users while they actively searched for, located and retrieved information in the library system. According to Peil (1995) “much can be learned by observing what people actually do and how they do it” (p.114). As a research method for social scientists, observation involves more than just looking at what is going on. Because subjects can talk and explain behaviour, observation also includes listening, asking questions and participating in activities of the group to get first-hand experience of what their daily lives involve.

Peil (1995) points out that, “observation has advantages” (p.115). An observer need not specify the research problem as clearly as someone designing a survey, but can be flexible, examining events as they happen in their natural environment, trying to understand how social relationships reflect values and beliefs and the meaning people give to what they do.

#### **3.4.2.1 An observation checklist**

The observation checklist consisted of a list of things which the researcher was looking at when observing (see Appendix H). The list consisted of things such as NESEIC user interaction with manual and electronic library systems; observing the search formulations the users used to search for information; observing how users utilise the card catalogue; the level of knowledge that was applied by NESEIC users in searching for information, especially when using the Earth data Namibia database to load historic data for various exploration licences, in accessing and locating drill holes, deposits and geochemistry data. The researcher also observed the way NESEIC users, pose their

queries on how to go about locating information in NESEIC library systems to librarians. 10 NESEIC users and 2 NESEIC librarians were interviewed.

### **3.4.3 Structured questionnaire (Ranking, Closed and Open ended questions)**

A structured questionnaire was used to collect data for this study. Questionnaire refers to a list of research questions asked to respondents to collect appropriate data to answer research questions. Mouton (1996) defines a questionnaire as a commonly mailed or handed list of research questions to the respondent to answer the research questions. Ranking, closed as well as open ended questions were employed in the structured questionnaire for gathering data. Closed questions provided the respondents with a limited set of response choices, such as Yes or No. Open ended questions gave NESEIC users more opportunity for self-expression to respond to the question in whatever way they saw fit. NESEIC users were also given the opportunity to rank their answers to the answer which seemed best for them. Ranking helped the researcher in evaluating whether the services NESEIC provided to the users met their information needs.

#### **3.4.3.1. Design of the questionnaire**

Questions were aimed at finding out the extent of NESEIC users' current knowledge and if the knowledge enable the users to search for, and retrieve the correct information in NESEIC library.

The questionnaire (see appendix C) was subdivided into four parts; Part A represents questions about demographic information, part B represents questions about the information retrieval knowledge of NESEIC users. Part C represents questions about

user education and information literacy skills. Part D represents questions on challenges NESEIC users face in searching for, locating and accessing the right information from the NESEIC library, be it the manual or electronic systems. Part E represents questions on suggestions regarding enhancing NESEIC service.

#### **3.4.3.2 Administering the questionnaire**

Most NESEIC users have well established e-mails access. Questionnaires were distributed to NESEIC users by email as well as by personal contact. This method of delivery was chosen because it was cost effective and did not use much time. Most people were reached very fast and emailing the questionnaires also allowed most respondents to fill in the questionnaire electronically and saved much time for the researcher to do data analysis and presentation of data on time. Postal services were not used because of their unreliability and slowness. On the other hand, email did also disadvantage the researcher as some NESEIC users deleted it thinking it was a spam.

A covering letter (see appendix B) requesting user participation and detailing the reason for investigation was sent to NESEIC users together with the questionnaire. The letter also included the contact details of the researcher as well as the request that the questionnaire be completed and returned within two weeks from the date of receipt.

Questionnaires have advantages as well as disadvantages as follows:

### **3.4.3.3 Advantages of Questionnaire**

The questionnaire was distributed to numerous respondents and facilitated the collection of large amounts of data in a short period of time. It allowed a wider range and distribution of the sample than the interview method which was restricted to 10 NESEIC users and 2 librarians. It also provided an opportunity for respondents to give frank, anonymous answers as well as enabling the gathering of quantitative data which were relatively easy to analyse. The questionnaire was also designed in a way that ensured background information about respondents was gathered, which is hard-to-obtain through interviews and observation. The questionnaire allowed insightful information about a relatively unexplored problem of NESEIC users' information retrieval knowledge to be gathered. The questionnaires were completed at the convenience of the respondents within the time limit set by the researcher.

### **3.4.3.4 Disadvantages of Questionnaire**

A questionnaire precludes personal contact with respondents, perhaps causing the investigator to gain insufficient knowledge about participants in a study (Howard, 1990). Open-ended questions generated a large amount of data regarding NESEIC user information retrieval knowledge but they consumed a lot of time in terms of processing and analysing.

### **3.5 Reliability and Validity**

Reliability usually refers to the degree to which the findings of the study are independent of accidental circumstances of their production. Silverman (2006), Fox and Bayat (2007), Bui (2009) and Vaus (2002) define reliability with regards to the consistency of the results of test or measurement, that is, when a test or measurement supplies the same answer at different times then it is considered as reliable. Therefore, when measurements are consistent from one research session to another, they are reliable and some degree of trust may be placed in them. “If they are unreliable, it is unwise to depend on them” (Fox & Bayat, 2007). Reliability was ensured in this study through interview guides and questionnaires, maintaining consistency. Simon and Burstein (2003) point out that reliability is important for adequate measurement, but not sufficient. An adequate measure must also be valid. Validity refers to the extent to which the instrument measures what it is intended to measure. If a measurement instrument is not valid for the intended purpose, then it will be difficult to interpret the results in a meaningful way (Bui, 2009).

Validity was ensured through pre-testing of the questionnaire. Howard (1990) says that validity in term of quantitative research must include what is called measurement error which is the degree to which scores are different from the true score because of unreliability or systematic confounding. Systematic confounding is a form of bias that influences successive measurements in the same way. The score observed is influenced by chance or irrelevant or contaminating influence obscuring the true score. The

validity of a measure refers to the degree to which the scores obtained in using the instrument successfully approximate the true score (Howard, 1990).

The researcher mitigated the above through triangulation. According to Olsen (2004) triangulation refers to the mixing of data or methods so that diverse viewpoints or standpoints cast light upon a topic. This study used 3 data collection techniques namely, semi-structured interviews, participative observation, as well as questionnaires. Moreover, triangulation was used to explore and improve knowledge of the NESEIC real world through the use of a variety of sources and resources. Triangulation was important for this study because it minimised the weaknesses in data collection since the researcher did not rely on one single approach but used 3 types of data collection techniques. Furthermore, triangulation was used in this study as a strategy to improve validity as well as reliability. Validity was also ensured through piloting of interview guides before the main study. This helped to rectify areas of weaknesses found, along with enabling the researcher to know what to ask about, in sequence, how to pose questions, and how to pose follow-ups.

### **3.6 Pilot testing**

Pilot studies are mini studies carried out as part of the process of preparing for a study. The questionnaire was pre-tested in a pilot study. The purpose of pre-testing the questionnaire was to determine whether the questions were placed in the best order, whether the questions would achieve the desired results, whether the questions would be understood by all classes of respondents, whether additional or specifying questions would be needed or whether some questions should be eliminated; and whether the instructions to interviewers were adequate.

The pilot study was conducted at the Namibia De Beers (NAMDEB) special library. NESEIC library is different from NAMDEB library because NESEIC is a special library which falls under the Ministry of Mines and Energy while NAMDEB deals with diamonds. Pilot study improved the quality and effectiveness of the questionnaire and ensured that the questions asked would be understood by respondents. Through the pilot study, the researcher learned that respondents complained that the questionnaire was too long with too many open ended questions. This caused many participants to become reluctant to fill out the questionnaires. Therefore, the researcher solved this problem by incorporating more closed questions and minimising open ended questions. When a pilot study is conducted as part of the research process, it is useful in many ways such as improving the internal validity of a questionnaire as well as assessing the feasibility of the main study. Through a pilot study, one can establish whether the sampling frame and techniques are effective as well as giving feedback on the logistics of data collection (Nyatanga, 2005) and (Baker, 1994). In this study, a pilot study was

used to give the researcher advance warning about where the main research project could fail, and indicate whether proposed research methods or instruments were inappropriate or too complicated.

### **3.7 Data analysis process**

Data analysis involves working with data as well as organising such data and breaking it into manageable units to ensure logical reasoning (Ormrod and Reedy, 2005).

#### **3.7.1 Qualitative data analysis**

Huberman and Miles (1994) and Vaus (2002) explain that data analysis in qualitative research is defined by following three concurrent flows of activity which are data reduction, data display as well as conclusion drawing or verification. Babbie and Mouton (2001), and Huberman and Miles (1994) state that data reduction refers to the process of selecting, focusing, simplifying, abstracting and transforming the data that appear in written-up field notes or transcriptions. Huberman and Miles (1994) further argue that data reduction is part of the data analysis and is a form of analysis that sharpens sorts, focuses, discards and organises data in such a way that final conclusions can be drawn and verified.

Walter (2006) define content analysis as a research technique that attempts to ascertain the meanings in a body of discourse in some systematic manner. Content analysis is a research method that detects records and analyses the presence of specified words or concepts in a sample of forms of communication. Content analysis researchers count and analyse the presence, meanings and relationships of these words and concepts.

They then make inferences about the messages within the texts, the writers, the audience and the time and the place. Content analysis was employed to analyse qualitative raw data from interviews, open-ended questions within questionnaire and observation.

The researcher also used data coding during analysis. Bui (2009) remarks that data coding is an effective method for making large qualitative data sets more manageable for content analysis which develops and applies a series of structural codes to the data. Structural code refers to question-based rather than theme-based codes. Each discrete question and its associated probes are assigned a code that is then applied or linked to the question or subsequent response text in each data file. Sets of questions that comprise a conceptual domain of inquiry can also be given a structural code. For this study, the researcher used tally mark to manage the data by recording it during the analysis process.

The analysis activity in analysing qualitative data is called data display. Huberman and Miles (1994) point out that data display is an “organised, compressed assembly of information that permits conclusion drawing and action” (p. 11). In this study, data was displayed in tables and figures. This is because, tables and figures are an easy way of presenting information and they make it understandable to the intended reader or user of such information. The School of Chemical Engineering and Advanced Materials (2011) states that figures are effective when presenting large amounts of data and giving idea of the value and visual indication of how the value is changing, furthermore, effective use of figures requires an understanding of the type of data to be presented, the key feature that is to be portrayed, how the information will be used as

well as the intended audience. Figures are also used to show similarities, highlight differences and compare performances.

The third flow of analysis activity in qualitative analysis of data is what is called conclusion drawing and verification. Huberman and Miles (1994) inform that “from the start of data collection the qualitative analyst should decide what things mean, by noting regularities, patterns, explanations, possible configurations, causal flows as well as prepositions” (p. 11). Bui (2009) points out that it is important for the researcher to make his or her own interpretations about the conclusions based on the actual results. A competent researcher holds these conclusions lightly, maintaining openness and scepticism, but the conclusions are still there increasingly explicit and grounded.

Huberman and Miles (1994) stress that final conclusion may not appear until data collection is over, depending on the size of the corpus of field notes, the coding, storage and retrieval methods used, the sophistication of the researcher and the demands of the funding agency. Moreover, conclusions are also verified as the analytic proceeds. Verification may be as brief as a fleeting second thought crossing the analytic mind during writing with short excursions back to the field notes, or it may be thorough and elaborate with lengthy argumentation and review among colleagues to develop inter-subjective consensus, or with extensive efforts to replicate a finding in another data set. Huberman and Miles (1994) state that, “the meaning emerging from the data have to be tested for their plausibility, their sturdiness, their confirmability- that is their validity” (p. 11). Considering the qualitative nature of this study, conclusions were drawn from

the sample to the population. This means that the findings of the study were generalised from the sample to the NESEIC population.

Content analysis also has its advantages and disadvantages. The Colorado State University (2011) states that, content analysis is a good method for analysing qualitative data because it looks directly at communication via texts and, transcripts, and hence gets at the central aspect of social interaction. It allows both quantitative as well as qualitative operations, it provides valuable historical insights over time through analysis of texts, it allows closeness to the texts which can alternate between specific categories and relationships, and also statistically analyses the coded form of the text. Content analysis is used to interpret texts as well as provide insight into complex models of human thoughts and language use. Mouton (1996) and Bailey (2006) point out the disadvantages of content analysis are that it can be extremely time consuming, it is subject to increase error particularly when rational analysis is used to attain high level of interpretation and it attempts to liberally draw meaningful inferences about the relationships and impacts applied in the study. It can also be difficult to automate or computerise. Another limitation to the use of content analysis is that keywords are acknowledged only as part of a simple word count without taking the word context into account.

### **3.7.2 Quantitative data analysis**

This study employed a deductive way of analysing data. Data were analysed according to the main research question and research sub-questions. Variables were defined in those research questions. The analysed data was then used to present findings upon which conclusions and recommendations were based. Descriptive Statistical Analysis was used to analyse quantitative data from the questionnaires, specifically used bivariate descriptive statistics in analysing categorical as well as scale variables. Chi-square statistical analysis was used to test and analyse dependency questions and SPSS was used as a programme for data entry. All the questionnaires were given a code (Q1, Q2, Q3, Q4 up to Q100) in order to assist the researcher with cross checking of data entry in the SPSS programme. For categorical variables, cross tabulation was used to present the data in a table (Bailey, 2006). Moreover, column and row percentages were also employed to present the data categorically.

Bivariate analysis is the method that studies two variables at a time. Bivariate relationships include whether the relationship is positive or negative, the strength of the relationship, whether it is symmetrical or asymmetrical, which variable is the independent variable and which is the dependent (asymmetrical relationships only), whether the relationship is linear or curvilinear, and whether the relationship is spurious or involves an intervening variable (Bui, 2009) and (Bailey, 2006).

In this study, Pearson Correlations coefficients was used to summarise the association between the knowledge levels of NESEIC users and their ability to search for, locate and retrieve the right information. Correlation is basically a measure of the relation

between two variables. This study chose a significant level of 0.05 and used Chi Square Test to test the dependency relationship between the knowledge levels of NESEIC users and their ability to locate and retrieve the right information from the library manual and electronic systems. Tests for statistical significance were used to address the question: What is the probability that what is considered a relationship between two variables is really just a chance of occurrence?

In research, there is always a possibility that the researcher will make a mistake regarding the relationship between the two variables. There are two possible mistakes or errors (Bui, 2009); (Bailey, 2007). These are called Type I and Type II errors which refers to incorrect conclusions that can be drawn during a test. In any test, there are four basic options: two which are accurate- something is true and the test says it is true and, something is false and a test says it is false (Vaus, 2002). The two other options which are inaccurate are something is false but the test says it is true and something is true but a test is saying it is false. Minimising errors of decision is not a simple issue. For any given sample size the effort to reduce one type of error generally results in increasing the other type of error. The only way to minimise both types of errors, without just improving the test, is to increase the sample size and this may or may not be feasible (Bailey, 2006). In this study Column and row percentages were employed to present the data categorically. The analysed data was then used to present findings upon which conclusions and recommendations were based.

### **3.7.3 Coding**

In analysing quantitative data, every questionnaire was given a unique number to identify each one easily (Vaus, 2002). The questionnaires were numbered from one to a hundred and each number was written on top of every questionnaire. This helped the researcher in doing descriptive analysis. To allow more flexibility, the questionnaires were placed accordingly in a file.

Interview transcripts were coded uniquely by assigning a transcript name per interview such as user one, user two, up to user ten as well as librarian one and librarian two. This greatly helped in analysing the data question by question using the answers given by different users and comparing different users and librarians' response given to the questions. Bui (2009) defines "data coding in qualitative research as the data analysis used to categorise and label major themes" (p.128).

## **3.8 Data collection procedure**

This section is a discussion of all stages the researcher went through during the research process from seeking permission to conduct the study up to the collection of data.

### **3.8.1 Seeking permission from the institutions and individuals**

Permission was sought from the Permanent Secretary of the Ministry of Mines and Energy. NESEIC falls under the Geological Survey of Namibia therefore permission was also sought from the Director of the Geological Survey of Namibia and the librarian of NESEIC as well as research participants. Questionnaires were self-administered to every participant who wished to provide answers and to be studied for

this research. No participant was forced to participate. Questionnaires were distributed within one week and only during working hours. Participants were given two weeks to complete the questionnaires. Participants were informed about on the importance and purpose of the research face to face. The participants were instructed to submit the questionnaires at NESEIC library for the researcher to pick them up.

### **3.8.2 The interview process**

The researcher conducted all the interviews personally. The researcher planned the interviews well and ensured their success by being courteous and friendly to the respondents. The researcher went into the interview process bearing in mind the advice of (Vaus, 2002) that interviews should be conducted in a relaxed atmosphere in which the respondent can concentrate and the interviewer must be well prepared before the questioning process begins. The researcher asked the respondents' one question at a time, making sure that each question was concise and clear. The researcher appreciated whatever information on retrieval knowledge the respondent gave. The researcher used an interview guide during the interview process but there were also other questions that arose during the interview. The researcher used a note book to note all the details and answers given by the respondents.

The researcher assured the respondents that their views were valuable and of significance to the research being conducted. Upon completion of the interview, the researcher thanked the respondent for their cooperation and assistance in taking part in the study.

### **3.9 Research ethics**

Ethics in research refers to norms and equity a researcher abides by in designing research (Babbie, 2004), (Glatthorn & Joyner, 2005), (Vaus, 2002) and (Peil, 1995).

This study addressed ethical rules of social research as follows:

The study honoured voluntary participation; confidentiality and the issue of informed consent by informing the participants about the study and their role in participating.

Formal permission in writing (see Appendix A) was sought from the Permanent Secretary of the Ministry of Mines and Energy, the Director of the Geological Survey of Namibia and the librarian who enabled the researcher to gain access to the respondents. After permission was granted, the researcher provided a written letter of consent (see Appendices D and E) to all respondents, in order to seek their permission as well as to assure respondents' confidentiality regarding to the study. The study was voluntary and no respondent was forced to participate.

### **3.10 Evaluation of research process**

This section seeks to evaluate the research methodology that was used for the conduct of the study. Welman, Kruger and Mitchell (2005) inform that every research methodology has its own strength and weaknesses. For this reason, the researcher used a survey, employing mixed methods (quantitative and qualitative approaches) as a triangulation techniques for the worth and value of this study as far as reliability and validity are concerned. Vogt, Gardener and Haeffele (2012) define reliability as “the consistency or stability of an observation, measurement or test” (p. 349). Evaluation of the research process assisted the researcher in replication in case there were any

challenges with the methodology. Graziano and Raulin (2013) stress that replication means “repeating a study to see if the same results is obtained” (p. 44).

### **3.10.1 Motivation for research used**

The researcher evaluated the mixed methods (qualitative and quantitative approaches) employed by the study. Mixed methods refer to “combining qualitative research exploring the meaning and understanding of constructs and quantitative research assessing magnitude and frequency of constructs” (Vogt, Gardener and Haeffele, 2012, p.344). Quantitative research gathers facts in studying relationships from one set of facts to another, while qualitative research deals more with understanding individual meaning or perception of the world around such individual (Bell, 2005). Triangulation was used for this study to assist the researcher in gathering both facts and perceptions of NESEIC users’ information storage and retrieval knowledge. This method, because of its flexibility and cost effectiveness was found to be appropriate for this study, despite few challenges such as, not many NESEIC users being were willing to fill-in the questionnaires or take part in the interviews.

