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Information behaviour of Durban University of Technology Masters and Doctoral students with specific reference to the use of Information Technology (IT)

Mini-Dissertation

By

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Declaration

I, Nhlanhla Nhleko also known as Mncamisi, declare that this mini-dissertation is my own work and I explicitly state that it has not been submitted to any other university for the award of any degree in any Institution of Higher learning. This study represents the original work by the author and has not been submitted in any form at another university. Where use is made of the work of others, it has been duly acknowledged in the text and included in the list of sources cited.

20 Febraury 2015

N.M. Nhleko   Date

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Dedication

This piece of work is dedicated to my wife, my two daughters and to the rest of my family. My family is very big and diverse; I'm talking about the Nhleko's, Mdlalose's, Mpungose's, and Sithole's

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List of Abbreviations

DUT ....Durban University of Technology

IT..Information Technology

ITS...Information Communication Technology

ISP...Information Search Process

IR..Institutional Repository

LIS..Library and Information Science

IL.. Information Literacy

RMS .... Reference Management Software

OPAC.. Online Public Access Catalogue

Abstract

Ever-evolving information technology influences the information behaviour of users. This enforces both academic libraries and other libraries to try by all means to cope with the accelerating rate of information technology. The abundance of electronic and digital resources and tools have been reported to have a strong impact on the information behaviour of researchers (Vilar and Žumer 2011).

The study seeks to find out if this concept applies to DUT masters and doctoral students. The challenge for any library now is to find out how these researchers search for the information they need for their work because the traditional way of searching for information has shifted due to the ubiquity of IT tools. The study explores how integration of IT tools influences information behaviour of masters and doctoral students. The study further examines information-seeking needs of the researchers at the two campuses of Durban University of Technology, namely ML Sultan and Steve Biko, and to assess if they are met satisfactorily.

The main research question for this study is "How has the integration of information technology influenced the information-seeking and searching behaviours of the masters and doctoral students at DUT Library?" The study largely used qualitative methods and data was collected form twenty respondents using a self-administered questionnaire. The findings from the study indicate that resources at DUT Libraries are adequate to support research; however, there is a room for improvements. The participants indicated that they also face challenges in some areas like accessing information.

Keywords: Information behaviour, Information-seeking, Information searching, OPAC, Information Technology

Chapter 1

1. Introduction and background

The research investigated the information behaviour in the field of Library and Information Science (LIS); it specifically investigates the information behaviour of masters and doctoral students at Durban University of Technology (DUT). The emphasis is on how the use of Information Technology (IT) affects information behaviour. The The study sought to investigate information- seeking needs of the researchers at the two campuses of DUT, which are named ML Sultan and Steve Biko campuses, to ascertain if effective library services and IT support are being provided. These DUT campuses are located in Durban Central Business District. The library will be able to better understand not only the needs of the users but also the ways in which are used by the users in finding information.

Retrieving information in any form unlocks riches for any information user. However, t h e success of finding what an individual is looking for is mostly determined by the "know how" and the skill one possesses. This implies knowledge of the behaviour of the information seeker and the skill required to access that particular information using specific IT tools. IT has a direct impact on the processes and behaviour of information seekers. Students in most academic institutions are overwhelmed by the variety of information resources available at their disposal within libraries. This could also have direct impact on their behaviour. Rowlands et al., (2008: 294) observe the "anxiety of librarians caused by digital information world that is characterized by massive choice, easy access and simple to use tools."

IT tools in the library perspective could mean the following: Integrated Library System (ILS), Online Public Access Catalogue (OPAC), Institutional Repository (IR), Electronic journals, electronic databases, electronic books (e-books) and any machine or computer accessible items in the library. DUT Library has invested a lot of funds in database subscriptions and

over the years plus or minus R2 5000 000.00 is allocated for books and media and the proportion of it is spent on e-books. . It is gradually moving towards an e-environment where most traditional library materials will be made available online. The patterns of searching have certainly shifted. DUT has a mix of postgraduate students, masters and doctoral students, ranging from people who finished their undergraduate degrees and master's degrees five or ten years ago and people who recently finished.

The researcher has observed that masters and doctoral students of DUT are diverse when it comes to information searching. Some of the students are familiar with technology (digital natives) and some are not so familiar with technology (digital immigrants). The research has yielded information that may bridge the gap between the digital immigrants and digital natives by developing an information behaviour model that would accommodate both groups.