Furthermore, the advantage of the survey methodology to this study was that; it allowed the selection of a small sample from much larger population and the findings were applied to the larger population of NESEIC users. Fox and Bayat (2007), Miller (1991) and Punch (2005) inform researchers that when evaluating research methodology, one ought to answer the question - Is the methodology adequate for the research problem under investigation? This will ensure that the methodology will successfully investigate the research problem. Fox and Bayat (2007) advise researchers to always bear in mind the right techniques used to gather and analyse quantitative and qualitative data. For

this study, sampling was well chosen and excluded respondents who could not give useful data for the study, for example cleaners.

Tongco (2007, p.147) states that “key informants know much about the culture and are both able and willing to share their knowledge”. This is what happened with the NESEIC staff (two librarians), who were chosen for the interviews; the information they gave supplemented data accumulated from questionnaires.

In analysing quantitative data, the Statistical Package for the Social Sciences using bivariate descriptive analysis was used. For categorical variables, cross tabulation was used to present data in a table, including the column and row percentages which were used in presenting the data categorically. Content analysis was used to analyse qualitative data. These methods gave the researcher an opportunity to present the findings upon which conclusions and recommendations were based (see Chapter 4, 5 and 6).

If the researcher was to carry out the same study, she would use the same method (survey employing mixed methods, qualitative and quantitative approaches). The language (English) usage of the questionnaires was not a problem as the majority of respondents had attained their university qualification as their highest educational qualification. (see Chapter 4, section 4.2).

### **3.10.2 Challenges encountered as part of the research process**

The major problem experienced in this study was that NESEIC users were not willing to respond to the questionnaires as they were distributed. The research respondents paid no attention to the questionnaire, said that, it was too long to fill in. This was not only experienced in the main study but in the pilot study. The questionnaires that were distributed to the first respondents were 100 and only 10 people filled them in with 2 people responded by email. There were many complaints that respondents were too busy and the questionnaire was too long. The researcher solved the length problem by incorporating more closed ended questions and minimised open ended questions. The researcher printed 120 questionnaires after the first failed batch, and 90 questionnaires were completed.

### **3.11 Summary**

This chapter has outlined the methods and techniques employed in studying the information retrieval knowledge of NESEIC users. The chapter discussed the research design and the reasons for choosing the mixed method approach methodology instead of other techniques. The advantages and disadvantages of qualitative and quantitative approaches were also discussed, along with the data collection instruments used; semi-structured interviews, participative observation and questionnaires.

The sampling method used and applied in this study was discussed. This was purposive sampling which lies within the non-probability category in the qualitative research approach. Two NESEIC librarians and ten users were selected as the respondents for the interviews. In quantitative research, the sampling used and applied lie within the probability category. In drawing probability samples, simple random sampling was used to gather information through the use of questionnaires from a sample of 100 NESEIC users drawn from the NESEIC population of 400.

Content analysis was used to analyse qualitative data. Descriptive Statistical Analysis was used to analyse quantitative data. Chi-square statistical analysis was used to test and analyse dependency questions and the SPSS was used as a programme for data entry. Pilot testing of instruments, validity and reliability and research ethics were also discussed. The chapter ended with an evaluation of the research methodology used, reflecting on challenges encountered and how they were addressed.

Chapter 4 provides analysis and presentation of the research data.

## **CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION**

### **4.1 Introduction**

This chapter presents the results of the. The results were gathered through questionnaires, observation and interviews from NESEIC users and librarians in the National Earth Science and Energy Information Centre, Ministry of Mines and Energy are presented in Chapter four. The purpose of this study was to establish what skills and knowledge NESEIC users require to search for and locate the right materials from the library system.

Data was presented in tables, diagrams and figures. Glatthorn and Joyner (2005, p.198) remark that “tables present complex data in columns and rows and are useful because they present multiple data in a form which is easy to understand”. A figure is an illustration other than a table. Glatthorn and Joyner further advise that a figure should be easy to read, complement and not duplicate the text. Codes in this chapter are used to refer to NESEIC users and librarians with no specific reference to any specific individual, to ensure anonymity of respondents. Qualitative data were analysed using content analysis (see 3.7.1) and quantitative data were analysed using the statistical package for the social sciences (see 3.7.2). In writing this chapter, the researcher heeded the advice of Bui (2009, p.162) advising that when analysing and presenting data in chapter four “tell the main findings of the research study as they were collected”.

Data was presented mainly with relevant direct voices in the form of quotes from the interviewees and questionnaires (including open and closed questions data). Data from observations was used as supplement information to questionnaires and interviewer, and relevant observed data is presented in direct quotes as observed.

The chapter was divided into the following sections guided by the research questions. These thematic areas are demographic information of NESEIC users (4.2), information retrieval knowledge (4.3), user education and information literacy skills (4.4), challenges in searching for, locating and accessing the right materials in NESEIC library systems (4.5), suggestions to enhance NESEIC services (4.6), recommendations to the NESEIC library and other customers with similar needs (4.7).

The study presents the system of codes used to uniquely identify NESEIC users and librarians who were interviewed as well as to identify individual questionnaires (see appendix i: meaning of each code).

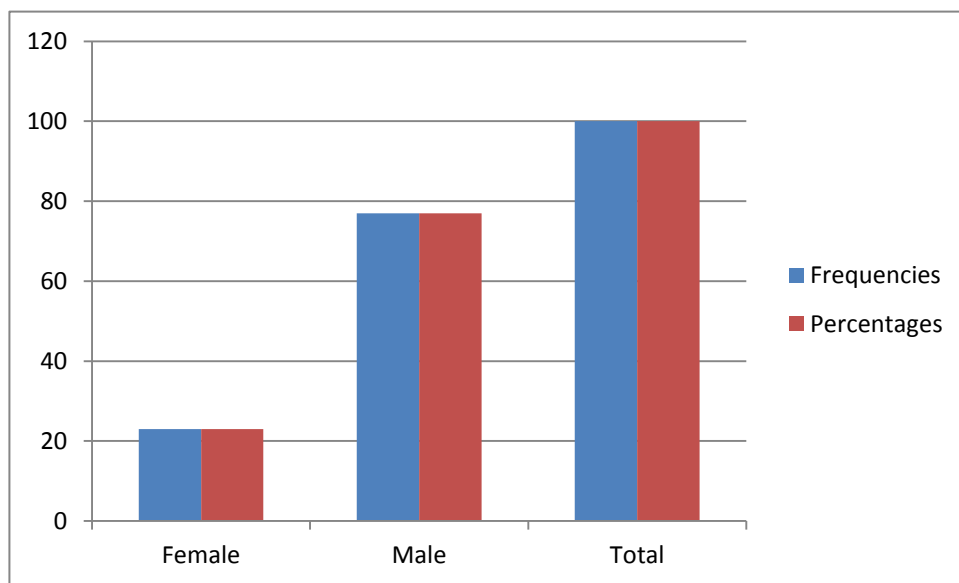
Questionnaires and interviews were coded in order to distinguish them from each. Every questionnaire was given a unique number counting from 1 up to 100. Q1 means questionnaire 1, Q2 means questionnaire 2 until Q100. They were given the unique number in order to help with data analysis. For instance, in doing descriptive analysis, if anything went wrong or the wrong information about a particular questionnaire was entered by mistake, as a researcher, it was very convenient to be able to go to that particular questionnaire number and make the correction. Interviews of NESEIC Users were given unique codes, for example NU1 means NESEIC User 1, NU2 means NESEIC User 2 until NU10. The two librarians, who were interviewed,

were coded as NL1 meaning NESEIC Librarian 1 and NL2 meaning NESEIC Librarian 2.

#### 4.2 Demographic information

Gender information for all research participants is shown in the following diagram

4.1



**Diagram 4.1 Gender of research participants (NESEIC users)**

N=100

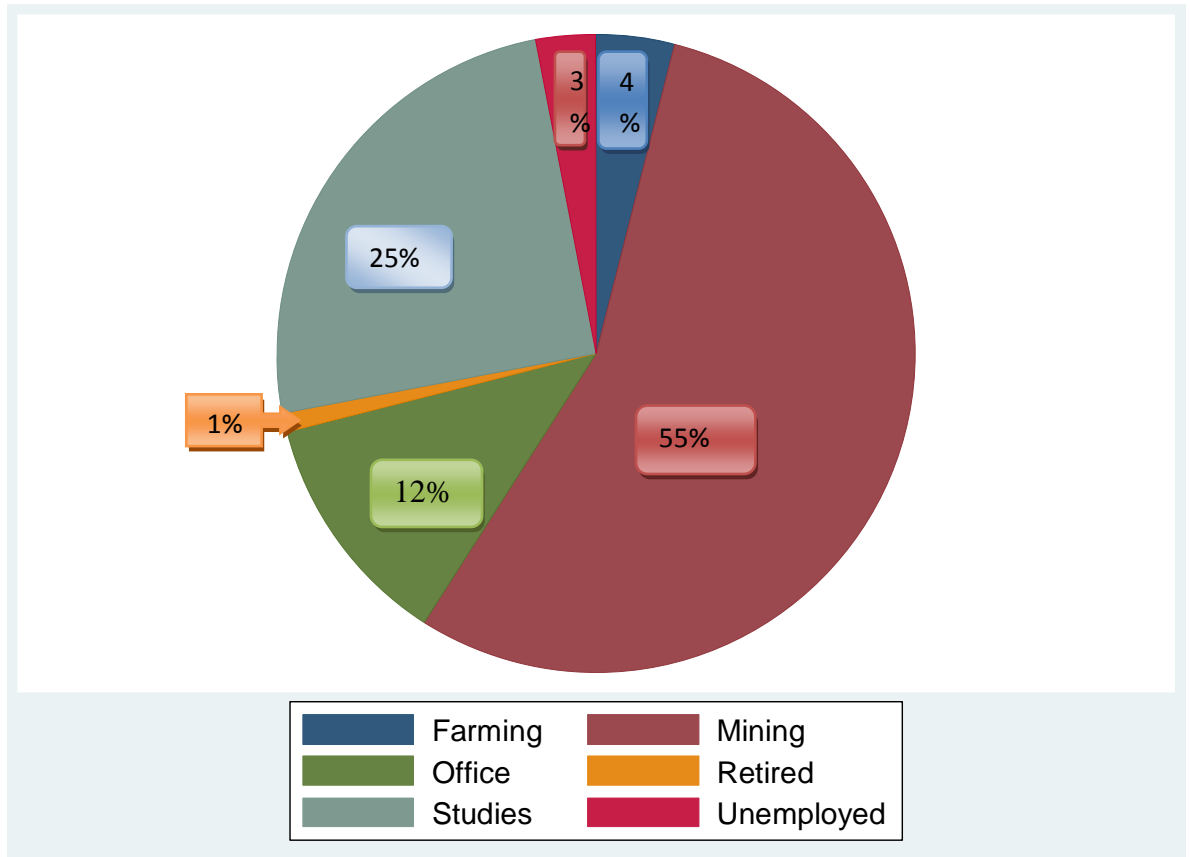
Diagram 4.1 presents the percentages of research participants. Males formed the highest percentage was at 77% and females made up 23% of those who participated in this study. The reason is that there were more males available to fill out the questionnaire than females.

**Table 4.1 Highest educational qualifications**

N=100

<b>Education</b>	<b>Frequencies</b>	<b>Percentages</b>
Polytechnic	7	7%
Secondary	4	4%
University	82	82%
Vocational	7	7%
Total	100	100%

Table 4.1 presents the percentages of research participants' level of education. The highest was for those who had university education at 82% and the lowest was secondary school at 4%. This information is very important for the research because it provides information about the qualifications of the population in terms professionalism and level of knowledge in retrieving information in NESEIC systems.



**Figure 4.1 Main occupation**

N=100

Figure 4.1 presents the main occupation of research participants. Research respondents were asked to state their main occupation in the questionnaire. The highest is 55%, representing those in the Mining industry and the least is 1% representing those who have retired, 25% represent those studying, 4% represent research participants who are farming and 3% represent the unemployed. This shows that most of the respondents who participated in the study are those whose occupation is mining and it is related to information retrieval in the sense that, the retired are less likely to search for information in NESEIC, while the participants in

the mining industry search for information in the NESEIC library for exploration and mining reason.

**Table 4.2 Cross tabulation of main occupation and gender**

N=100

	<b>Gender</b>	<b>Gender</b>	
<b>Occupation</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
Farming	0	4	4%
Mining	10	45	55%
Office	2	10	12%
Retired	0	1	1%
Studies	10	15	25%
Unemployed	1	2	3%
<b>Total</b>	<b>23</b>	<b>77</b>	<b>100%</b>

The Cross Tabulation Table 4.2 presents the percentages of females and males in relation to different occupations as listed; farming, mining, office worker, retired, studying and unemployed. The highest can still be seen in the male category (45%) within the mining sector when compared to the female percentage (10%) in the same sector.

### 4.3 Information retrieval knowledge

**Table 4.3 Library visitation**

N=100

<b>Library visitation</b>	<b>Frequencies</b>	<b>Percentages</b>
Everyday	3	3%
Four times a year	1	1%
Irregularly	1	1%
Once a month	29	29%
Once a week	26	26%
Once a year	10	10%
Once in a while	4	4%
Once when need arise	2	2%
Quarterly	1	1%
Three times a week	1	1%
Twice a month	13	13%
Twice a week	1	1%
Twice a year	2	2%
When doing research	1	1%
When necessary	5	5%
Total	100	100%

Table 4.3 presents the percentages of research participants in relation to the frequency of their visits to the NESEIC library. The table shows that the majority of people (29%) visit the library once a month, followed by 26% who visit the library once a week. The reason could be that most of the NESEIC users are from the mining industry (see Figure 4.2) and only visit NESEIC when a need arises.

**Table 4.4(a) Intention for library visitation**

N=100

<b>Intention for library visitation</b>	<b>Frequencies</b>	<b>Percentages</b>
Customer services	1	1%
General geological information	1	1%
Journals, textbooks, EPLs	1	1%
Mining claims and EPLs information	64	64%
Newspapers	1	1%
Publications of certain authors	3	3%
Purchase GSN publications	4	4%
Scientific Journals	10	10%
Text books on Geosciences	10	10%
To access electronic data	4	4%
To study	1	1%
Total	100	100%

Table 4.4(a) lists the reasons people visit the library and presents percentages relating to each reason. The highest percentage (64%) of the library users visits the library to get mining claims and exclusive prospecting licences information. The lowest 1% represents those who visit the library to make use of the library's customer services, read newspapers and studying.

**Table 4.4 (b) Cross Tabulation of gender and intention for library visitation**

N=100

<b>Intention</b>	<b>Gender</b>		<b>Total</b>
	<b>Female</b>	<b>Male</b>	
Customer services	1%	0%	1%
General geological information	0%	1%	1%
Journals, textbooks, EPLs	0%	1%	1%
Mining claims and EPLs information	14%	50%	64%
Newspapers	0%	1%	1%
Publications of certain authors	1%	2%	3%
Purchase GSN publications	1%	3%	4%
Scientific Journals	4%	6%	10%
Text books on Geosciences	2%	8%	10%
To access electronic data	0%	4%	4%
To study	0%	1%	1%
<b>Total</b>	<b>23%</b>	<b>77%</b>	<b>100%</b>

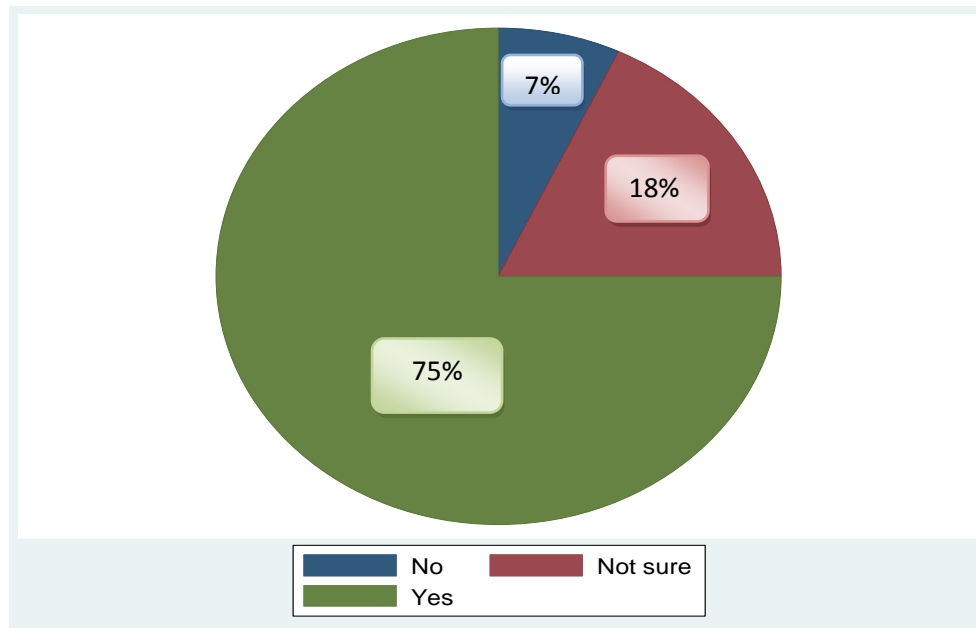
The cross tabulation table in 4.4(b) indicates the percentages of how many males and how many females visit NESEIC with what intention. Looking at mining claims, males seem to be more interested in mining information with the highest percentage of 50% compared to female (14%).

**Table: 4.5 NESEIC users' knowledge in searching for information from library systems**

**N=100**

<b>Knowledgeable</b>	<b>Frequencies</b>	<b>Percentages</b>
Do not know	18	18%
Knowledgeable	23	23%
Less knowledgeable	54	54%
Not knowledgeable	5	5%
Total	100	100%

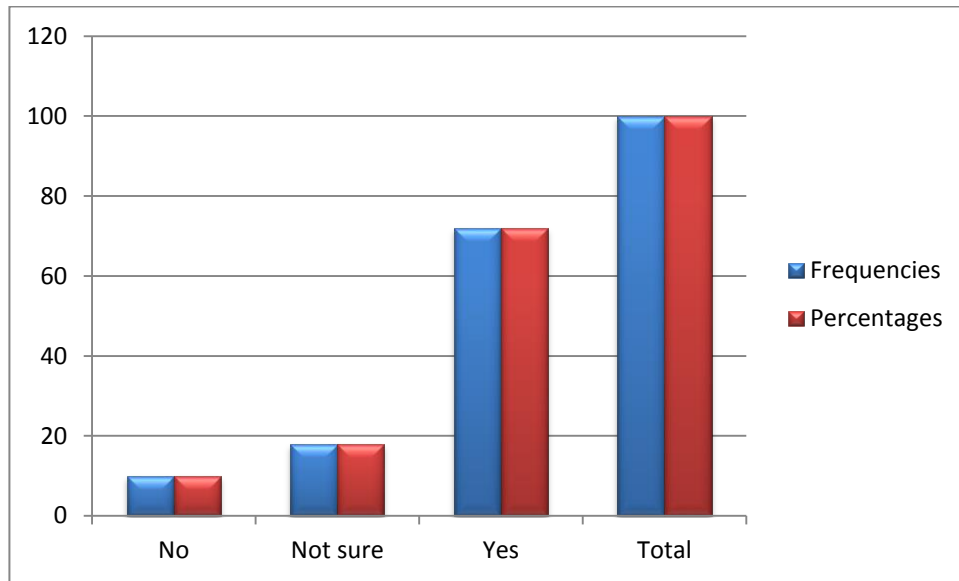
Table 4.5 presents the percentages of research participants' responses on how knowledgeable they are in searching for information in the NESEIC library systems (NESEIC library systems include both electronic and manual systems). The highest response of 54% came from those who are less knowledgeable. The least response of 5% came from those who are not knowledgeable at all.



**Figure 4.2 Retrieval of correct information from the library manual system**

N=100

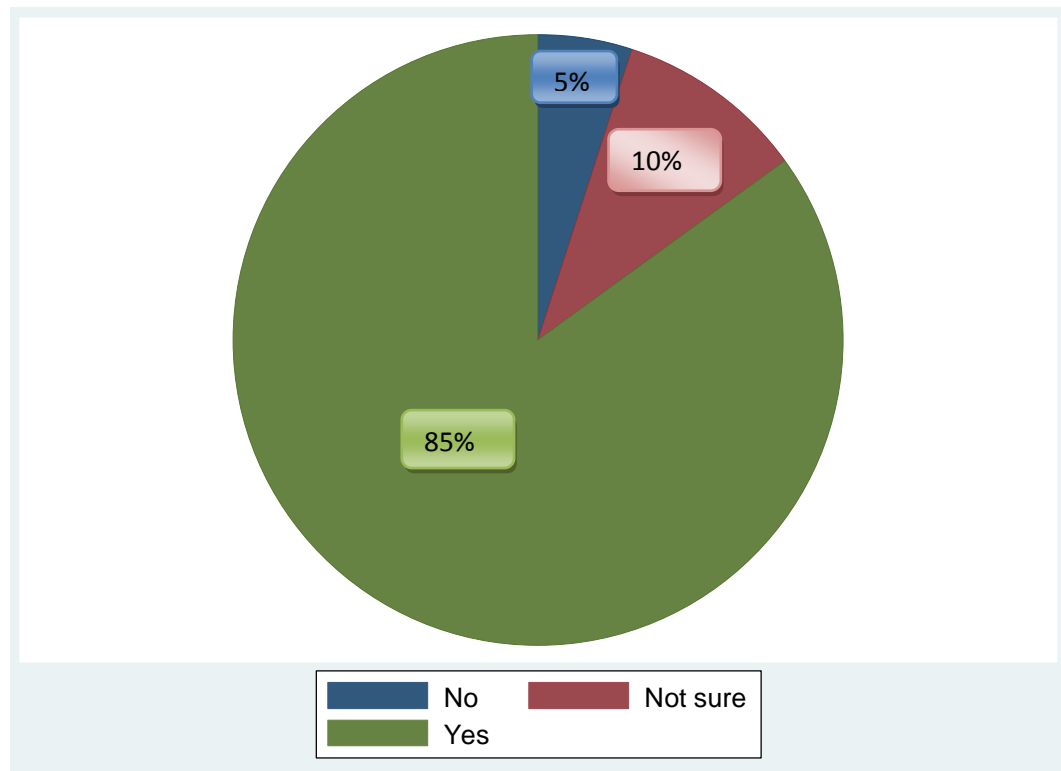
Figure 4.2 presents the percentages of research respondents' responses in relation to the retrieval of information from the library manual system. Seventy five percentage of the respondents said they have retrieved the right information, 7% stated that they did not retrieve the right information. Eighteen percentage were not sure that their visit to the library satisfied their information need and therefore they are not sure if they retrieved the right information.



**Diagram 4.2 Retrieval of correct information from the library electronic system**

N=100

Diagram 4.2 presents the percentages of research participants in relation to their responses regarding the retrieval of information from the library electronic system. Seventy two percentage of research participants who responded that they retrieved the right information. Ten percentages is the lowest percentage of the research participants who responded that they did not retrieve the right information. The 18% represents research respondents who were not sure whether they retrieved the correct information, meaning that their need for information was not met.



**Figure 4.3 Information need solved (through evaluation of information retrieved)**

N=100

Figure 4.5 presents the percentages of research participants who responded to the question regarding their information need and whether it solved or not. Eight five is the highest response that research respondents' need was solved through the evaluation of information retrieved and 5% responded that their information need was not solved. The remaining 10% of research respondents were not sure whether their information need was met or not after they had evaluated the information retrieved.

### 4.3.1 Chi-square test: information retrieval knowledge of NESEIC users in relation to usage of the NESEIC library systems

In this section, data was collected based on research question two (see Chapter One, section 1.4) “Are differences in knowledge levels of users at NESEIC library related to their ability to locate and retrieve the right information?” The result of Chi-square test carried out to ascertain the knowledge of NESEIC users in relation to usage of NESEIC manual system and electronic system are presented in the table below (Table 4.6a and Table 4.6b).

**Table 4.6 (a) Chi-square test of NESEIC users’ knowledge in relation to the manual library system**

N=100

	<b>Manual system</b>				
<b>Knowledgeable</b>	<b>No</b>	<b>Not sure</b>	<b>Yes</b>	<b>Total</b>	
Do not know	0%	2%	16%	18%	
Knowledgeable	2%	4%	17%	23%	
Less knowledgeable	4%	11%	39%	54%	
Not knowledgeable	1%	1%	3%	5%	
<b>Total</b>	<b>7%</b>	<b>18%</b>	<b>75%</b>	<b>100%</b>	
Pearson chi2(8)=	4.4641	Pr=	0.813		
Fisher's exact=			0.692		

Table 4.6 (a) presents the chi-square test of NESEIC users' knowledge in relation to the manual library system, testing whether there is any relationship in the utilisation of the NESEIC manual system with the knowledge of users.

The study tested at 0.05 significant level. A Chi-square test was used in this study to test for statistical significance with a focus on finding out if there was any relationship between knowledge of NESEIC users and their ability to locate and retrieve the right information from the NESEIC manual system. The Fisher's exact results of the use of the NESEIC manual system in relation to NESEIC users' knowledge is 0.692 which states and proves that both variables (Users' knowledge and NESEIC manual system) are independent and have no relation in common. This means that even if one is not knowledgeable on how to search for information from the library manual system, he or she is able to manipulate the manual library system. This study could not rely on the Pearson result 0.813 (see Table 4.6a) because it was not the final result therefore it was not going to give the needed result to prove whether NESEIC users' retrieval knowledge and usage of the NESEIC manual system were related (depended upon each other or not). This study relied on the Fisher's exact result which was 0.692.

**Table 4.6 (b) Chi-square test of NESEIC users' knowledge in relation to the electronic library system**

N=100

Knowledgeable	Electronic			Total
	No	Not sure	Yes	
Do not know	0%	1%	17%	18%
Knowlegeable	2%	8%	13%	23%
Less knowledgeable	8%	9%	37%	54%
Not knowledgeable	0%	0%	5%	5%
Total	10%	18%	72%	100%
Pearson chi2(8)=	14.4776	Pr=	0.07	
Fisher's exact=			0.060	

Table 4.6 (b) presents the chi-square test of NESEIC users' knowledge in relation to electronic to the library system, testing whether there is any relationship in the utilisation of the NESEIC electronic system with the knowledge of users.

The study tested at 0.05 significant level. A Chi-square test was used in this study to test for statistical significance with particular focus on whether there is any relationship between knowledge of the NESEIC users and their ability to make use of, search and retrieve the right information from the NESEIC electronic system. The Fisher's exact result of the NESEIC electronic system in relation to NESEIC users 'knowledge is 0.060 which indicates that users' knowledge and the library electronic system are independent and thus have no relation. This means that even if one is not knowledgeable, he or she should be able to manipulate the library electronic system.

The question is: Do they really get relevant information after the search results or do they just manipulate the library electronic system without solving the information need.

The interview results of the question on relevance of information retrieved from the library's manual and electronic systems are listed below. Only the interviews which provided relevant information are discussed below:

NU9 answered "I retrieve the relevant information which is relevant to my research topics. It is unlikely really to get irrelevant information from the Earth database because if you put a keyword of your search information, it will load all the information on that search topic, which is what it gives me. I do not know about other people and if they experience the same".

NU3 answered "I know about NOT and AND operators. They are just operators that one can use to easily find information in narrowing and broadening their search. Boolean operators really help me to find the exact information I am looking for without getting all the un-necessary information out of my topic of study. I actually like the library electronic system; Boolean operators really help us in finding information in an easy manner without sweating too much".

NU3 answered “Relevancy depends on the information I retrieve. Normally I do retrieve the information which is very relevant in solving my information problem”

NU4 answered “Asking about different strategies in retrieving the right materials, I go to the internet and search for author names and subject title of my information. Once I get them, I especially get Journals information (volume numbers, issue numbers, title, year of publication), I then go to the Ministry of Mines and Energy library, approach the Librarian in NESEIC to help me retrieve the Journals physically”.

According to the answers given by interviewees, to get relevant results from the library manual system, one must know exactly what he/she is looking for and where it can be found. This is because one cannot just go to the library shelves and start searching from one corner of the library to the next corner trying to locate a specific book. One must at least know the classification number of where the right book was shelved. As mentioned by NESEIC User4 he goes to the internet and search for author names and the subject title of the information he needs, for example, searching for journal publications’ information (volume numbers, issue numbers, title, year of publication), then he approaches the NESEIC librarian to help him retrieve the Journals physically. This kind of user is likely to get the right information to solve their electronic information need because he or she know exactly what is needed and where to go and whom to approach to retrieve the right information.

NESEIC User3 pointed out that Boolean operators are important in that they help in retrieving the right information and the relevancy of the retrieved information depends on whether it answers the user's query or not. Using the right keyword is very important in retrieving the relevant information to solve specific information need.

#### **4.3.1.1 Observation results**

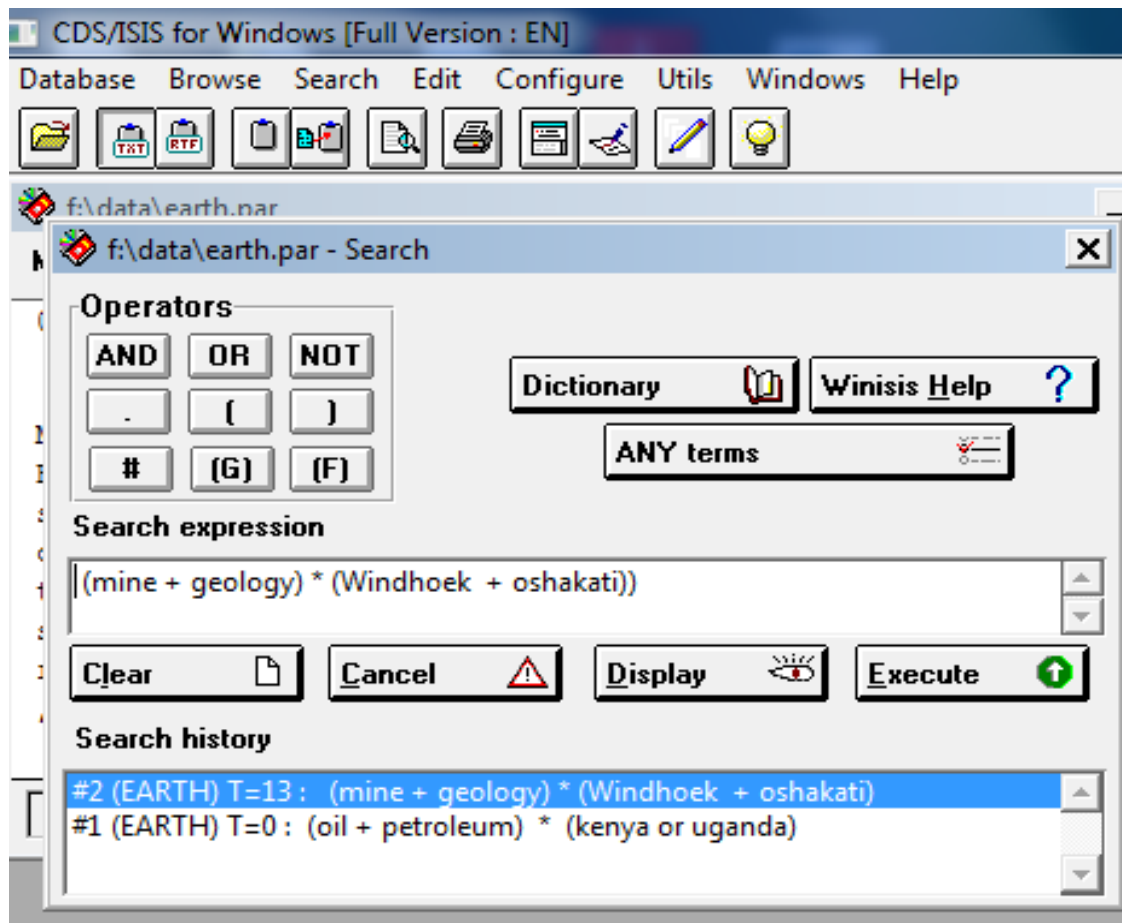
Observation was conducted from the 4<sup>th</sup> of September 2012 to the 20<sup>th</sup> of November 2012. The observation was very technical, meaning that it excluded observing users who came to the NESEIC library to sit and do nothing and those who came to the library for scanning, making copies, binding and laminating documents. A total of 13 NESEIC users were observed. The observation results of the question on relevance of information retrieved from the library **manual** system are as follows:

A library user was observed on the 20<sup>th</sup> of November 2012 as he entered NESEIC library and approached the librarian with a request for a particular thesis by an author called Ward. After this, the library user was observed as he went to the library shelves in the theses section, seemingly with the knowledge that thesis collections in the NESEIC library are shelved alphabetically with the first three letters of the author's surname. The user did not waste time but went quickly to the thesis shelves and retrieved the relevant thesis. His information need was met and he left the library satisfied.

On the 23<sup>rd</sup> of November 2012, five geologists were observed as they entered the library. Two of them were looking for information on rare earth minerals, while the other two geologists were looking for information on an orange group. The fifth one was looking for information on copper and manganese. The observer actively participated with them in searching for information. One geologist was confident that she knew exactly where to find what in the library. She did not ask for help from the librarian but went straight on to the library physical collection and started searching for her materials which she fortunately found. The fifth geologist who was searching for information on copper and manganese was a bit troubled and confused because he was not familiar with the library and he too wanted to search for materials for himself but could not retrieve the relevant information until the librarian rescued him in his search and retrieved for the materials he was looking for.

The observation results of the question on relevance of information retrieved from the library **electronic** system are as follow:

On the 6<sup>th</sup> August 2012, one of the NESEIC users entered the NESEIC library and needed the geological information of the Windhoek and Oshakati areas to solve his information need. The user used WINISIS to search for the needed information. The user was observed utilising expert search tools including the Boolean operators and dictionary within the Earth database to search for materials within NESEIC general or special collection (see Figure 4.4).

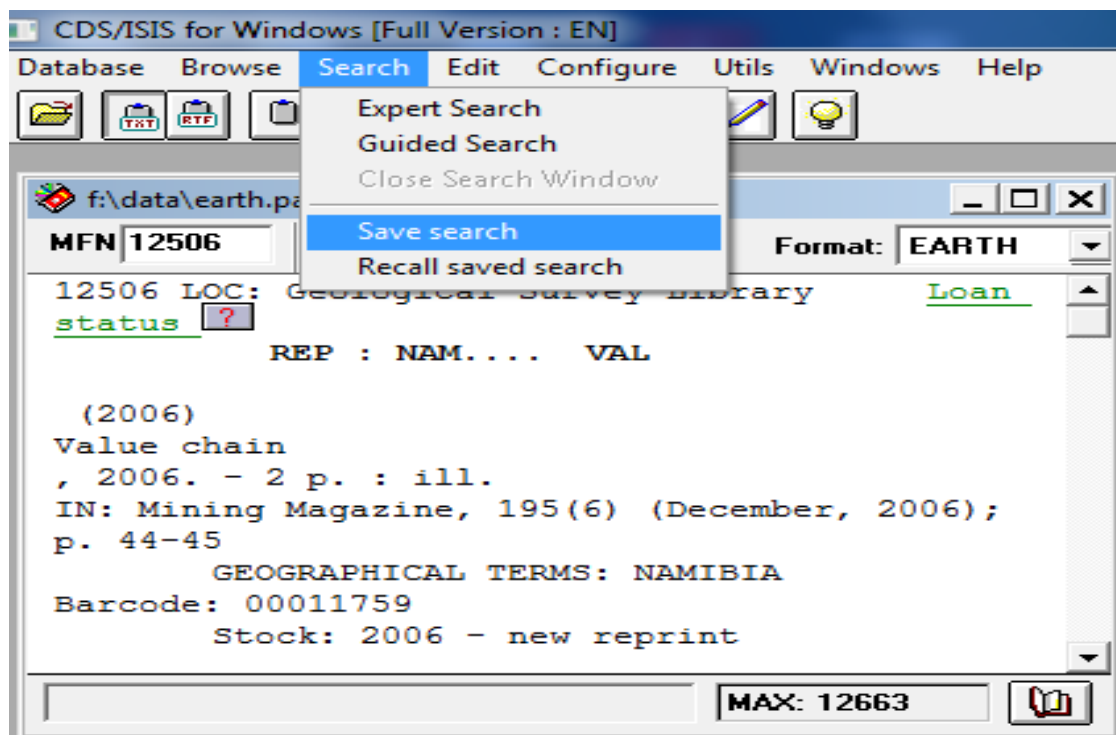


**Figure 4.4 Expert search and the use of Boolean operators**

NESEIC user was observed searching for information on mines and geology in the geographical areas of Windhoek and Oshakati according to figure 4.6. The NESEIC user entered search terms in the search expression box (mine + geology) \*(Windhoek + Oshakati). The user also combined brackets with Boolean operators. The AND operator was used to narrow the search and appeared as an asterisk\* in the search expression box. The user used the asterisk to narrow mine and geology information in Windhoek and Oshakati only. While the OR operator was only used to broaden the search and appear as a plus sign (+) in the display of the search expression box.

Finally the user was also observed using the NOT operator to exclude irrelevant terms from the search display results.

After the completion search result, the user was observed the saving the relevant retrieved information search (see Figure 4.5). The user was also observed taking detailed notes with bibliographic citations for future reference as well as taking bibliographic citations for their assignments and research projects.



**Figure 4.5 Saving the relevant retrieved information**

After an hour, the same NESEIC user was observed accessing the saved search results and asking for help from the librarian to print it out and retrieve the documents from

the library physical shelves. After retrieval of the materials, observation with this particular client ended.

The researcher also observed the NESEIC librarian referring other users to other libraries (National library and the University of Namibia library) for inter-library loan services of books that were not available in NESEIC library.

**Table 4.7 Ranking of NESEIC services**

N=100

<b>Ranking of NESEIC service</b>	<b>Frequencies</b>	<b>Percentages</b>
Excellent	45	45%
Very good	37	37%
Good	15	15%
Fair	1	1%
Bad	1	1%
Very bad	1	1%
<b>Total</b>	<b>100</b>	<b>100%</b>

Research respondents were asked to rank the NESEIC library systems (manual and electronic) ranking the systems as follow: very good, good, fair, bad or very bad. If the service meet the users' information needs or solve their information problem, then it is an excellent service but if it does not meet users' information needs, then it can be ranked from bad to very bad.

The above Table represents the percentages of research participants' rankings of the NESEIC service. The highest percentage of 45% represents research participants who ranked the NESEIC service as excellent. The lowest percentage of 1% represents those who ranked the NESEIC service as very bad.