Information behaviour would also vary, taking into consideration that the digital immigrants are used to the traditional way of searching information (paper-based) yet the digital natives are electronic-based. It is crucial for any university to always take care of the needs of its users despite their diversity. Haglund and Olsson (2008: 52) assert that "it is necessary to be attentive to the changing needs and methods of work of younger researchers; otherwise university libraries cannot contribute to the competitiveness of its university's research." Knowing the change and variation of masters and doctoral students' needs and knowing what drives them to adopt information technology will also help the library in attaining the goal of creating custom-made personal information infrastructures made distinctively for individual researcher (Haglund and Olsson 2008).

1.1. Objectives of the Study

The proposed study has the following research objectives:

- To explore how integration of IT tools influences information behaviour of masters and doctoral students
- To examine information-seeking needs of the researchers at the two campuses of Durban University of Technology, ML Sultan and Steve Biko, and to assess if they are satisfactorily met.
- To develop a greater understanding of masters and doctoral students information behaviour
- To assess if the DUT Library is in a state of providing effective services and IT-support
- To investigate how the Library could enhance masters and doctoral students' information behaviour

1.2. Problem Statement

The DUT Library has advanced in the use of information technology just to make it easy for users to access information. It is believed that the more IT advances in the library the better for the students, but it is also recognised that it may impose a challenge to some of the users. The shift from traditional library to electronic library poses a problem to some of the students who may not have acquired necessary skills to access and explore these library resources.

However, students seem to be failing to navigate the integrated library system (ILS), which proves to be one stop shop for any student looking for information from within DUT campuses. Students find it very difficult to formulate keywords for their study; instead they put the entire topic in the search box which then yields no usable results, and consequently frustrations loom. Information behaviour proves to be problematic; therefore, information-seeking models should be employed to show how to improve the conduct of searches.

1.3. Research question and sub-questions

How has the integration of information technology influenced the information-seeking and searching behaviours of the masters and doctoral students at DUT Library?

1.3.1. Sub-questions

- What information-seeking behaviours do masters and doctoral students exhibit? – What are their information needs?

- To what extent are masters and doctoral students aware of available library electronic resources?

- How do masters and doctoral students use library IT tools in fulfilling their information needs?

- Do masters and doctoral students face challenges in navigating electronic resources?

- What can DUT Library do to support masters and doctoral students' information behaviour?

1.4. Demarcation of the field of study

The focus of the study is on the masters and doctoral students in two DUT campuses, namely ML Sultan and Steve Biko Campuses. Other campuses are not included in the study because the researcher believes that these two main campuses adequately represent the entire university as these campuses are bigger than the rest of the other four campuses, which are: City, Brickfield, Riverside and Indumiso. The most important factor is that the two selected campuses are closely located within less than five kilometers from each other. The shorter distance between two campuses is an added advantage to the researcher in terms of saving time in collecting the required data.

1.5. Justification for the research

The researcher believes that this intervention will help the library in identifying the gaps and gather in-depth understanding on the information behaviour of the masters and doctoral

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students at Durban University of Technology. Similar studies have never been done at DUT before. It is hoped to benefit not only the masters and doctoral students but also undergraduate users and the Library. The Library will be able to better understand not only the needs of the users but also the various means employed by the users in finding information. The author will do as Korobili, Malliari and Zapounidou (2011: 155) suggested: that, based on the results, proposals for developing information literacy programs will be made and will focus on the information habits of graduate students. The users may benefit in accessing information more easily after the library has a n information-seeking model tailored for them.

1.6. Value of the Study

The study adds value to the field of LIS professionals who work in academic libraries and also to those who work in special libraries where research is the priority. The research will not only help DUT Library personnel but also other colleagues from other higher education institutions to re-look at their current training programs and, perhaps, re-design and customise this training in a way that will be acceptable to the users.

The study adds value to the body of knowledge filling the gaps which previous literature may have not explored. Information behaviour of masters and doctoral students where one would understand how these students behave in fulfilling their information needs could also be used in a larger scale in the South African perspective.