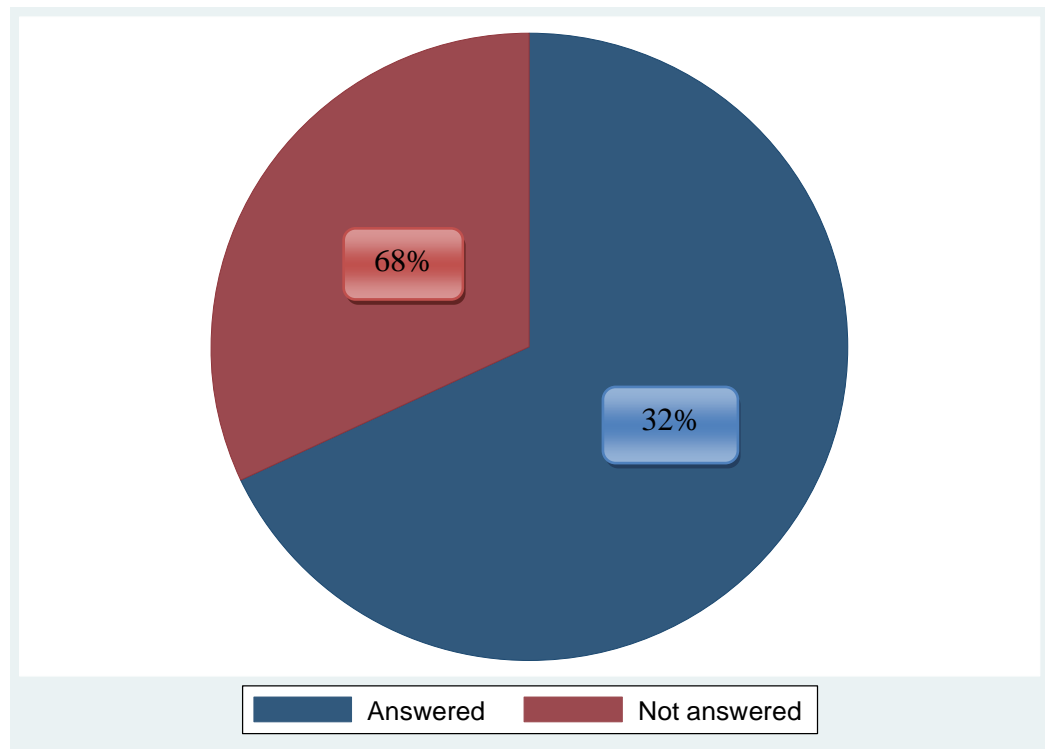
**Table 4.8 Ranking of the relevancy of information retrieved from the search**

N=100

<b>Ranking of the relevancy of information retrieved from the search</b>	<b>Frequencies</b>	<b>Percentages</b>
Very relevant	44	44%
Relevant	51	51%
Irrelevant	3	3%
Do not know	2	2%
Total	100	100%

Table 4.8 presents the percentages of research participants in relation to on the ranking of the relevancy of information retrieved from the search. A majority (51%) of the research participants found the information retrieved from the search useful. Forty four percentage presents the research participants who ranked the information

retrieved to be relevant to their information need. The lowest percentage, 2% said they did not know whether they had retrieved the relevant information or not.



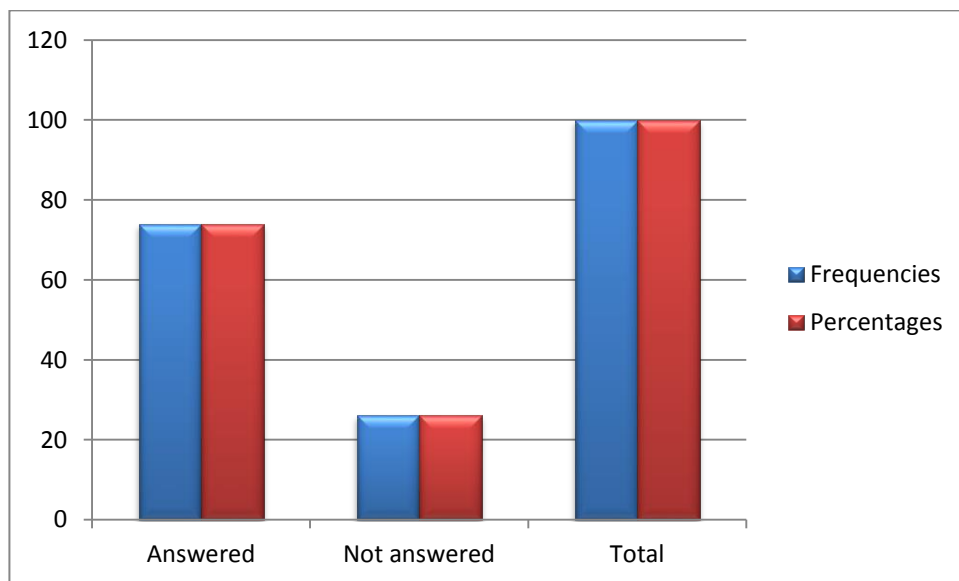
**Figure 4.6 Explanation of how NESEIC users search using the manual system**

N=100

Research participants were asked to explain how they search for materials in the NESEIC manual system.

Figure 4.6 presents the percentages of how NESEIC users search for materials in the NESEIC manual system. The highest is 68% representing research respondents who answered the question and the lowest percentage is 32%, representing research respondents who did not answer this question.

Among the 68% of research respondents who answered the question, including NU1, some receive help from the librarians to search for materials successfully in the NESEIC manual system. Moreover, interview results also indicated that NU8 went straight to the library shelves to search for and locate the books they were looking for, while NU2 made use of library shelves guides to locate certain material on the specific library shelves. NU5 made use of the melon files with all the lists of Exclusive Prospecting Licences found in the NESEIC Library and then checked the files for which EPLs were scanned and which ones were not. Once they found the one they were interested in, they requested the librarians to assist in accessing them.



**Diagram 4.3 Explanation on how NESEIC users search using the electronic system**

N=100

Diagram 4.3 show research participants which were asked to explain how they searched for materials in the NESEIC electronic system. Most of the research respondents explained how they search for information in the NESEIC library electronic system. 74% responded that they make use of NESEIC databases when searching for materials in the NESEIC electronic system with the help of librarians. 26% of the lowest, which shows that research participants did not answer this question. NU4 who was interviewed pointed out that he uses the internet to search for journal publication information and then goes to the library to retrieve the journals physically.

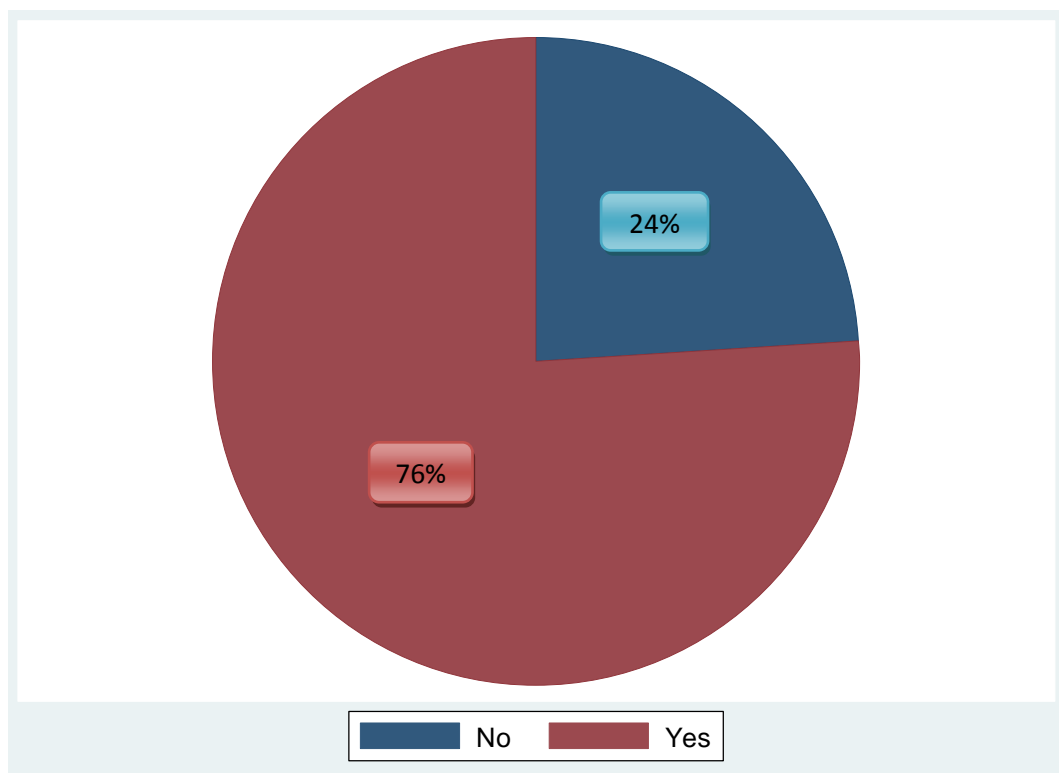
**Table 4.9 Usage of library card catalogue in NESEIC library**

N=100

<b>Usage of library card catalogue in NESEIC</b>	<b>Frequencies</b>	<b>Percentages</b>
Yes	12	12%
No	87	87%
Not answered	1	1%
Total	100	100%

Research respondents were asked if they made use of the NESEIC card catalogue in searching for information in the NESEIC library.

Table 4.9 presents the percentages of research participants' responses to the question whether they make use of the NESEIC card catalogue. The highest is 87% who responded that they do not make use of the card catalogue, while the 12% responded that they utilise the card catalogue. One respondent did not answer the question.



**Figure 4.7 Usage of Earth Data Namibia database in searching for information**

N=100

Research respondents were asked if they made use of Earth Data Namibia database to search for information in NESEIC.

Figure 4.7 presents the percentages of research respondents' response in relation to this question. Seventy six percentage of research respondents make use of the Earth Data Namibia database and 24% do not.

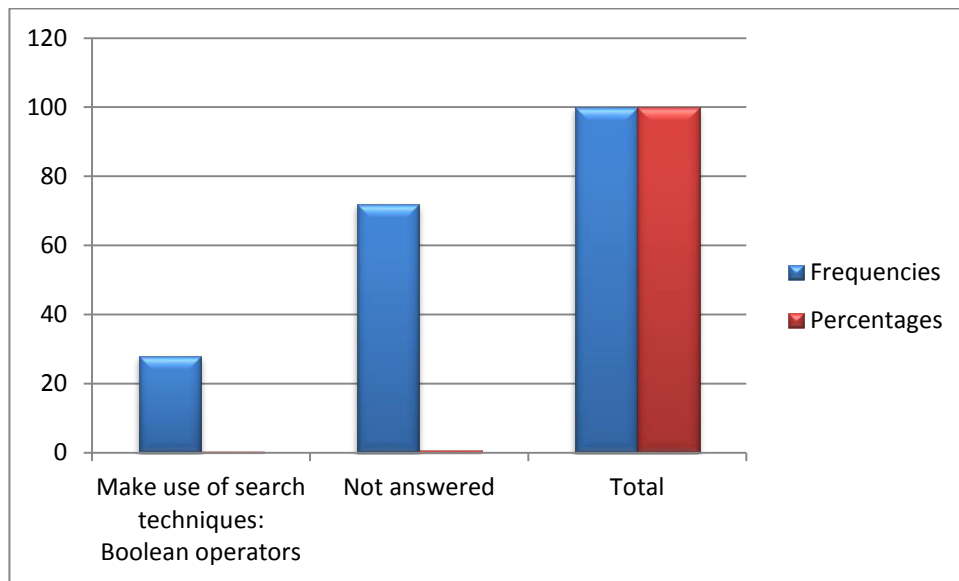
**Table 4.10 Usage of WINISIS in searching for information in NESEIC**

N=100

<b>Usage of WINISIS</b>	<b>Frequencies</b>	<b>Percentages</b>
No	76	76%
Not Answered	1	1%
Yes	23	23%
Total	100	100%

Research respondents were asked if they make use of WINISIS to search for information in NESEIC.

Table 4.10 presents the percentages of WINISIS usage in NESEIC. The majority, 76% of the research respondents do not make use of WINISIS to search for information in NESEIC and 1% did not give an answer to this question, while only 23% responded that they make use of WINISIS to search for information in the NESEIC electronic library system.



**Diagram 4.4 Search techniques**

N=100

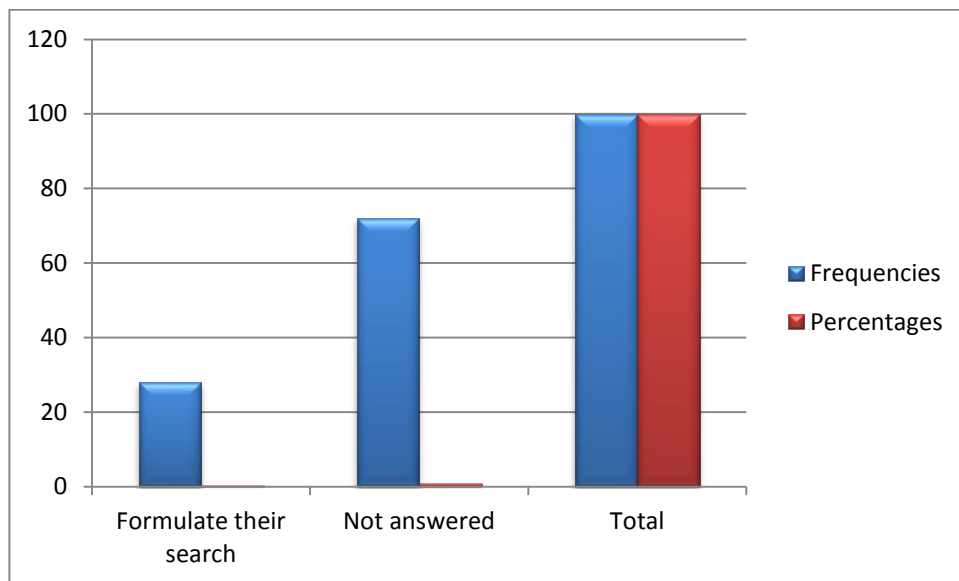
Research respondents were asked if they make use of search techniques to search for information in NESEIC. (NB: this question did not ask research participants to give a 'yes and no' answer but, required participants to give information about the searching techniques they make use of in NESEIC).

Figure 4.11 presents the percentages of research participants who responded to the question whether they make use of search techniques and what those search techniques are. The majority of the respondents (72%) did not answer the question and 28% answered the research question, indicating that they do make use of search techniques, specifically Boolean operators.

Interview result on search techniques:

NU3 “I know about NOT and AND operators. They are just operators that one can use to find information in narrowing and broadening the search. Boolean operators really help me to find the exact information I am looking for without getting all the un-necessary information. I actually like the library electronic system; it really helps us in finding information in an easier manner without sweating too much”.

Though a number of research respondents said that they do not make use of Boolean operators, there were few who indicated that they make use of Boolean operators.



**Diagram 4.5 Re-formulation of the search strategy**

N=100

Figure 4.5 presents the percentages of research respondents who responded to the question on whether they re-formulate their search strategy if they fail to get what

they selected in their first term search. The majority of the research respondents (72%) did not answer this question and 28% responded that they always formulate their search strategy to another keyword in case they fail to get what they were looking for in the first strategy search. (NB: This question did not require a ‘yes and yes’ but required the research participants to give more information on their re-formulation strategy).

NESEIC user 4 was interviewed on what happens when the search does not go successful and the information needs are not met, NU4 answered “I basically just go back to the internet to re-check if the titles, volumes and issue numbers, authors and year of publication are correct or if I failed to copy the right information”.

**Table 4.11 Search duration**

N=100

<b>Search duration</b>	<b>Frequencies</b>	<b>Percentages</b>
10 Minutes	6	6%
20 Minutes	12	12%
30 Minutes	23	23%
45 Minutes	19	19%
1 hour	15	15%
Not answered	3	3%
Total	100	100%

Research respondents were asked to indicate the approximate duration of their searches when locating the right material(s) from the NESEIC library system.

Table 4.11 presents various durations of searches in retrieving the right information. The highest percentage (23%) research respondents who devoted 30 minutes to their search and the least (6%) devoted 10 minutes to their search for information in the NESEIC library systems.

The interview and observation results indicate that some NESEIC users' search duration depends on whether the right information is retrieved or not. This is because some users search until the relevant information is retrieved. It can take 10 minutes, 20 minutes, 30 minutes or sometimes even an hour or two hours and upon failing to retrieve the right information, the user comes back to the library again the next day. According to one of the NESEIC users who were interviewed, he spends more than an hour and at times, even two hours. The user gave the following reasons for why spending so much time searching and locating the right information in NESEIC:

“I spend so much time because, first of all I have to load historic EPLs (Exclusive Prospecting License) using the Mineral Licenses module and then the Document module to see which data are scanned and which are not. If I need digital data saved on CD, I have to make sure I retrieve all the file names of each document and this is also time consuming”.

Another respondent narrated:

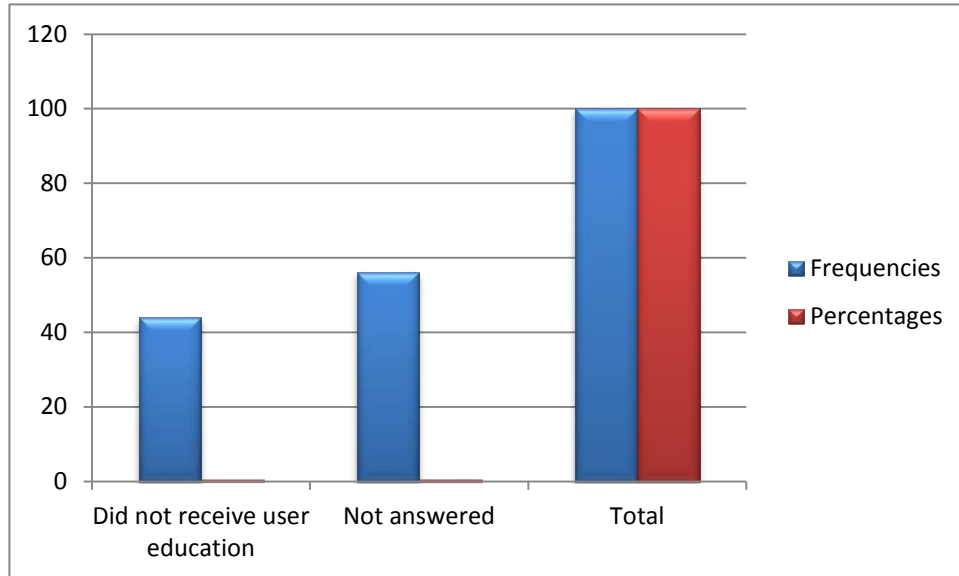
“Sometimes if I am working on certain farms, it really requires a lot of time because I have to load GIS (Geographical Information System) to locate them on the Map of Namibia. Sometimes, the system is slow and at times

the server is down which requires me to come back the next day which is waste of my time”.

Another respondent in the interviews said that the duration of searching for and locating information depends on whether the user is satisfied with the information retrieved or not. The user can spend the whole day in NESEIC times when the information need is not met or spend a few hours in the NESEIC library when he or she immediately finds the right materials being looked for.

Furthermore, another research respondent responded that he spends not more than 20 minutes, perhaps just 10 minutes because he goes to NESEIC with specific titles of the journals that he wants to retrieve. He pointed out that he does not have stress in searching; the stress comes only when he does not find what he is looking for.

#### 4.4 User education and information literacy skills



**Diagram 4.6 User education and information literacy skills**

N=100

Research respondents were asked to give details of how often they receive user education in NESEIC (that is, how frequent user education is carried out).

Diagram 4.6 presents the percentages of responses to the question of user education if (if the NESEIC user has ever received user education and information literacy skills training which explains to them how to fully exploit the library resources and retrieve the right information). Fifty six percentage did not answer this question while 44% gave a response. The 44% of research respondents who responded (through research questionnaire answers) stated that they had never heard of user education in the NESEIC library apart from the help they received from the librarians

on how to use the NESEIC electronic and manual systems, as well as how to search for, locate and retrieve the relevant materials.

NESEIC users' interview proved that none of the users had ever received user education or heard about it. User 2 responded that "I never received any, beside the librarians showing me how to search for information on the NESEIC library system. Maybe NESEIC can come up with programmes teaching us how to fully operate the library and how to use databases".

#### 4.5 Challenges NESEIC users face

**Table 4.12 Problems encountered by NESEIC users when searching for, locating and accessing the right materials in the NESEIC library system**

<b>Suggestions</b>	<b>Frequencies</b>	<b>Percentages</b>
NESEIC faced problems in NESEIC with Earth Data Namibia Database, down most times and very slow; Lack of experienced librarians in geology; out-dated historical information for EPLs; books not catalogued correctly	75	75%
Not Answered	25	25%
Total	100	100%

Research respondents were asked to briefly explain the problems they encounter when searching for, locating and accessing the right materials from the NESEIC library system.

As shown in table 4.12, the majority of the respondents (75%) answered the question and 25% did not. Most of the problems that were put forward by the research respondents were such as books are not in the right shelves section where they are supposed to be; sometimes there is only one copy of a book available and if somebody is using it, that means that the next person has to wait; the computers with the Earth data Namibia database are down most of the times and it seems or looks like once there are more people using the database system; it is slow or not available.

Information for current EPLs is out-dated; incorrect cataloguing of text books; very few reprints on Namibia Earth Science; Scanning is too slow; Ministry server and power problem, if the server of the Ministry goes off, it affects the Earth Data Namibia database.

The interview results present that NU2 is facing a problem with out-dated historic information for EPLs; while NU3 have a problem with NESEIC weather that, it is either too hot or too cold in the NESEIC library at the wrong season and NU2 faced a problem with the NESEIC books which are wrongly shelved and not in the right library collection where they supposed to be.

In summary, it appears that the nature of all the problems encountered by NESEIC users is summed up to be resulted from lack of sufficient library staff.

#### 4.6 suggestion for enhancing NESEIC service

**Table 4.13 Suggestion on enhancing NESEIC service**

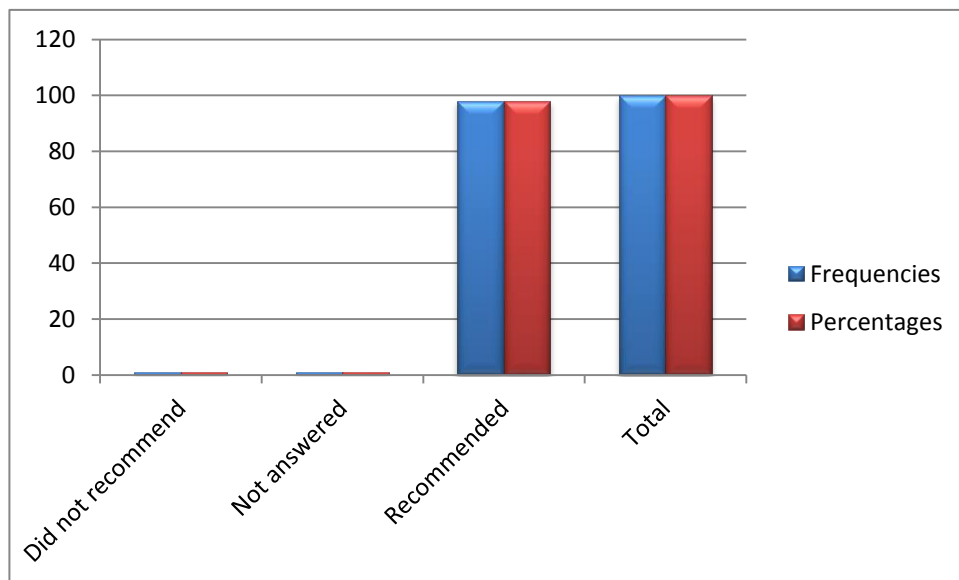
<b>Suggestions</b>	<b>Frequencies</b>	<b>Percentages</b>
NESEIC users suggested: NESEIC must acquire more computers for research and access to electronic documents; get more recent articles on Namibia Earth Science; get more updated information on clients current EPLs; ensure that all computers and the library website are working at all times	60	60%
Not Answered	40	40%
Total	100	100%

Table 4.13 Research respondents were asked to give suggestions for enhancing NESEIC users' knowledge as far as retrieval of information in NESEIC is concerned. The majority (60%) of the research respondents gave suggestions on how NESEIC can enhance its users' knowledge and 40% did not answer this question.

The respondents who answered the question suggested that NESEIC should get more computers for searching information and install internet for NESEIC users to do research and access electronic documents especially e-journals. The respondents suggested that books should be shelved in their right sections and positions, furthermore, respondents suggested that NESEIC should get more copies of books and be responsible in giving electronic data on time, library materials ought to be

catalogued correctly, more recent articles on Namibia Earth Science should be obtained along with more updated information on clients' current EPLs. NESEIC should ensure that all computers and the library website are working at all times as well as through user education teaching NESEIC users how to use NESEIC databases.

#### 4.7 Recommendation of NESEIC library and its' services



**Diagram 4.7 Recommendation of NESEIC library and its' services**

N=100

Research respondents were asked if they would recommend NESEIC services to other customers with similar needs. 98% of research participants recommended NESEIC services to other customers, 1% would not recommend and another 1% did not answer this question.

#### **4.8 Summary**

This chapter presented the research data gathered from questionnaires, interviews, and observations and is organised according to the thematic areas of the study. The researcher firstly analysed data based on pre-determined thematic areas in line with the study's research questions in the questionnaire. Data were presented in Figures and Tables in the form of descriptive narratives.

The study's findings show that even if a user may not be knowledgeable in searching for and retrieving the correct information from the NESEIC library system, he or she can be able to manipulate the library services, for example using library shelves guides. The study shows that only users who know exactly how to search for the right information and use the right searching techniques will be likely to get relevant information. The findings show that some users of NESEIC make use of Boolean operators in WINISIS to search for the right information and others, make use of filter tools when searching for information from Earth Data Namibia database. These searching techniques contribute to the user's ability to retrieve the best results that will solve their information need.

The study's findings show that there is no user education program in NESEIC hence many users rely on the librarian to help them search for the relevant materials from NESEIC manual system.

The study's findings further show that NESEIC users experience different challenges when it comes to searching for the right information from the NESEIC manual and electronic systems. NESEIC users experience problems with the library's

temperature which does not seem to be normal because the findings show that at times the library is too cold and at times it is too hot. The findings also show that NESEIC need one or two more qualified staff with the knowledge of geology as well as chief librarian. Moreover, the findings show that materials in the library are located and wrongly catalogued and some copies of materials are missing. Besides, the above, the findings also show that historic information for current EPLs is out dated.

The next chapter discusses the findings of the study and incorporating the literature reviewed.

## **CHAPTER 5: DISCUSSION OF RESEARCH FINDINGS**

### **5.1 Introduction**

This chapter presents the discussion and interprets the findings of the study. Bell (2005) argues that “raw data means nothing to a researcher or to a reader until they are discussed and interpreted” (p.253). This chapter discusses the most important findings, integrating the study’s data (the quantitative analysis of the questionnaire data and the content analysis of the qualitative data from the interviews and observation as presented in Chapter 4) with the literature reviewed. The data which has been presented addressed the research questions drawn from the main research question of the study: “To what extent does NESEIC users’ current knowledge allow them to effectively find in retrieve information in the NESEIC library”?

This study was guided by five research questions. Maree (2007) notes that the “research question is the beacon that guides the research” (p.3). The sections of the discussion are organised according to research questions, respective research questions discussed in each section. The first section focuses on research question 1: What are the knowledge levels of users at NESEIC? The main theme discussed in this section is “information retrieval (IR) knowledge levels of NESEIC users” addressed in section 5.2. The second section focuses on research question 2: Do differences in knowledge levels users at the NESEIC library influence their ability to locate and retrieve the relevant information? The main theme discussed in this section is

“knowledge levels of NESEIC users and their influence on IR” shown in section 5.3. The third section deals with research question 3: What skills are required by users of NESEIC to actively locate and retrieve the relevant information? The main theme discussed under this section is “library users’ skills; information literacy skills needed to retrieve information” and this is addressed in section 5.4. The fourth section focuses on research question 4: What challenges do NESEIC users face in accessing the relevant information? The main theme to be discussed in this section is “challenges library users face when trying to access the relevant information” discussed in section 5.5. The fifth section discusses research question 5: What can the NESEIC library do to enhance user knowledge? The main theme discussed in this section is “the role of the NESEIC library in enhancing user knowledge” addressed in section 5.6.

## **5.2 IR Knowledge levels of NESEIC users**

The findings from the questionnaires, interviews and observation have shown that IR knowledge is important for the users of NESEIC and the knowledge level of NESEIC users varies when they search and retrieve information from the NESEIC library systems. This was confirmed by (Nonaka, 2006 and Manhaj, 2004) who states that knowledge constitutes the basis of understanding, the moral wisdom of carrying out the task correctly and at the right time.

### **5.2.1 Information retrieval (IR) and knowledge**

The data presented in Chapter 4 (Table 4.5) indicates that only (23%) of NESEIC users are knowledgeable in searching for information from the library systems. Fifty

four percentage of NESEIC users are less knowledgeable, (5%) of NESEIC users do not have any knowledge of how to search and retrieve the relevant information that could meet their information problem, while (18%) of the users do not know if they are knowledgeable or less knowledgeable. This means that NESEIC users vary in their knowledge of retrieving information. The interview results (see chapter 4, Diagram 4.4) confirm that NESEIC users who are knowledgeable are those who can make use of the library databases by using the filter tools and the right keywords in searching for information, such as Boolean operators. Observation results (chapter 4, section 4.3.1.1) confirm that NESEIC users who are less knowledgeable and are confused about whether they are knowledgeable or not are those who just go straight to the library shelves without consulting the library databases or asking for help from the librarians. This discovery confirms several studies (Maybury and Kowalski, 2000; Greengrass, 2000; Boom, 2004) which stress that information retrieval knowledge makes it possible for the user to be able to access information from the right information source and use it for the right purpose and evaluate such information in order to solve a specific information need or information problem.

The data presented in Chapter 4, (Table 4.4a) shows that NESEIC users use their knowledge as discussed above to retrieve information from the library for different purposes, (64%) for mining claims and EPLs information, (10%) for scientific Journals and textbooks on geosciences, (1%) for other general geological information. This indicates that NESEIC users have different information needs. An example of one category of NESEIC users are geology students who indicated that when doing assignments, they get stuck in the middle because of information which

can only be obtained from the NESEIC library, especially on the mineral resources of Namibia, such students are forced to visit NESEIC library and search for information. While other NESEIC users, specifically explorers and miners indicated that they visited the library because they applied for EPLs, they needed historic information in order to help them investigate who previously mined the area, what was mined and what to expect when mining in that area and the environmental constraints attached to it. This is confirmed by Wilson (1997), Wilson (2006), Stevenson (2002) Allen (1997) who state that the gap in information leads to the need for information in order to fulfil the problem experienced from the gap.

In conclusion, the first research question: What are the knowledge levels of users at NESEIC? was answered through establishing the fact that NESEIC users vary in their knowledge levels when searching and retrieving the right information. As discussed above, some NESEIC users are knowledgeable and know how to use the library databases to filter the right information to solve their information need, some are less knowledgeable and some do not know if they are knowledgeable or not because they just know how to go straight to the library shelves which might be not the best option because library shelves can be relocated. Hjørland (1997) concludes that when an individual is caught up doing something and suddenly confronted with a problem that stops him or her from continuing with their activity, the thought of all possible accessible information that might define and illuminate the problem develops in a question and a plan of action to solve the specific problem.

### **5.3 Knowledge levels of NESEIC users and their relation on IR**

Data presented and analysed in Chapter 4 (Table 4.6a and Table 4.6b) indicate that knowledge levels of NESEIC users may vary when searching for information but the different level do not influence their retrieval of information from the library's electronic and manual (physical) systems. This discovery disagrees with the study of Palmquist and Kim (1998) where they state that users' information searching and retrieval behaviour in information resource centres depends on what stages of the information searching process the user is and not necessarily his or her knowledge. The data presented in Chapter 4 revealed that NESEIC user knowledge is important in the searching and retrieval of the right information from NESEIC library systems, even though user knowledge may vary from one user to another. This is confirmed by Grow's (1996) cognitive model of learning that says an individual searching for information should have a prior knowledge of what will be relevant and the strategies useful in approaching new information.

The study tested at 0.05 significant level through the Chi-square test and revealed that the information retrieval for NESEIC users using the manual (physical) system is 0.692 and for the electronic system is 0.060 (see Chapter 4, Table 4.6a and Table 4.6b). This means that all the variables are independent and have no relation in common. The study revealed that they have no relationship in common because if a user is searching in the manual (physical) library system, for example searching for a newspaper, he or she can retrieve the newspaper without having to apply any retrieval

knowledge of using a library card catalogue. In this case, the user can simply ask the librarian for the newspaper or go to the table where newspapers are displayed. The study also revealed that 76% (see Chapter 4, Table 4.10) of the research respondents do not utilise their knowledge to search for information from the library's electronic system because they are dependent on the librarians to search for information for them. These findings confirm the findings by Grobler and Chanetsa (2009) who revealed that this problem of dependency is caused by lack of information literacy skills of library users. The findings of this study also agree with what was discovered by Collan (2007) who states that some users with information problems are lazy in their information searching behaviour, though the laziness at times can be caused by challenges in information communication and technology skills.

### **5.3.1 Kuhlthau's 1991 information search process model**

In a study on information search process model, Kuhlthau (2004) discovered that users of libraries go through six stages when searching and retrieving the right information.

The data presented in Chapter 4 (Table 4.4a) revealed that NESEIC users visit NESEIC library because they have an information need or information problem that should/will be solved in NESEIC library. These findings confirm the study by Kuhlthau (1999) that noted that the first stage in the information searching process is initiation where the user recognises the need for information to complete a task. This stage is filled with feelings of apprehension and uncertainty.

During the second stage which is selection, Kuhlthau (1994) discovered that the user decides on the topic to be investigated and how to proceed with the information searching and retrieval. Uncertainty diminishes and is replaced with a sense of optimism. The data presented in Chapter 4 (see Figure 4.7) revealed that the majority of NESEIC users make use of library reference collections, 76% of NESEIC users make use of Earth Data Namibia database in the process of proceeding with their information searching and retrieval. Twenty three percentages of NESEIC users make use of WINISIS in searching for and deciding on the valuable information needed (see Table 4.10). Kuhlthau (2004) confirms that during this stage, actions may include making a preliminary search for information available, using a reference collection, skimming and scanning for an overview of alternative topics and talking to others about possibilities.

In the third stage of the information searching process which is exploration, Kuhlthau (2004) discovered that, information is gathered and new personal knowledge is created. Observation data presented in Chapter 4 (section 4.3.1.1) however, revealed that some NESEIC users at this stage get confused regarding the lack of information sources to solve their specific information need. Kuhlthau (2004) revealed that, this is the most difficult stage for an individual in the information search process because there are high feelings of confusion, uncertainty and doubt. Wilson (2007) and Godbold, (2006) confirm that at this stage, information encountered from different sources commonly seems inconsistent and incompatible which leads to an individual finding the situation very complicated, challenging, discouraging and threatening causing a sense of personal inadequacy as well as frustration with the search system.

This stage will at some point cause an individual to abandon the search (Kuhlthau, 1988).

In stage 4 of the information search process model, formulation, Kuhlthau (2004) discovered that the information seeker starts to evaluate the information that has been gathered. The data presented in Chapter 4 (see Figure 4.3) revealed that 85% of NESEIC users' needs were met through evaluation of information retrieved. Kuhlthau (2004) states that "focus formulation is the turning point of the information search process when feelings of uncertainty diminish and confidence increases" (p.48). The task is the information encountered aimed at forming a focus. Thoughts are geared toward identifying and choosing ideas in the information from which to form a focused perspective of the topic. Kuhlthau (1988) and Kuhlthau (2004) further revealed that the success of possible concentrations is predicted within the criteria of personal interest, assignment requirements, information available, and time allotted. Strategies for selecting a specific concentration within the general topic are reading over notes for themes and reflecting, and talking and writing about themes and ideas. If construction occurs during this stage, the topic becomes more personalised. Although a focus may be formed in a sudden moment of insight, it is more likely to emerge gradually as constructs become clearer. During this stage, a change in feelings is commonly noted, with increased confidence and a sense of clarity. Kuhlthau (2004) points out that "when an individual does not form a focus during the search process, they commonly experience difficulty throughout the remainder of the search and when they begin to write or present findings, a clear focus enables a person to move on to the next stage" (p.48).

Collection is the fifth stage in the information search process where a user is sure of his or her success in the search process. Kuhlthau (2004) discovered that “at this stage, interaction between the user and the information system functions most effectively and efficiently” (p. 49). Through observation data presented in Chapter 4 (section 4.3.1.1), the study revealed that NESEIC users in this stage start taking detailed notes with bibliographic citations for their future reference, for example students take bibliographic citations for their assignments and research projects.

Search closure is the sixth stage in the information search process. Kuhlthau (2004) discovered that this is the last stage in the information search process. This is the presentation of results. It presents two things, either disappointment or satisfaction. This means that if the search has gone successfully, there is satisfaction in the results but if the search failed or went wrong be it in the system or anywhere else, there will be disappointment in the presentation of results. The data presented in Chapter 4 (see Diagram 4.5) revealed that only 28% of NESEIC users reformulate their search techniques after failing in the first information search process. The search at this stage, can be ended for different reasons such as satisfaction with search results. According to the data presented in Chapter 4 (see Table 4.11), 23% of NESEIC users devote 30 minutes to their information search process, 22% devote more than one hour to complete the information search process, 19% devote 45 minutes, 15% devote 1 hour, 12% devote 20 minutes and 6% devote 10 minutes. Based on the data presented in Chapter 4, these differences indicate that NESEIC users have different information needs and as soon as the users retrieve the right information for their

information need or fail to find answers to their information problems, they end the search for information in NESEIC library systems. The Search duration depends on the complexity of the topic. Kuhlthau (2004) states that “assuming a deadline, many people cease collecting information, not because they have exhausted the available sources but because they need time to synthesise and prepare their final product before the due date” (p.50).

In conclusion, the research question: Do differences in knowledge levels of users at NESEIC library influence their ability to locate and retrieve the right information? was answered by establishing that knowledge levels of NESEIC users are important and vary when searching for information but do not necessarily influence their information retrieval from the library’s electronic and manual (physical) systems. This conclusion disagrees with the study of Palmquist and Kim (1998) who argue that users’ information searching and retrieval behaviour in the information resource centres depends on what stages of the information searching process the user is and not necessarily his or her knowledge. The data presented in Chapter 4, indicates that user knowledge is important in the searching and retrieval of the right information. This is confirmed by Grow’s (1996) cognitive model of learning that states that an individual searching for information should have prior knowledge of what will be relevant and the strategies useful in approaching new information.

Kuhlthau (2004) discovered six stages users of libraries go through in searching and retrieving the right information. The data presented in Chapter 4 reported that, NESEIC users go through various stages in searching and retrieving information such

as identifying of research problem, selection of information, retrieving information and evaluating information retrieved. The findings of the study reveal that even though NESEIC users go through various stages in searching and retrieving information, they are very dependent on the librarian in searching and retrieving information from the NESEIC physical and electronic systems. This dependency is caused by lack of information retrieval knowledge to use the library databases. Grobler and Chanetsa (2009) revealed that this problem of dependency is caused by a lack of information literacy skills.