1.7. Overview of the literature

The literature review in this study provides an overview of current, and relevant retrospective literature (Maree 2007). The researcher synthesized the findings in the literature in trying to identify gaps between what has written about and what has not been written about in relation to the topic. This gives a clear indication of how information technology affects

information behaviour.

1.7.1. Information Behaviour

Jansen and Rieh (2010: 1518) defined information searching behaviour "as a subset of information-seeking, referring to the actions involved in interacting with an information search system". Previously, users were quite dependent on the professional skills of the librarian in using the card catalogue; the online catalogue has made productive searching easier for users to undertake , yet today it is dependent on user's knowledge of online catalogue. Information behaviour will constantly be shaped by the current trends of information technology, and as technology evolves then information behaviour will always change.

1.7.2. Information Technology

Bates and Maack (2010: 9) argued that "the first major technology in modern times to affect information-seeking was the computer". Information behaviour and information technology are terms which go together: Bates and Maack (2010) argued that parallel to t h e e x i s t e n c e o f information searching behaviour there are information systems on which these behaviours interact. Jansen and Rieh (2010) further refer to information systems as all processes and technology people use to interact with information, which the researcher found applicable to the library setting as well. Information technology enables users to get both electronic and paper-based resources within the library. Based on users' understanding on IT processes involved, this could be an interesting way or frustrating way of getting what users want.

Hepworth (2007) argued that "understanding the consumer of data, information and knowledge is becoming increasingly important in relation to the design and development of electronic information products and services." The wish for any library is to design its services

to suit the needs of the individual and society the library serves and services. The face-to-face information service, as Hepworth (2007) coined it, tailored its services to meet the information needs of the clients. This type of service disadvantaged remote users; therefore, it meant that service to a wider community could be developed if libraries could embrace the issue of electronic access to information. Information technology comes in rendering the library services through a variety of access points – that is, web- based information services, information retrieval tools (catalogues and repositories) and learning environments and also electronic environments (Hepworth 2007).

The abundance of electronic and digital resources and tools have a strong impact on the information behaviour of researchers (Vilar and Žumer 2011). This study sought to find out if this concept applies to DUT masters and doctoral students. The challenge for any library now is to find out how these researchers search for the information they need for their work because the traditional way of searching for information has shifted due to IT tools that have that have become ubiquitous. George *et al.,* (2006) argued that "for academic libraries to adequately address the changing information needs of its students, they need to know more about the information that students use and value and what influences their information searching, obtaining, and use."

1.8. Research Methodology

The study used mixed methods research which embraces qualitative and quantitative approaches; however it was largely qualitative. The study design is a mix of qualitative and quantitative research techniques and, in the spirit of the mixed method approach, these two research methods complemented each other and contributed to a better understanding of information behaviour throughout this exploratory study. The researcher largely used the qualitative research method because it is a suitable method for exploration of human

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behaviour. Haglund and Olsson (2008: 53) assert that "the most common approach to investigating information searching behaviour is to use questionnaires, interviews, and focus groups to identify the specific methods used by different user groups within different subject area." The researcher used s e l f - a d m i n i s t e r e d questionnaires to acquire data that was used and analyzed in this study. The questionnaires were distributed physically to the Research Commons of the two campuses. The researcher used a content analysis procedure to make meaning of the data provided in the filled questionnaires and partially used quantitative methods in codifying data and apply ethnology into this study to make results more clinical.

1.8.1. Study Location

The study is based at Durban University of Technology, within academic libraries of the two main campuses, which are n a m e d Steve Biko and ML Sultan a n d b o t h located in Durban. These campuses are situated in section of the city called Durban Central Business District (CBD). Steve Biko Campus is located along 50-70 Steve Biko Road and ML Sultan is situated along 41-43 ML Sultan Road. The two campuses are physically proximate and this is the added advantage on the side of researcher because the researcher locomotes between these two campuses with ease.

1.8.2. Study Subject

The data was collected from twenty (20) masters and doctoral students of Durban University of Technology. The researcher was targeting fifteen (15) masters students on two campuses and five (5) doctoral students on both campuses. The researcher used purposive sampling in selecting participants for the study, the reason behind this b e i n g t h e n e e d i s t o select people who had sufficient knowledge to be able to understand and respond to the questions sufficiently well.