#### **5.4 Library users' skills: information literacy skills to retrieve information**

The data presented in Chapter 4 (see Diagram 4.6) revealed that 44% of NESEIC users did not receive user education, the remaining 56% of the research respondents did not answer this question and all the NESEIC users who were interviewed on the same question responded that none of them had received user education in the NESEIC library, apart from getting assistance the librarians to search and retrieve the relevant information from the library's electronic and manual (physical) systems. This study agrees with Fleming (1990) who discovered that lack of information literacy skills leads to poor use of information.

Data from the interviews indicates (see chapter 4) indicate that, NESEIC users find it difficult to search for information in NESEIC library especially for EPLs because of the new technology, for example, they are not trained to use the database with EPL information (the Earth Data Namibia Database). Stacey (2004) and Toffler (2012)

discovered that computers are complex technology and for an individual to make use of them, they must be trained otherwise they will live a stressful life.

Nonaka (2006) discovered that what a person needs is “the right knowledge” (p.6). Some religious views confirm this discovery “a person needs moral wisdom to claim having the right knowledge” (Pollock, 2009, p.3). Therefore for library users to obtain this kind of knowledge to utilise for the purpose of searching and retrieving the right information, Grobler and Chanetsa (2009) state that, library users need assistance from the librarians with user education and information literacy skills.

In conclusion, the research question “What skills are required by users of NESEIC to actively locate and retrieve the right information?” was answered by establishing that NESEIC users require information literacy skills. Forty four percentage of NESEIC users revealed that they did not receive user education in NESEIC library, the remaining 56% of research respondents did not answer this question and all the NESEIC users who were interviewed on the same question responded that none of them had ever received user education in NESEIC library, apart from the librarians who assist them in searching for and retrieving the right information from the library electronic and manual (physical) systems. California Media and Library Educators Association (1994) discovered that “at many institutions, information literacy skills are taught within the library in a form of user education” (p.2) but this study revealed that NESEIC library does not offer user education. If a person is not literate, he or she will not have the ability to make good decisions and have critical thinking skills regarding when to access information and from which information source. Grobler

and Chanetsa (2009) discovered that library users need assistance from librarians with user education and information literacy skills in accessing library resources.

### **5.5 Challenges library users face when to accessing the right information**

The data presented in Chapter 4 (see Table 4.12) revealed that NESEIC users experienced various challenges in searching for and retrieving the right materials from NESEIC library. The study found out that 75% of research respondents faced various problems in NESEIC library, while the remaining 25% did not answer the question. This study agrees with the discovery by Dhammananda (2014) that “people do face different problems and challenges in life but problems can be solved” (p.6).

Research respondents were asked to briefly explain the problems they encounter when searching for, locating and accessing the right materials from the NESEIC library system. Seventy five percentages of NESEIC users faced problems such as, lack of library staff with the knowledge in geology and incorrect cataloguing and classifying of books. The data from the interviews revealed that NESEIC users faced problems with the Earth Data Namibia Database which was down most times and information for current EPLs was outdated. Agyen-Gyasi (2008) confirms this discovery by stating that, such nature of problems can be caused by inadequate library resources and inefficient services to library patrons.

In conclusion, the research question “What are the challenges facing library users to access the right information?” was answered that by establishing that, 75% of

research respondents that they faced various problems in NESEIC library, while the remaining 25% did not answer the question. Problems mentioned included lack of library staff with the knowledge of geology; books were either not catalogued or classified wrongly; books on the library shelves not shelved correctly, historic information in the Earth Data Namibia database was outdated. Similar studies by Anwar, Ansari and Abdullah (2004) studied the information seeking behaviour of Kuwaiti Journalists and found out that Journalists faced a problem in retrieving information from Kuwaiti library which should solve their information need. The problems found were lack of support from library staff and lack of training in information use skills.

### **5.6 Role of NESEIC library in enhancing users' knowledge**

The data presented in Chapter 4 (see Table 4.13) revealed that, 60% of NESEIC users suggested that their knowledge can be enhanced through the provision of electronic documents that could meet their information needs especially e-journals on geology, along with this, users suggested that NESEIC update its website to create awareness for users regarding potential resources which are available in the library or are newly acquired by NESEIC. This study agrees with what Toffler (2012) who found out that though computers, people can share data and electronic documents.

Data from the interviews revealed that NESEIC users' knowledge can be enhanced through complete and accurate answers to NESEIC users' information queries. The library should make user aids available in appropriate formats to help NESEIC users

identify information in the right collection either on the library manual or electronic systems relevant to the users' interests and needs.

Furthermore, the library should carry out surveys to assess the information needs of NESEIC users and acquire the right information to fulfil the needs not met by existing information. To support this view, (The American Library Associations, 2013) states that enhancing user knowledge aims at satisfying users' needs and improving the services offered by the library.

In conclusion, the research question "What can the NESEIC library do to enhance user knowledge?" was answered. 60% of the research respondents suggested that their knowledge can be enhanced through the provision of electronic documents that could meet their information needs especially e-journals on geology. Respondents suggested that NESEIC update its website to create awareness in users regarding potential resources which are available in the NESEIC library. Data from the interview revealed that NESEIC users' knowledge can be enhanced through complete and accurate answers to NESEIC users' information queries, along with this, the library should make user aids available in appropriate formats to help NESEIC users identify information in the right collection relevant to their interests and needs. Additionally, the library should conduct surveys to assess the information needs, of NESEIC users and acquire the right information to fulfil the needs not met by existing information. These findings are confirmed by The American Library Associations (2013) who that enhancing user knowledge aims to satisfy users' needs and improve the service offered by the library.

## **5.7 Summary**

This chapter discussed the findings of the study. The findings from the questionnaires, interviews and observation have shown that IR knowledge is important for the users of NESEIC library. The findings of the study revealed that, NESEIC users' search and retrieval of information in NESEIC library is affected by information retrieval knowledge and the stages of the information search process they find themselves in.

The aim of the study was to answer the main research question: To what extent does NESEIC users' knowledge allow them to effectively find and retrieve information in the NESEIC library? Currently NESEIC users' knowledge is limited because they are depended on librarians to search and retrieve information from the library's manual (physical) and electronic systems. The study revealed that this is caused by lack of user education and information literacy skills. Using the sub-research questions, all findings of the study as presented in Chapter 4 were discussed.

Based on the findings in Chapter 4 and the discussion in this chapter, the next chapter proposes a model for setting up user education programme in the NESEIC library.

## **CHAPTER 6: MODEL FOR SETTING UP A USER EDUCATION PROGRAMME IN NESEIC**

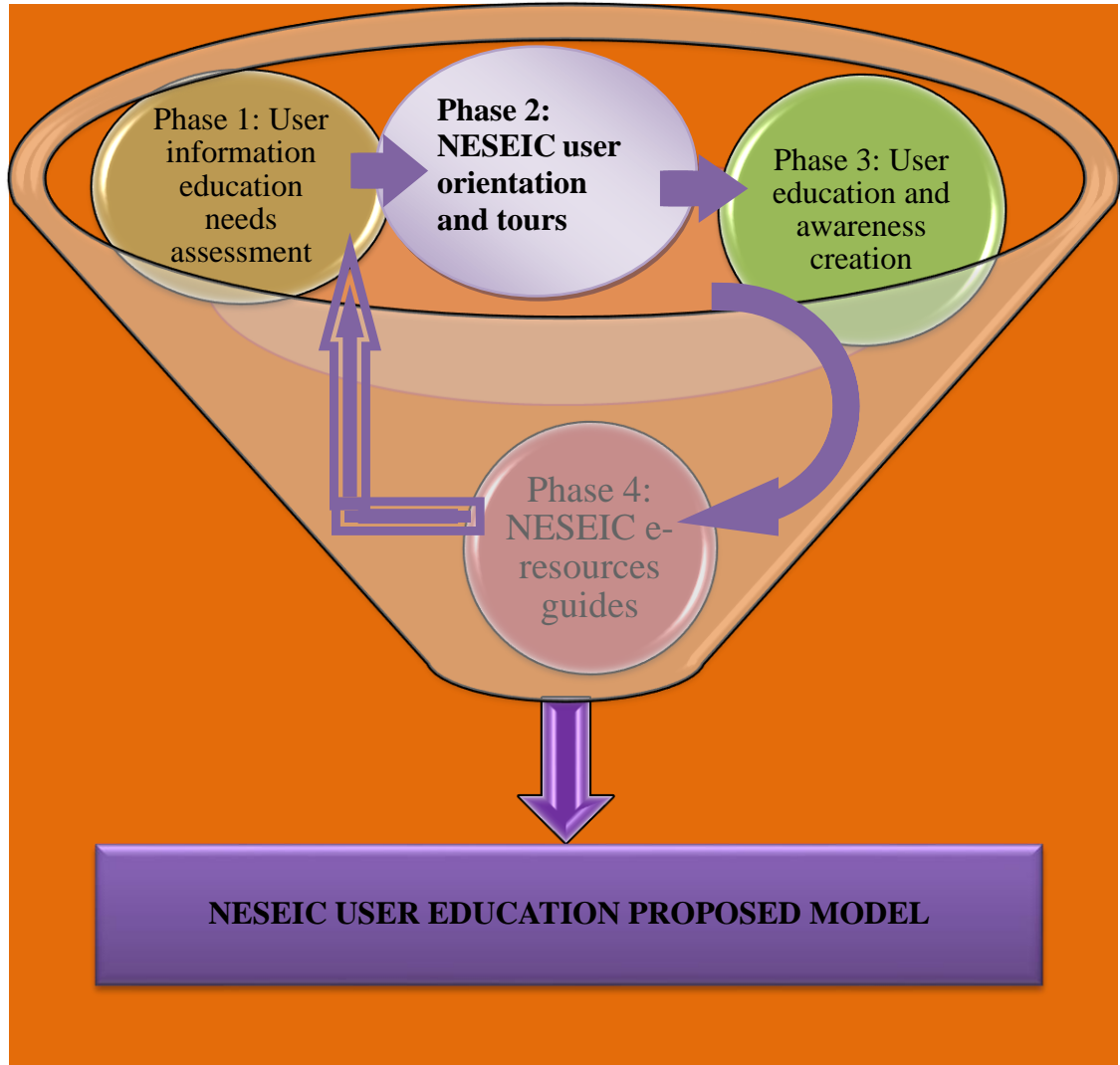
### **6.1 Introduction**

This chapter presents a proposed model for setting up a user education programme to support the information search processes in the NESEIC library. Melnik and Roberts (2002) define a model as a systematic description of a phenomenon that shares important characteristics for such a phenomenon. In this chapter, the findings of the study are put together to address the research questions of the study using Kuhlthau's 1991 model of the information search process (ISP) (Kuhlthau, 1996) which guided this study. This chapter starts with discussing the basis for the proposed model (6.2), goals and objectives for the proposed model (6.3), analysis of information gap factors (6.4), analysis of the driving and executing force factors (6.5), analysis of the triumphing factors (6.6), analysis of information search and retrieval for NESEIC users (6.7), and what differentiates this study's proposed model from Kuhlthau's model of Information Search Process (6.8).

### **6.2 Basis for the proposed model**

A proposed model for setting up a user education programme to support the information search processes in NESEIC should address the gap of poor information use and lack of user education programmes at the NESEIC library.

User education is important for the NESEIC library because through it, “library users are able to use the library services, resources and facilities to the fullest” (Grobler and Chanetsa, 2009, p.48). Fleming (1990) defines user education as various programmes of instruction, education and exploration provided by any library to users to support them to make more effective, efficient and independent use of information sources and services provided by the library. The proposed model for NESEIC user education consists of four phases: phase one is user information education needs assessment; phase two is NESEIC library orientation and tours, phase three is NESEIC user education and awareness creation, phase four is NESEIC e-resources guides (see figure 6.1).



**Figure 6.1 Proposed model for setting up a user education programme to support the information search processes in NESEIC library**

### **6.2.1 Phase 1: User information education needs assessment**

The study revealed that 44% of NESEIC users (see Chapter 4, Diagram 4.6) had not received user education in NESEIC, including also the 56% who did not answer the question. Therefore, there is a need for user education to be introduced in the

NESEIC library. A user education training programme will assist NESEIC users in various ways such as helping teach the users how to independently search and retrieve the desired information from NESEIC library and helping teach the users how to manipulate the library's physical and electronic systems.

The way forward is for the NESEIC librarians to assess the information needs of their users and come up with various user education trainings strategies to meet such information needs. This study is in agreement with Clarke (1999) who found that assessing the needs of users helps the resource centre in providing the right resources in meeting such needs.

### **6.2.2 Phase 2: NESEIC library orientation and tours**

The study revealed that the majority (54%) of NESEIC users have less knowledge of the NESEIC library collections and facilities and that the library users are not able to access the library services efficiently and effectively (See also Chapter 4, Table 4.5).

The way forward in setting up NESEIC user education program to support the information search process is for the NESEIC librarians to orientate NESEIC users and give them tours in the library to familiarise the users with the library collections, facilities and services. This study concurs with (Agyen-Gyasi, 2008) who stresses that:

“Introducing user education benefits the library users in the way that they will get to know the facilities and resources provided by the library and that library orientation provides basic understanding of

the library so that users can make efficient use of the library collection and services” (p.1.)

The responsibility will be for the NESEIC librarians to come up with a programme for the library orientation and library tour, that is, for when either can be conducted with permission from the Director of the Geological Survey of Namibia and the Permanent Secretary of the Ministry of Mines and Energy.

### **6.2.3 Phase 3: User education and awareness creation**

This study’s findings has shown that the majority of NESEIC users (74%) are not information literate regarding how to independently search for information in NESEIC library electronic system (see Chapter 4, Diagram 4.3) and 68% in the manual library system (see Chapter 4, Figure 4.6). This is why NESEIC users become dependent upon librarians in searching and retrieving the right information from NESEIC library systems. This study agrees with Kuhlthau (1996), Manning, Raghavan and Schütze (2009) who advise that for the library user to actively and successfully make use of the library services and resources, such user must have the ability to make use of the searching tools as a filter to find the required information as well as to limit the final set of results to include only the highest quality resources that will address the information need.

The way forward then would be for NESEIC librarians to introduce user education and awareness creation to support NESEIC users with the information search process in the library. This can be done through the following:

- Setting up steps on how NESEIC users can search for information in NESEIC library systems
- Providing information on how NESEIC users can retrieve the right information from the right information sources
- Educating NESEIC users on how to evaluate information retrieved
- If information cannot be retrieved in NESEIC library, librarians should always refer users to other libraries and practice inter-library loans with other libraries for sharing resources.

This study established that NESEIC users visit NESEIC library to satisfy their information needs for EPLs, mining claims, newspapers, accessing geological information, geosciences text books and scientific journals to complete assignments and research projects. These findings agree with Kuhlthau's first stage of the information search process which is characterised by the need for information (Kuhlthau, 2004). Kuhlthau's information search process model is supported by Eriksson-Backa (2003) who highlighted has shown that the need for information is caused by a gap in knowledge and lack of understanding. Kuhlthau (1993a) further says that this stage is filled with feelings of apprehension, uncertainty and thoughts revolve around thinking about the information problem and considering the appropriate action the user will take to solve the information problem.

This study revealed that the majority of NESEIC users (76%) in proceeding with their search for EPLs historic information and mining claims in the NESEIC library systems, struggle to use the Earth Data Namibia database (see Chapter 4, Figure 4.7) and WINISIS (23%) of NESEIC users which struggle in searching for books and journals as well as in deciding on the valuable information sources needed to solve their information problem (see Chapter 4, Table 4.10). This study concur well with Kuhlthau (1994) who discovered discovery that this is a difficult stage as actions may include making a preliminary search for information available and making use of reference collections which may not always be available or accessible.

The data from the questionnaire in this study has shown that after NESEIC users searched for information, they begin to retrieve information. Kuhlthau calls this stage exploration (Kuhlthau, 1993). (Kuhlthau, 2004) discovered that, information is gathered and new personal knowledge is created. Observation data presented in Chapter 4, section 4.3.1.1 however, revealed that most NESEIC users at this stage get confused regarding the lack of information sources to solve their specific information need especially when using the library card catalogue which most users (87%) find complicated and difficult to use to locate the suitable information (see Table 4.9). Kuhlthau (1999) revealed that, this is the most difficult stage for an individual in the information search process because there are high feelings of confusion, uncertainty and doubt. This study's findings agree with the findings from Wilson (2007) and Godbold (2006) who point out that at this stage, information encountered from different sources, commonly seems inconsistent and incompatible which leads to an individual to finding the situation complicated, challenging, discouraging,

threatening and causing a sense of personal inadequacy as well as frustration with the searching system. This situation will at some point cause an individual to abandon the search (Kuhlthau, 1988).

This study's findings revealed that after NESEIC users retrieve the information, they begin to evaluate whether the information retrieved is useful in meeting their information need or not (see Chapter 4, Diagram 4.5). Kuhlthau called this stage formulation (Kuhlthau, 1996). This stage concurs with Kuhlthau (2004) who found that the information seeker starts to evaluate the information that has been gathered. Additionally this study agrees with the California Media & Library Educators Association (1994) who state that the user evaluates information to establish the relevance and accuracy of information retrieved, to establish the authority and to recognise point of view and opinion versus factual knowledge, to reject inaccurate and misleading information as well as to create new knowledge in meeting the information problem. For example, this study's findings reveal that NESEIC users searching for information on EPLs, evaluate their information to verify whether they retrieved historic information that assures whether that specific minerals can be explored in a particular area or not.

Kuhlthau (1994) noted that "focus formulation is the turning point of the information search process when feelings of uncertainty diminish and confidence increases" (p.48). The task is the information encountered aimed to form a focus. Thoughts aim at identifying and choosing ideas in the information from which to form a focused perspective of the topic. Kuhlthau (2004) further revealed that the success of possible

concentrations is predicted within the criteria of personal interest, assignment requirements, information available, and time allotted. Strategies for selecting a specific concentration within the general topic are reading over notes for themes and reflecting, talking and writing about themes and ideas. If construction occurs, the topic becomes more personalised during this stage. Although a focus may be formed in a sudden moment of insight, it is more likely to emerge gradually as constructs become clearer. During this phase, a change in feelings is commonly noted, with increased confidence and a sense of clarity. Kuhlthau (1999) points out that “when an individual does not form a focus during the search process, they commonly experience difficulty throughout the remainder of the search and when they begin to write or present findings, a clear focus enables a person to move on to the next stage” (p.48).

This study’s findings indicate NESEIC librarians at some point, refer their users to other information centres for sharing resources, in the event that materials cannot be found in NESEIC library, however this only applies to monographs. In the search closure stage, Kuhlthau’s model of information search process never discovered what happened with the user who failed to retrieve the right information. The only mention in the occasion of a search failure was that, the user obviously faced disappointment when their information need was not met (Kuhlthau, 1996).

In contrast, the NESEIC user education proposed model refers the user to other information centres and uses inter-library loan where the user's information needs can be met. For example, one of the NESEIC users who was interviewed regarding what happens if their information need is not met or they fail to retrieve the relevant information mentioned that the librarian provided the user with EBSCO e-databases where the user could search for various articles to meet the information need. Other NESEIC users mentioned that, when a specific book title cannot be found in NESEIC library, referral is done through inter-library loan with the National Library and the University of Namibia which then leads to user's information need being met (see Chapter 4, section 4.3.1.1). In most cases this study revealed that NESEIC users face a problem with user education as they are not information literate concerning how to search independently for their own information using the Earth Data Namibia Database and WINISIS.

#### **6.2.4 Phase 4: NESEIC e-resources guides**

This study's findings show that NESEIC does not have much to offer when it comes to e-resources and librarians are not well trained on how to use e-resources. For example, the inadequate use of GeoRef database provided by EBSCO, library users are still relying on print journals and books which put them at a disadvantage at times when the journals and books are borrowed by other users (see Chapter 4, Table 4.12). This study's findings do not agree with Toffler (2012) who point out that information processing and communication technologies through computers have improved the lives of people and made life easy, this is because not everyone has the knowledge of technology and not all NESEIC users have access to computers and the majority of

NESEIC users still only access print information, for example print journals and books instead of e-Journals. Therefore, NESEIC librarians should be trained on how to use e-resources and then be able to set up online guides on how to use e-resources for their users.

#### **6.2.5 The focus of this study's proposed model and Kuhlthau model of information search process**

This study's proposed model focused on library user education to support NESEIC library users' information search process, while Kuhlthau's model focused more on the information searching process of students (educational background). Kuhlthau (1996) argued that people engage in an information search experience holistically, with an interplay of thoughts (cognitive), feelings and physical (actions). Furthermore, Kuhlthau (1996) developed six stages of the information search process namely; Task Initiation, Topic Selection, Prefocus Exploration, Focus formulation, Information Collection and Search Closure (Kuhlthau, 1993). This study's model comprise of four phases which are (Phase one: user information education needs assessment, phase two: NESEIC library orientation and tours, phase three: NESEIC user education and awareness creation and phase four: NESEIC e-resources guides). This study's proposed model for user education and awareness creation proposed that the users whose information needs cannot be met in NESEIC library should be referred to other information centres through inter-library loans for the purpose of sharing resources. On the other hand, Kuhlthau's model in the search closure stage

(Kuhlthau, 1994a) point out that there are only two things present in the search closure either disappointment or satisfaction and thus no referral is present in Kuhlthau's model.

### **6.3 Goals and objectives for the proposed model**

In proposing a NESEIC user education training programme and information search process model, it is important to first define user education. Fleming (1990) defines user education as various programmes of instruction, education and exploration provided by any library to users to enable them to make more effective, efficient and independent use of information sources and services provided by the library. Before a user education training programme and information search process model is implemented, the goal and objectives for the NESEIC user education training program and information search process model should be defined.

The broad goal for the NESEIC user education training programme and information search process model should include:

- To provide library instructional services that fulfil the needs of NESEIC users through information access, retrieval, evaluation and fostering information independence as well as critical thinking skills.

The objectives for the NESEIC user education training programme should include:

- To implement effective user education programmes in NESEIC which will focus on meeting the information training needs of the users,

- To develop strategies for teaching NESEIC users how to access the right information from the right information source, solving the specific information need,
- To develop and maintain a strong two-way communication programme between NESEIC librarians and NESEIC users,
- To improve access to print and electronic resources through creating information guides.

The way forward in setting up NESEIC user education is that, NESEIC librarians need to have consultations with the Director of the Geological Survey of Namibia and analyse the user information needs and information gaps factors (phase 1), the driving and executing force factors (phase 2) (Mancini, 2010), triumphing factors (phase 3), and information search and retrieval for NESEIC users (phase 4).

#### **6.4 Analysis of user information needs and information gaps factors**

A successful NESEIC user education model to support information search process in NESEIC library, as proposed should analyse the user information needs and information gaps in NESEIC library. The presentation of data in Chapter 4 showed that NESEIC users faced problems in independently accessing the right information from the right information source that could solve specific information needs because of lack of information literacy skills.

The analysis should identify user information needs and information gaps; the missing information literacy skills that limit NESEIC users' abilities to access the relevant information to meet specific information needs as well as gaps that limit NESEIC users' in evaluating and effectively using the needed information.

The analysis should also focus on the formats with regards to how the NESEIC user education training programme should be conducted, either through making appointments for small group sessions, one-to-one sessions, written guides, audio-visual presentations or computer-assisted instructions. Grobler and Chanetsa (2009) highlight that user education can occur in various forms and what is important is that, users of libraries should be well taught on how to access the right information, using the right finding tools, evaluating the information retrieved and using the retrieved information to solve a specific information need.

### **6.5 Analysis of the driving and executing force factors**

The library exists to provide and support the reading and research needs of its clients through the provision of better services to make sure that information sources, services and resources are utilised for the best of its clients' benefits (Suleiman, 2012) and (Clarke, 1999). This is why a NESEIC user education training programme is important and crucial for the NESEIC users.

The library needs to keep abreast of new technology, such as through purchasing of new computers and laptops. Through trained library staff, the technology will help in managing the searching and retrieval knowledge of NESEIC users through teaching, and sharing of e-resources. One of the interviewees in this study, third year Geology student from the University of Namibia, when asked on information search and literacy, pointed out that he utilised the computers on campus using the internet to search for journals' publication information and then retrieve the Journals physically from the NESEIC library. In support of this findings, the California Media and Library Educators Association (1994) state that when a user is information literate, such a user will be able to formulate questions based on information needs, develop successful search strategies, access print and technology-based sources of information, become a competent reader, recognise different points of view and opinions versus factual knowledge, organise information for practical application and integrate new information into an existing body of knowledge.

### **6.6 Analysis of the triumphing factors**

There is need for putting triumphing factors in place to ensure successful development of a user education training program and information search process in NESEIC library. These factors include setting up NESEIC information technology infrastructure in order to align information technology services with the needs of NESEIC users as far as the user education programme is concerned. Toffler (1980) highlights that where there is technology, there is growth.

The successful implementation of NESEIC user education also depends also on the available financial resources, a well-planned budget and human input, such as having librarians with geo-information skills to carry out the work.

### **6.7 Analysis of information search and retrieval of the NESEIC users**

The analysis of information search and retrieval of NESEIC users enables the librarians to learn the type of information resources to deliver to NESEIC users that will best meet users' needs. Maybury and Kowalski (2000) suggested that library materials should be catalogued in order to make it easier for the library user to retrieve the right information from the library collection.

The analysis of information search and retrieval will also help NESEIC librarians to know the NESEIC users who cannot search for their own information independently. This will enable NESEIC librarians to know which area of user education to focus on in giving instructional services to NESEIC users.

## **6.8 Conclusion**

In this chapter, a NESEIC user education model to support the information search process in NESEIC library was proposed. User education refers to various programmes of instruction, education and exploration provided by any library to users to enable them to make more effective, efficient and independent use of information sources and services provided by the library. The information search process ensures that the user is information literate in order to independently access the specific information that could solve their information need. The goal and objectives of the NESEIC user education programme were also formulated. The NESEIC user education model to support the information search process model was proposed, presented in four phases namely phase 1: user information education needs assessment, phase 2: NESEIC library orientation and tours, phase 3: user education and awareness creation, and phase 4: NESEIC e-resources guides. Finally, Kuhlthau's model of information search process was also discussed.

The next chapter provides a summary, conclusions and recommendations.

## **CHAPTER 7: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **7.1 Introduction**

This chapter summarises and concludes the research and made recommendations. The chapter is in three parts: the summary (7.2), conclusions (7.3) and recommendations (7.4). The summary is arranged according to the main thematic areas, within which data was presented. The conclusion is organised according to the study's research questions. The recommendations include a model for setting up a user education training programme to support the information search processes in NESEIC as explained in detail in Chapter 6 and a number of related recommendations as well as areas for further research.

### **7.2 Summary of the findings**

This section is a summary of the findings of the study on the user information retrieval knowledge at the National Earth Science and Energy Information Centre. In this section, a brief summary of the research will be presented. This study was guided by Kuhlthau's 1991 model of the information search processes (ISP) (Kuhlthau, 1996) which revealed that people engage in an information search experience holistically, with an interplay of thoughts (cognitive), feelings and physical (actions), and discovered six stages of the information search processes (see Chapter 2 and Chapter 6, section 6.2). This study proposed a model on user education training programme to support the information search process in NESEIC and developed four phases namely phase 1: user information education needs assessment, phase 2:

NESEIC library orientation and tours, phase 3: user education and awareness creation, and phase 4: NESEIC e-resources guides. A NESEIC user education model was proposed in order to assist NESEIC users in their information search process and literacy skills to enable NESEIC users to make more effective, efficient, independent use of information sources and services provided by the library.

The data was collected from a sample of 100 NESEIC users who represented the population of 400 NESEIC users. The study gave answers to the research questions and provided information on the information retrieval knowledge of NESEIC users which is important for improving information literacy skills of NESEIC users. Furthermore, the study proposed a model for a NESEIC user education training programme to support the information search process in the NESEIC library.

The main thematic areas, within which the summary is presented include:

- Information retrieval (IR) knowledge levels of NESEIC users
- Knowledge levels of NESEIC users and their influence on IR
- Library users' skills: information literacy skills to retrieve information
- Challenges library users face to access the right information
- Role of NESEIC library in enhancing user knowledge
- Proposed model for setting up a NESEIC user education training programme

### **7.2.1 Information retrieval (IR) knowledge levels of NESEIC user**

The findings from the questionnaire, interviews and observations have indicated that IR knowledge is important for the users of NESEIC and the knowledge level of NESEIC users vary when they search and retrieve information from NESEIC library systems (see Chapter 4, Table 4.5, Table 4.6a, Table 4.6b, section 4.3.1.1 and Chapter 5, section 5.2). This agrees with the findings of (Nonaka, 2006 and Manhaj, 2004) who point that knowledge constitutes the basis of understanding, the moral wisdom of carrying out the task correctly and at the right time, bearing in mind the virtue of the task.

The majority of NESEIC users have less knowledge about using the library card catalogue, WINISIS and Earth Data Namibia Database, while few a NESEIC users know how to go straight to the library shelves to get books which may not be the best option as library shelves can be relocated (see Chapter 4, Table 4.9, Table 4.10 and Figure 4.7). Kuhlthau (1996), Manning, Raghavan and Schütze (2009) argue that for the user to actively and successfully make use of the library, such a user must have the ability to make use of the searching tools as a filter to find the required information as well as to limit the final set of results to include only the highest quality resources that will address their information need, a viewpoint this study agrees with.

### **7.2.2 Knowledge levels of NESEIC users and their influence on IR**

Data presented and analysed in Chapter 4 (see 4.6a and 4.6b), discussed and interpreted in Chapter 5 (see section 5.3 ) revealed that knowledge levels of NESEIC users vary when searching for information but does not influence their information retrieval from the library's system and the library's manual (physical) systems. This is in contrast with the study of Palmquist and Kim (1998) who found that the users' information searching and retrieval behaviour in information resource centres depends on what stages of the information searching process the user is and not necessarily his or her knowledge. This study's findings prove that NESEIC users' knowledge is important in the search and retrieval of the right information from NESEIC library systems, (see Chapter 4, Table 4.5, Table 4.6a and 4.6b). Grow (1996) concurs with this assessment by pointing out that when a user is searching for information, such user should have prior knowledge of what will be relevant and the strategies useful in approaching new information.

Moreover, this study found that NESEIC users who visit NESEIC for the purpose of reading newspapers retrieve the newspapers without having to apply any retrieval knowledge of using a library card catalogue or library databases, the user can simply ask the librarian for the newspaper or go to the table where newspapers are displayed (see Chapter 4, Table 4.4a and Chapter 5, section 5.3). The study also revealed that the majority of NESEIC users do not utilise their information searching knowledge to search for information from the library's electronic system because they are dependent on the librarians to search for information for them (see Chapter 4, section

4.3.1.1). These findings agree with the findings by Grobler and Chanetsa (2009) who revealed that this problem of dependency is caused by lack of information literacy skills of library users.

### **7.2.3 Library users' skills: information literacy skills to retrieve information**

This study's findings show that the majority of NESEIC users had not received user education. Without the benefit of any user education, librarians had to assist the majority of NESEIC users in searching for and retrieving the right information from the NESEIC library's electronic and manual (physical) systems (see Chapter 4, Diagram 4.6). This study agrees with Fleming (1990) who revealed that lack of information literacy skills leads to poor use of information. For example, data from the interview results indicate that, NESEIC users find it difficult to search for information in the NESEIC library especially for EPLs because they are not trained to use the computers with the Earth Data Namibia Database which NESEIC users are not trained to use (see Chapter 4, Table 4.12 and Table 4.13). This is in agreement with (Stacey and Stacey, 2004) who argue that computers are complex technology and for an individual to make use of them, they must be trained otherwise they will live a stressful life. The California Media and Library Educators Association (1994) revealed that "at many institutions, information literacy skills are taught within the library in a form of user education" (p.2) but this study found that the NESEIC library does not offer user education. Additionally, Nonaka (2006) also concur that what a person need is "the right knowledge" (p.6).

#### **7.2.4 Challenges library users face to access the right information**

The study's findings shows that NESEIC users experience various challenges in searching and retrieving the right information from the NESEIC library (see Chapter 4, Table 4.12). NESEIC users faced problems such as; lack of library staff with the knowledge of geological topics and incorrect cataloguing and classifying of books (see Chapter 4, Table 4.12).

The data from the interviews revealed that NESEIC users faced problems with the Earth Data Namibia Database which was often down and the out-dated information for current EPLs (see Chapter 4, Table 4.12). This study agrees with Agyen-Gyasi (2008) who confirms that, such nature of problems can be caused by inadequate library resources and inefficient services to library patrons.

#### **7.2.5 Role of the NESEIC library in enhancing user knowledge**

This study's findings revealed that NESEIC users suggested that their knowledge can be enhanced through the provision of electronic documents that would meet their information needs especially e-journals on geology. Furthermore, users suggested that the NESEIC update its website to inform NESEIC users on potential resources which are available in NESEIC library or newly acquired by the library. Users said their knowledge would also be enhanced through user education, with the library teaching NESEIC users how to use databases (see Chapter 4, Table 4.13). This concur with

(Toffler, 2012) who states that the use of computers, people share data and electronic documents.

Furthermore, data from the interviews shows that NESEIC users' knowledge can be enhanced through complete and accurate answers to NESEIC users' information queries; the library should make user aids available in appropriate formats to help NESEIC users identify information in the right collection relevant to their interests and needs, along with this, the library should conduct surveys to assess the information needs of NESEIC users and acquire the right information to fulfil those needs not met by existing information (see Chapter 4). This study is in agreement with the American Library Associations (2013) who states that enhancing user knowledge aims to satisfy users' needs and improve the services offered by the library.

### **7.2.6 Proposed model for setting up a NESEIC user education training programme**

The proposed model for setting up a user education programme to support the information search processes in NESEIC should address the gap of poor information use and lack of user education programmes in the NESEIC library. Through a NESEIC user education training programme, as proposed by this study, four phases would be considered: phase 1: user information education needs assessment; phase 2: NESEIC library orientation and tours; phase 3: user education and awareness creation, and phase 4: NESEIC e-resources guides (see Chapter 6, Figure 6.1). This study's findings show that NESEIC user education is very important because every NESEIC user searching for information needs to be literate regarding how to search for the right information from the right sources of information to solve the information problem (see Chapter 4, Diagram 4.6 and Chapter 6, Figure 6.1).

This study's model refers the users to other information centres through inter-library loan where the user's information needs can be best met if not satisfied in the NESEIC library. For example, one of the NESEIC users who was interviewed on what happen if the right information need is not met or they fail to retrieve the right information, mentioned that the librarian provided the user with EBSCO e-databases where the user search for various articles which helped to solve the information need (see Chapter 6, section 6.2.4 and section 6.2.5). A majority of NESEIC users mentioned that, when a specific book title cannot be found in the NESEIC library, referral is done through inter-library loan with the National library and the University of Namibia. This leads to NESEIC user's information needs being met in most cases

though this study revealed that NESEIC users are facing a problem with lack of user education.

In proposing a NESEIC user education training programme model to support the information search process, the goals and objectives of the NESEIC user education training programme to support the information search process model were defined (see Chapter 6, section 6.3)

### **7.3 Conclusion**

This study investigated the information retrieval knowledge of the users of National Earth Science and Energy Information Centre. The purpose of the study was to establish the gaps in the information retrieval knowledge of NESEIC users and the information skills NESEIC users require to search and locate the right information from the NESEIC library system. The study utilised a qualitative and quantitative research approaches. Data was collected through interviews, observation and questionnaires from the NESEIC librarians and NESEIC users. A sample of 100 NESEIC users responded to the questionnaire. Thirteen NESEIC users were observed. Ten NESEIC users and two NESEIC librarians were interviewed. Descriptive Statistical Analysis was used to analyse quantitative data from the questionnaires, Chi-square tests were used to explore relations between variables and SPSS was used as a programme for data entry. Moreover, cross check was ensured through assigned codes for all questionnaires in the SPSS programme. Content analysis was used to analyse qualitative data from the interviews. The ethics of this study honoured voluntary participation, confidentiality and informed consent.

This study has achieved its purpose of studying the information retrieval knowledge of NESEIC users. The study has provided understanding on what cause poor information use in the NESEIC library. The study has also revealed that lack of information literacy skills is the major problem limiting NESEIC users to independently searching for, accessing and making use of the resources in the NESEIC library.

A user education training programme in NESEIC was proposed. Literature reviewed in Chapter 2 showed that user education training programme is important because, it helps to instruct and educate library users to enable them to make more effective, efficient and independent use of information sources and services provided by the library. Besides this, the study also revealed that for a user education training programme to be established in NESEIC, there are financial implications to consider, such as the acquisition of new computers and librarians with geo-science knowledge.

NESEIC users' knowledge can be enhanced through complete and accurate answers to NESEIC users' information queries, through the provision of electronic documents that could meet their information needs especially e-journals on geology, the updating of the NESEIC website to make NESEIC users aware of potential resources which are available in NESEIC library. The library should make user aids available in appropriate formats to help NESEIC users identify information in their right collection relevant to their interests and needs. Furthermore, the library should conduct surveys to assess the information needs of NESEIC users and acquire the correct information to fulfil the needs not met by existing information.

NESEIC users should be are the focal point for the NESEIC library's existences. In order for the NESEIC library to continue existing, it needs to meet its users' information needs.

## **7.4 Recommendations**

The following are the specific recommendations:

### **7.4.1 Information search knowledge**

Firstly, the study's findings show that NESEIC users' information searching knowledge is limited when searching for and retrieving the right information from the NESEIC library systems (see Chapter 4, Table 4.5, Table 4.6a, Table 4.6b and Chapter 5, section 5.2.1), therefore,

- NESEIC librarians should create information research steps or guides on how to use the library databases (WINISIS and Earth Data Namibia Database) in searching for information, and type and display them in the library.

The above recommendation agrees with Manning, Raghavan and Schütze (2009) who state that for the library user to actively and successfully make use of the library, such user must have the ability to make use of the searching tools as a filter to find the required information as well as to limit the final set of results to include only the highest quality resources that will address the information need.

### **7.4.2 Training policy**

Secondly, the study found that NESEIC is currently facing a problem with poor information use because NESEIC librarians lack knowledge on geological issues to provide the right service to NESEIC users (see Chapter 4, Table 4.12 and Chapter 5, section 5.5), therefore,

- NESEIC should come up with a training policy outlining the NESEIC Librarians to be sent for specialised training through seminars and workshops on geological issues to improve their subject knowledge and enable them to provide better information services which meet their clients' needs.