1.8.3. Data Analysis

The researcher qualitatively analyzed the completed questionnaires from the twenty (20) respondents. The researcher used content analysis for open-ended questions of which Blumberg, Cooper and Schindler (2008) believe that coding open answers is useful in grasping the structure of the information collected. This part of the data was analyzed using the Statistical Package for Social Science (SPSS) software version 22. The data was coded into the software to make sense of what has been said by respondents. SPSS provides charts and other visual representations which aid to the explanation in the text. The results were then presented in both textual and visual forms.

1.9. Clarification of key terms

The following terms are defined for the purpose of this study; these are arranged in an alphabetical order:

1.9.1. Information Behaviour

Bates and Maack (2010) define information behaviour as "the currently preferred term used to describe the many ways in which human beings interact with information, in particular, the ways in which people seek and utilize information". Spink, Park and Cole (2006: 137) define information behaviour as "an integrated process of information-seeking/foraging/sense- making, information searching, information organizing, and information use on single or multiple topics".

1.9.2. Information Retrieval

According to Manning, Raghavan and Schütze (2008) information retrieval "is finding material of an unstructured nature that satisfies an information need from within large collections stored on computers."

1.9.3. Information Searching

Information searching "refers to people's interaction with information retrieval systems, ranging from adopting search strategy to judging the relevance of information retrieved" (Wilson 2000:49).

1.9.4. Information-Seeking Behaviour

Prasad (2000: 6) defines information-seeking behaviour as "the strategies and actions undertaken to locate discrete knowledge elements".

1.9.5. Information-Seeking

Information- seeking is defined as "a sub-set of information behaviour that includes the purposive seeking of information in relation to a goal" (Spink and Cole 2004: 622-623).

1.9.6. Information Technology

The Business Dictionary (2013) defines information technology as a "set of tools, processes, and methodologies (such as coding/programming, data communications, data conversion, storage and retrieval, systems analysis and design, systems control) and associated equipment employed to collect, process, and present information. In broad terms, IT also includes office automation, multimedia, and telecommunications".

1.10. Division of chapters

The chapters are divided according to the following format: Introduction and background, objectives, research question and sub-questions of the study are covered in Chapter One.

Chapter Two covers the literature review whereby information behaviour is discussed

extensively. There are sub-headings in this section detailing more on information behaviour, information-seeking, information retrieval and information searching.

Chapter Three contains a discussion of the chosen research methods, specifically the data collection instruments, target population, sampling technique and data analysis..

Chapter Four discusses the researcher's findings and presentation of results in the form of visual aids.

Chapter Five presents the researcher's conclusion and recommendations emanating from the results of the study.

Chapter 2
2. Literature Review

2.1. Introduction

A literature review "discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period". A literature review can be "just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis" (University of North Carolina 2013: 2). Hearst (2009: 64) argued that "in order to design successful search user interfaces, it is necessary to understand the human information-seeking process, including the strategies people employ when engaged in search" (Hearst 2009: 64).

It is important to note that there have been no previous studies in Durban University of Technology that discuss information-seeking behaviour of either students or staff members of the institution. Based on research it is evident that "with the widespread use of computerized databases and the Internet, resources for information searches have shifted from paper to digital media" (Sugie 2013: 69). Sugie (2013) believes that information-seeking behaviour in physical libraries has become less common and has been replaced by the use of Web resources. However, Sugie's comment relates to only a few institutions and those are based outside South Africa. DUT Library, in conformity with the majority of academic libraries in South Africa, continues to cater for users who prefer paper-based services and digital services.

According to Wilson (2000: 50) "the origins of human information-seeking behaviour are found in work on the users of libraries and in readership studies in general". In the early 1920s and 1930s the study of information behaviour focused on the library use: as stated by Wilson (2000:50), "these studies were about library use and, in general, they were concerned less with the needs that led people to the library as a source of information and more with issues such as

the social class make-up of the clientele". In 1948, "a Royal Society Conference marked the beginning of a concern with understanding how people used information in relation to their work and how they used it in science and technology" (Wilson 2000: 50). Between 1948 and 1965 there were many document-focused studies done and, later, attempts to study the information needs began. In 1972-3, according to Warner (1973), for the first time, one of the most exhaustive studies was carried out to assess the information needs of ordinary citizens of Baltimore, U.S.A.

The study of information-seeking behaviour is complex and many researchers have chosen to separate it into a set of steps to form a model. For the purposes of this dissertation, the researcher has chosen to consider it as four stages, all of which are experienced by information seekers: problem identification, problem definition, problem resolution and solution statement. Nevertheless, the behaviour of users may be different through all the stages. Wilson (1999a: 266) has found out that "each individual experiences the same stages in the resolution process, moving from uncertainty to increasing certainty".

According to Macedo and Barbosa (2013: 131) "to know how to manage information, retrieve it and then identify which information will lead to the expected result is the greatest challenge organizations face when managing information". This concept is similar and applicable to that of students when searching and retrieving information. Students search for information for specific reasons and they critically select particular information that will fulfil their information needs. It is indeed one of the greatest challenges to search find what one is looking for; that is, searching will involve which tools are to be used and also the skill on how to use these tools. In most cases the tools that are used are information communication technology tools: for example computers, software and many other technological tools.

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The emergence of computers and applications for conducting searches for information has made the biggest impact on information behaviour. The impact could be negative or positive depending on the student's educational background in terms of information communication technologies. Fidzani (1998: 329) states that the effective "use of resources and services depends on ability to use information access tools". The information-seeking process "is carried out in order to satisfy a perceived need, but has to be adapted in response to contextual factors or barriers such as the nature of the information environment and the available sources" (Al-Suqri 2011: 2).

Factors that influence information-seeking behaviour "may include the discipline, the demands of faculty members, the curriculum, and personal characteristics" (Korobili, Malliari and Zapounidou 2011: 155). Boyd (2004: 81) stresses that "information-seeking is a fluid and situation-dependent activity where a seeker's actions are influenced by access to information, perceived quality of, and trust in, the information source". Boyd (2004: 81) further argued that "the combination of all of these factors creates an ever-changing information-seeking environment". Many information retrieval systems are available in library environment however in an "academic contexts there are, for example, the library catalogue, databases and journal platforms, Google Scholar, repositories and digital libraries" (Fourie 2013: 556).

Banwell and Gannon-Leary (2000: 191) argued that "the use of electronic services had more impact in health studies than in business studies, and had more impact in both than in English studies". In other words some other factors must also play roles, such as the context of disciplines in their own faculties; for example, how demanding faculty standards are. The literature has revealed that "it is difficult to collect exact data on a user's actual search using traditional methods, however, such data are central to understanding the user's information-seeking behaviour and developing library services" (Sugie 2013:69).

2.2. Information needs

Information needs of the users are a central priority for suppliers of information services such as an academic library and many more. Therefore any information system needs to be adjusted to meet such needs. Prasad (2000: 5) expresses this well in stating that "there is no field of human activity wherein information is not a component". In everyday situations people need information for various reasons: it could be that of solving problems, decision making or beginning a venture in business and, most importantly, to accomplish specific tasks. In the tertiary institution, students and staff will look for information to better understand academic assignments or to explore a body of knowledge.

Post graduate and undergraduate students will look for information to complete their research and assignments respectively. The library tries by all means to be successful in satisfying this need of students. By doing so, the library engages the students in a number of interventions in trying to understand their needs. Elisha (2010: 392) used the well-known aphorism that at the heart of any tertiary institution are academic library services, "which play an important role in ensuring that the research, teaching and learning activities are adequately supported with information resources". In this sense, information needs of the users are the priority of the library in any institution.

2.3. Information Behaviour

Academic libraries are there to satisfy information needs of their communities, which consist of students, staff and alumni. Haglund and Olsson (2008: 52) also affirm that "university libraries are dedicated to what they perceive as the needs of students and researchers at the university". The libraries will therefore be persistent in attempting to find out the needs of students and also encapsulate their information behaviour. This is the reason why Haglund and Olsson (2008: 52)

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stated the importance of paying attention "to the changing needs and methods of work of younger researchers; otherwise university libraries cannot contribute to the competitiveness of a university in the conduct of research".

Information behaviour is "influenced by many factors and interactions between them. These factors are related to at least one of the three information-seeking behaviour core entities: the information need, the environment and the seeker (personal factors)" (Marchionini 1995; Wilson 1981; Wilson 2006; Korobili, Malliari and Zapounidou 2011). Factors that mould information-seeking behaviour may comprise the following: discipline, the demands of faculty members, the curriculum, and personal characteristics (Korobili, Malliari and Zapounidou 2011: 155).