The above recommendation is supported by Okiki and Omotosho (2012) who stress that trained personnel help in providing the relevant resources and services to their patrons and this decreases the gap in information use.

#### **7.4.3 Information literacy skills and proposal model**

Thirdly, the study's findings show that NESEIC users lack information literacy skills (see Chapter 4, section 4.13) especially in using library databases (example, Earth Data Namibia Database and WINISIS) therefore,

- The study recommends the proposed model for setting up a user education training programme to support the information search process in the NESEIC library to be put into practice by NESEIC librarians through the Director of the Geological Survey of Namibia and the Minister of Mines and Energy (see Chapter 6, Figure 6.1).

The above recommendation is in agreement with Fleming (1990) who stressed that user education enable users to make more effective, efficient use of information sources and instructional services that fulfil the needs of the users. User education will ensure NESEIC users benefit in information search, logic information access, retrieval, evaluation and fostering information independence as well as critical thinking skills.

#### 7.4.4 Challenges

Fourth, the study revealed that, the majority of NESEIC users visit the NESEIC library to acquire historic information for their EPLs for the purpose of exploration and mining but according to the findings of this study, the EPLs' historic information is out-dated and books are wrongly catalogued and shelved (see Chapter 4, Table 4.12), therefore,

- Librarians should take steps to make sure, NESEIC users are provided with the right information and not out-dated information.
- Librarians through the Director of Geological Survey should make sure that EPLs' historic information is regularly reviewed by getting appropriate experts to up-date information in the Earth Data Namibia Database.
- Librarians through the Director of Geological Survey should get all the stakeholders involved in EPLs to keep maintaining and updating the Earth Data Namibia Database with EPLs information at least every second month.
- NESEIC library should outline a policy on how the librarians should catalogue library books in the right way, using the library rules of cataloguing, and they should shelve library books in the place where they are supposed to be shelved.

These recommendations agree with Agyen-Gyasi (2008) who stresses that, such problems can be met only when people work together as a team.

#### **7.4.5 NESEIC service and enhancing user knowledge**

Fifth, the study found that the majority of NESEIC users, are unable to utilise the NESEIC library to its fullest capacity to meet their information needs because of lack of good service as far as searching and accessing the correct information in the library is concerned, therefore,

- NESEIC librarians should provide electronic documents that can meet user's information needs especially e-journals on geology, the NESEIC website should be updated to make NESEIC users aware of the potential resources which are available or newly acquired by NESEIC library.
- NESEIC librarians should give complete and accurate answers to NESEIC users' information queries, the library should make user aids available in appropriate formats to help NESEIC users identify information in their right collection relevant to their interests and needs. Furthermore, the library should conduct surveys to assess the information needs of NESEIC users and acquire the right information to fulfil the needs not met by existing information (see also Chapter 4, Table 4.13 and Chapter 5, section 5.6)
- NESEIC should cooperate with the library of the University of Namibia and the library of the Polytechnic of Namibia to access e-resources such as e-journals on the subject of geology.

These recommendations are in agreement with the American Library Associations (2013) who state that enhancing user knowledge aims at satisfying users' needs and improving the services offered by the library.

### **7.5 Areas for further research**

This study identified the following areas for further research:

- Information literacy skills in NESEIC. This is because, this study revealed that NESEIC users are challenged by lack of information literacy skills. This topic could be a good one for further research in exploring the information literacy of NESEIC users and how to improve it.
- This study concentrated on the knowledge of NESEIC users in searching for, locating and retrieving the right information from the library manual and electronic system. Further research could look into “NESEIC users and e-resources”. This is because the majority of NESEIC users suggested that e-resources could help to create awareness and understanding among NESEIC users regarding sharing electronic resources.

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**APPENDICES A-J**

## **APPENDIX A: PERMISSION LETTER**



**UNIVERSITY  
OF NAMIBIA**

Education, Service, Development

**Faculty of Humanities and Social Sciences  
Department of Information and  
Communication studies**

**Date: 24 June 2011**

**To: Mr. Joseph Iita  
The Permanent Secretary  
Ministry of Mines and Energy**

**Through: Dr. Gabi Schneider  
The Director of Geological Survey of Namibia  
Ministry of Mines and Energy**

**The Librarian of NESEIC  
Ministry of Mines and Energy**

**Windhoek**

**RE: REQUEST TO CARRY OUT USER INFORMATION RETRIEVAL  
KNOWLEDGE RESEARCH AT THE NATIONAL EARTH SCIENCE AND  
ENERGY INFORMATION CENTRE, MINISTRY OF MINES AND ENERGY**

I am a final year Masters Degree student at the University of Namibia, Faculty of Humanities and Social Science, Department of Information and Communication currently working on my Thesis. My research topic is the “User information retrieval

knowledge of the National Earth Science and Energy Information Centre (NESEIC), Ministry of Mines and Energy.”

One of the aims of this study is to establish whether the current information retrieval knowledge of users of the National Earth Science and Energy Information Centre enable them to search for, locate and retrieve information efficiently in the library system. The main purpose of this study is to establish what skills and knowledge, NESEIC users require in searching for and locating the right materials from the library system. The study also seeks to come up with recommendations to inform on policy on the information retrieval knowledge and skills needed by NESEIC users to find and retrieve the right information.

I am hereby asking for permission to study their information retrieval knowledge when engaging with the library system. The study entails interviewing library staff, handing out questionnaires to users, observing them as they interact with the library system, be it manual or electronic. The findings of the study will be made available to your institution on completion of the study.

Yours Faithfully,

HP Amwenyo  
Tel. 284 8149  
Email: [hilya.amwenyo@hotmail.com](mailto:hilya.amwenyo@hotmail.com)

## **APPENDIX B: COVER LETTER FOR THE QUESTIONNAIRE**

Faculty of Humanity & Social Sciences

Department of Info & Communication

University of Namibia

Windhoek

NESEIC Users

Ministry of Mines and Energy

Windhoek

Dear NESEIC users

I am studying towards the Master Degree in Information Science, final year of study within the Department of Information and Communication Studies, Faculty of Humanities and Social Science, University of Namibia.

Your assistance by filling in the attached questionnaire will be highly appreciated.

All information you will provide will be treated with utmost confidentiality and will be utilised only for the purpose of this research.

Thank you.

Yours faithfully,

Hilya Panduleni Amwenyo

**APPENDIX C: QUESTIONNAIRE FOR NESEIC USERS****Instructions:**

- Do not write your name.
- Please indicate with a tick in the appropriate box.

**Part A: Demographic information****1. Gender**1.1  Male1.2  Female**2. Birth year:19\_\_\_\_\_****3. Education:  
(latest grade)**3.1  Secondary school3.2  Vocational school3.3  Polytechnic/ Technikon3.4  University/ College

**4. Main occupation:  
(at the moment)**

- 4.1  Farming
- 4.2  Mining, factory or construction work
- 4.3  Office or service work
- 4.4  Studies or school attendance
- 4.5  Retired
- 4.6  Unemployed
- 4.7  Housewife

**Part: B Information Retrieval Knowledge**

**5. How often do you visit the library?**

- 5.1  Once a week
- 5.2  Everyday
- 5.3  Once a month
- 5.3  Twice a month
- 5.3  If none of the above, please specify \_\_\_\_\_

**6. (a) What is your intention when visiting the library?**

- 6.1  To read scientific journals
- 6.2  To find text books on Geosciences
- 6.3  To get information information on mining claims and EPL's  
(Exclusive Prospecting Licences)
- 6.4  To research publications of certain author(s)
- 6.5  To access electronic information
- 6.6  To make use of the library's customer services  
(copying, binding, scanning and printing)
- 6.7  To read newspapers
- 6.8  To purchase publications including maps and data  
of the Geological Survey of Namibia

**1. (b) Are you knowledgeable in searching for, locating and retrieving the right information from NESEIC manual and electronic system?**

- 1.1 Knowledgeable
- 1.2 Not knowledgeable
- 1.3 Less knowledgeable
- 1.4 Do not know

**During your visit at the library, did you achieve the following?****7. (a) Retrieved the right information from library manual system?**

- 7.1  Yes
- 7.2  No
- 7.3  Not sure

**7. (b) Retrieved the right information from library electronic system?**

7.1  Yes

7.2  No

7.3  Not sure

**8. Solved your information need?**

8.1  Yes

8.2  No

8.3  Not sure

**9. How can you rank the service?**

9.1  Excellent                      5

9.2  Very good                        4

9.3  Good                                 3

9.4  Very bad                            2

9.5  Bad                                     1

9.6  Do not know

**10. Rank the relevancy of information you received from the search**

Very relevant  5    relevant  4    irrelevant  3    Do not know  2

**11. Explain how you search for materials in NESEIC manual system (e.g. library shelves)**

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**12. Explain how you search for materials in NESEIC electronic library system**

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**13. Do you make use of the library card catalogue?**

13.1  Yes

13.2  No

**14. Do you make use Earth Data Namibia to search for information?**

14.1  Yes

14.2  No

**15. Do you make use of WINISIS to search for library materials/ information?**

15.1  Yes

15.2  No

**16. What search techniques (e.g. Boolean operators) do you make use of, to search for materials in NESEIC successfully?**

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**16. a) Do you often get what you are looking for using the first term opted for and**

**how many times do you formulate your search strategy?**

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**17. Approximately how many Minutes or hours do you spend most of the time in searching for, locating and retrieving materials in NESEIC library system?**

- 17.1  10 Minutes
- 17.2  20 minutes
- 17.3  30 Minutes
- 17.4  45 Minutes
- 17.5  1 hour
- 17.6  more than 1 hour

**Part C: User Education and Information literacy skills**

**18. How often do you receive user information literacy skills training in NESEIC or any other user education teaching you how to search for and locate materials in the Library?**

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**Part D: Challenges facing NESEIC users in searching for, locating and accessing the right material(s) in NESEIC system**

**19. Briefly explain the problems you encounter when searching for, locating, accessing the right material(s) in NESEIC library system**

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**Part E: Suggestion on enhancing NESEIC service**

**20. Any suggestion(s) to improve NESEIC services?**

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**21. Would you recommend the library and its services to other customers  
With similar needs?**

22.1  Yes

22.2  No

**Thank you for your time you took in completing this questionnaire.**

## **APPENDIX D: DATA GATHERING PROTOCOL**

### **Instructions to the researcher**

This protocol will be strictly followed as written. Bolded text inside square brackets indicates instructions to the interviewer and cannot be read out loud to the interviewee.

### **Researcher introduction**

My name is Hilya Panduleni Amwenyo. I am conducting research as part of my Masters Degree study on the “Unformation retrieval knowledge of users using the National Earth Science and Energy Information Centre (NESEIC) databases”. I am particularly interested in establishing the extent of NESEIC users’ current knowledge if it allows them to effectively search for, locate and retrieve information in NESEIC library.

### **Consent**

Although I have been authorised to carry out research in NESEIC, I hereby seek your consent to be interviewed, and request you to show your consent by signing a consent form. [**Hand form for signing**]

Are there any questions that I can answer for you at this moment about my study before I continue?

[**Wait for respondent to reply. If there are no questions, continue. If there are questions, address them**]

I will be going through various questions with you. I would like you to be free and answer me as fully as you can, beyond yes and no answer. Be rest assured all the information you will provide will only be utilised for the purpose of this study.

I will be taking notes as you speak but I would like to use a tape recorder to record our conversation. This will help me when I am analysing my data. Do you mind if I use a video camera for our conversation?

**[Wait for the respondent to reply. If respondent replies that they do not mind being video recorded, move on, and if the respondent ask question why video recording, explain that the recording is purely voluntarily and that information recorded will be kept confidential except to serve the purpose of this study which is data analysis. If the respondent is feeling uncomfortable to be recorded, then do the interview without any recording].**

### **The Interview**

I would like to start asking you questions. I am just going to switch on the tape recorder upon your permission.

**[Switch on tape recorder and briefly test it to make sure that it is recording.**

**Skip questions not relevant to the person being interviewed].**

## APPENDIX E: INFORMED CONSENT FORM

**Title of the study:** Information Retrieval Knowledge of Users using the National Earth Science and Energy Information Centre Databases, Ministry of Mines and Energy

**Researcher:** Hilya Panduleni Amwenyo  
 Department of Information and Communication Studies  
 University of Namibia  
 Tel.: 061 284 8149  
 Email: [hilya.amwenyo@hotmail.com](mailto:hilya.amwenyo@hotmail.com)

### Information

This research aims to establish whether the current information retrieval knowledge of users of the National Earth Science and Energy Information Centre help them to search for, locate and retrieve information efficiently in the library system. As researchers, students, or any person making use of NESEIC library system, your input to this study is important. All your responses are confidential and your privacy will be protected. The interview should take about 30 minutes.

Your participation in this study will be highly appreciated. You will not be forced to participate because participation is on voluntary basis.

This study will not only benefit the researcher but it will benefit the National Earth Science and Energy Information Centre (NESEIC). The librarian of NESEIC will be

assisted by this study on how to address the needs of the patrons of NESEIC and how to utilise the library system to its fullest. This study will also boost the reputation of the Ministry of Mines and Energy in the research world.

For more information, questions or if you have any dissatisfaction with this study. You may contact my supervisor, Prof K. Mchombu, in the Department of Information and Communication Studies, University of Namibia, tel. (061) 2063649.

*If you voluntarily agree to participate in this study please indicate your consent by signing this form.*

**Name:**




**Signature:**

**Date:**

## APPENDIX F: INTERVIEW GUIDE FOR NESEIC USERS

**Instructions: Everything in bold is for the attention of the interviewer and not to be read out to the interviewee.**

### Issues to be investigated

-  **NESEIC User Information retrieval knowledge**
-  **Information literacy skills and user education**
-  **Challenges in information retrieval knowledge facing NESEIC users**

Education (latest grade)	
Main occupation (at the moment)	
Institution	

### 1. NESEIC User Information retrieval knowledge

1.1 Could you please briefly explain different search strategies you engage in to retrieve the right materials?

1.2 What is your understanding of the term search strategies?

1.3 Do you know about Boolean operators? What are they and briefly explain how they work and how do you find information using Boolean operators?

1.4 On average how relevant is what you retrieve?

1.5 Do you also make use of the library shelve guide to search for information?

How effective is it? Briefly explain how you locate the materials using shelve guide?

1.6 For how long to you spend searching for information?

1.7 **Last question:** what do you do when you fail in your search?

## **2. Information literacy skills and user education**

2.1 How often do you receive information literacy skills?

2.2 What was the duration of every session you attended?

2.3 How satisfied are you with the user education provided by NESEIC staff?





## **3. Challenges in information retrieval knowledge facing NESEIC users**

3.1 Do you perhaps have number of challenges you face in searching for, locating and accessing the right information?

## APPENDIX G: INTERVIEW GUIDE FOR NESEIC LIBRARIANS

**Instructions: Everything in bold is for the attention of the interviewer and not to be read out to the interviewee.**

### Issues to be investigated

-  **NESEIC User Information retrieval knowledge**
-  **NESEIC databases**
-  **Information literacy skills and user education**
-  **Challenges in information retrieval knowledge facing NESEIC users**

Main occupation (at the moment)	
Number of years in current position	
Institution	

### 1. NESEIC User Information retrieval knowledge

- 1.1 Could you please briefly explain how information retrieval works in your library system? [**establish how NESEIC librarians make their information available to their users and how they prepare them to effectively access and locate them in the library system**]

- 1.2 What is your understanding of the term user information retrieval knowledge?
- 1.3 In overall, how satisfied are your users with the service provided by NESEIC?
- 1.4 Do you record users or have statistics on users who are accessing and searching for materials? **[if yes, request to see for two years back to establish trends in the users' information retrieval]**
- 1.5 What information retrieval tools are available in your library?
- 1.6 Are there any comments you would like to point out regarding information retrieval knowledge and how your user search for, locate and access information from NESEIC library system?
- 1.7 What is your understanding of the term database?
- 1.8 Could you please briefly explain the functions NESEIC databases?
- 1.9 Specify how many databases are available in NESEIC and explain their usage?
- 1.10 What complaints do you get from users regarding NESEIC databases?
- 1.11 Do you keep statistics on how many users have visited NESEIC databases?  
**[If yes, request the statistics]**
- 1.12 **Last question:** Are there any comments you would like to point out regarding NESEIC databases?

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## **2. Information literacy skills and user education**

2.1 What is your understanding of the term information literacy skills and user education? [**Establish whether the librarians have an idea of what information literacy and user education entails; the meaning and definition?**]

2.2 Do you as a librarian provide any information literacy or user education in NESEIC library?

2.2.1 When was it introduced?

2.2.2 Who is responsible for teaching users?

2.2.3 What is the duration of your training sessions and what do they entail?

2.3 **Last question:** Are there any comments you would like to make regarding information literacy skills and user education of NESEIC?

## **3. Challenges in information retrieval knowledge facing NESEIC users**

5.3 What challenges do your users face in searching for, locating and accessing the right information?

5.4 What do you do to help users when they fail in their search?

**[Establish what problems NESEIC users are facing when interacting with NESEIC system, establish if NESEIC users do really retrieve the right information that solve their information need.]**

**APPENDIX H: OBSERVATION CHECKLIST**

Observer Name	
Institution	
Date	
Materials/Equipment	
Task observed	Comment
<p>Observe users who go straight to the library shelves without searching the catalogue. Do they really get what they are looking for?</p> <p>How do they establish where is what? In which shelve a particular book, thesis, journal(s) is located?</p>	
<p>Observe NESEIC users as they interact with library system, be it manual or electronic.</p> <p>Observe the search strategy they use. Observe the search process they encounter themselves.</p> <p>Does the search process correlate with Wilson's information search process of 1996?</p>	
<p>Observe NESEIC User skills and knowledge in searching for, and locating the right information</p>	

<p>from NESEIC library system. The Boolean operators, determine the recall and precision.</p> <p>Observe the user's ability to use the computers and access the database. The type of keywords they use? The spelling mistakes they make and how this affect the results of the search result.</p>	
<p>Observe the reaction of users when they cannot find the material they are looking for. What do they do? Do they go to the librarian(s) to ask for help or do they give up or do they go back to the database? How many times do they retry when they fail to get what they are looking for?</p>	
<b>Observer's signature:</b>	
<b>Participant's signature:</b>	

**APPENDIX I: MEANING OF EACH CODE**

Questionnaires	Interviews	
	NESEIC Users	NESEIC Librarians
Q1	NU1	NL1
Q2	NU2	NL2
Q3	NU3	
Q4	NU4	
Q5	NU5	
Q6	NU6	
Q7	NU7	
Q8	NU8	
Q9	NU9	
Q10 up to Q100	NU10	

**APPENDIX J: LANGUAGE EDITING CERTIFICATE**

**Language edit was done by Mr. Petrus Robert (Geo-Scientist) and Ms. Shelter Musavengana (Writing consultant).**

## To Whom It May Concern

This serves to certify that I, Mr. Petrus Robert (Geo-Scientist) edited the thesis for Mrs. Hilya Panduleni Robert (Amwenyo), a student at the Faculty of Humanities and Social Sciences, University of Namibia, entitled:

**‘INFORMATION RETRIEVAL KNOWLEDGE OF USERS USING THE  
NATIONAL EARTH SCIENCE AND ENERGY INFORMATION CENTRE  
DATABASES’**

Regards

Date: 25 November 2015

A handwritten signature in blue ink, appearing to read 'P. Robert', with a large, sweeping flourish extending to the right.

Mr. P. Robert

1 Aviation road  
Windhoek

Tel +264 61 2848111