2.3.1. Information-seeking

According to Wilson (2000: 49) "information-seeking is the purposive seeking for information as a consequence of a need to satisfy some goals". Information-seeking is a concept initiated by the perception of an information need which arises from the information seeker. One seeks to acquire information to fulfil a desire for knowledge; therefore the desire for knowledge is one of the drivers for information-seeking. Information-seeking is therefore a skill one would require in any stages of life, whether it is in a academic or social context. This makes information-seeking a process one should comprehend. For librarians it is of special importance because they are principally involved in creating access to information sources and making information available for use.

Librarians must have had training in order for them to perform such activities because information-seeking behaviour encompasses many processes, as previously mentioned. The research reveals that "user studies continue to be an important area of library research, as studying

the information-seeking behaviour of specific user groups has contributed to the development of a variety of library services" (Barrett 2005: 324). Information-seeking is a fundamental human process closely related to learning and problem solving (Marchionini 1995). Marchionini (1995: 6) further argues that "seeking connotes the process of acquiring knowledge; it is more problem-oriented because the solution may or may not be found". Marchionini (1995: 21) and in some of his publications Marchionini (1989b; 1993) noted that "information-seeking depends on interactions among several factors: information seeker, task, search system, domain, setting, and search outcomes".

Boyd (2004: 81) pointed out that "information-seeking is a fluid, yet personal and situation dependent, activity where a seeker's actions are influenced by access to information, together with perceived quality of, and trust in, the information source". It is supported by access to information and the effectiveness of the information source. It is pointed out that "there is a pressing need for additional information about academic information-seeking in different contexts in order to assess the continued relevance of existing models of information-seeking behaviour and to refine the knowledge base upon which Library and Information Science (LIS) is grounded" (Al-Suqri 2011: 2).

One would certainly agree with the statement of Al-Suqri (2011: 2) that "there is a need for more research which is focused on the information-seeking behaviours of scholars in particular disciplines, since a number of previous studies have provided evidence of significant differences between the information-seeking behaviour of scholars in the sciences, humanities and social sciences".

This study took a different approach from that of Al-Suqri: it sought to find out if information-seeking is influenced by the integration of information technology within the libraries. There are

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specific stages of information-seeking employed in a combined model which are drawn from both Ellis' 1989 information-seeking model and Kuhlthau's 1991 information search processes mode. These models are discussed later in this study. The Information Search Process Models (ISP) has mostly focussed on the physical methods of information-seeking rather than electronic methods of information-seeking.

Al-Suqri (2011: 2) stated that Wilson's 1996 model of information-seeking behaviour forms the conceptual basis for the synthesized model . Although considerable research, over many years, has been conducted into the processes used by individuals to satisfy a need for information, it is Wilson's view that the focus should be on information-seeking behaviour. The character of the information seeker is also considered as one of the influencing factors. Wilson (1999b: 251) highlighted that "information-seeking is carried out in order to satisfy a perceived need, but has to be adapted in response to contextual factors or barriers such as the nature of the information environment and the available sources".

Chowdhury, Gibb and Landoni (2011: 158) believed that the digital information age and environment have had an impact on the information-seeking behaviour of information users: the volume of information held in online resources makes the location of relevant items more difficult. However this depends on the formulation of keywords by the information seeker and the tool used to look for that piece of information. According to Nor Liyana and Noorhidawati (2010: 2) "rapid developments of computers and internet have brought significant changes in how students seek for information".

Ellis developed a model that is believed to be the most relevant to describing information-seeking. Good information seekers must have some basic facility with the physical interface of a search system. This involves abilities to read and use an index. In terms of a print-on-paper sources, this

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means the physical and mental ability to use the source; in the case of electronic systems additional factors, such as knowledge of the human-computer interface, also become important (Marchionini 1995).

2.3.2. Information searching

Korobili, Malliari and Zapounidou (2011: 159) believe that "search experience, computer and web experience, perceived ability and frequency of use of e-sources" are the factors that play an important role in shaping the information-seeking behaviour. This study attempts to find out if there is a significant role played by IT tools which is believed to be shaping the information-seeking behaviour.

- **Information Searching Strategies**

It was assumed that the strategy a user applies is dependent on his/her mental models for the task, database, and search system and how the information-seeking system manipulates those models (Marchionini 1989a: 58).

2.3.3. Information retrieval and Information Retrieval Systems

Fourie (2013: 554) argues that "ever since the introduction of computers and information retrieval systems (IRS), researchers and practitioners have focused on information and ensuring timely and precise access to accurate and relevant information". However there are some skills attached to that idea: one should be computer literate or must have at least gone through some training (for example, information literacy training) to acquire relevant skills in searching for information.

2.4. Information behaviour models

There is a variety of frameworks for information-seeking behaviour: for example, Ellis (1989), Kuhlthau (1991), Wilson (1997), and Ingwersen and Järvelin (2005) amongst many others. This study selected three information search models to discuss, which are Kuhlthau's, Wilson's and that of Marchionini. There are several reasons why these models have been selected; Kuhlthau's model was selected because this model has been frequently cited. The researcher thought it would be wise to opt for something that has been widely discussed and subjected to critique.

The Wilson model was also chosen because this model is ranked amongst the oldest in the literature of information behaviour, dating back in the early 1980s. The researcher attempted to find out what transpired back then and what is happening at the moment. The Marchionini model is also selected because it focuses mainly on the electronic environment (e-environment) which is also the focus of this study. This study also focuses on information behaviour, mainly in an e-environment.

Some of the models have been revisited considering the shift that is evolving from information technology. Kuhlthau, Heinström and Todd (2008) also noted that "these information environments and services have not remained static, particularly with rapid advances in and impacts of information technology".

"Information behaviour includes both information-seeking and communication which can be described in terms of the activities of information users and providers, the factors affecting those activities and the sources or information products involved" (Robson and Robinson 2013: 184). Spink, Park and Cole (2006: 233) argue that "the information-seeking approach, based on a problem-solving perspective of human behaviour, has been the dominant approach within the field of library and information science".

The Wilson's model was first published in 1981, whereby factors which lead to information-seeking and the barriers hindering action were outlined. Later on in 1994 Wilson revised his model and this edition was developed based on his original model in order to understand social dynamics of the user, for an example: personal circumstance, social role, and environmental context in which an information need is created. However Wilson (1999a: 250) argued that "most models in the general field of information behaviour are statements, often in the form of diagrams that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in information-seeking behaviour".

Research on information-seeking behaviour has applied models from various perspectives such as the sense making theory of Dervin (1983), the behavioural model of information strategies (Ellis 1989), the information search process (Kuhlthau 1991), seeking information in electronic environments (Marchionini 1995) and problem solving (Wilson 1999b).

2.4.1. Kuhlthau's ISP Model

Kuhlthau's model of the Information Search Process was formulated in the 1980s, fine-tuned and polished in the 1990s and was revisited in 2008 (Kuhlthau 2013). Kuhlthau (1988) explicated a model of how students search for information as part of the writing process. This model takes both cognitive and affective perspectives and was originated through observations and interviews with students over extended periods of time. The series of investigation conducted by Kuhlthau resulted to new model of the research process from an internal perspective which she named the Information Search Process (ISP). Kuhlthau states that the development of the ISP as a conceptual framework is the phenomenon of more than two decades of empirical research. This began with a qualitative study of secondary school students and the emersion of an initial model that was

affirmed and refined through quantitative and longitudinal studies of various library users and further developed in case studies of people in the workplace.

Since its formulation and development, the model has been used as a structure that can be used for understanding the information search experience of people in wide range of library setups. Models are of great value in the development of theory, "they are a kind of proto-theory, a tentative proposed set of relationships, which can then be tested for validity" (Robson and Robinson 2013: 171). Kuhlthau's Information Search Process (ISP) model was developed on the basis of research on library users, initially school students. Kelly (2003: 3) once argued that "personal construct theory is a notion about how man may launch out from a position of admitted ignorance, and how he may aspire from one day to the next to transcend his own dogmatisms".

Kuhlthau (2013) affirms that the ISP demonstrates information-seeking as a process of construction influenced by Kelly's personal construct theory as indicated above, as information increased uncertainty in the early stages of the ISP. Kuhlthau's ISP model identifies users' experience in the process of information-seeking as a series of thoughts, feelings, and actions.

It is therefore believed that these feelings and thoughts, which lacked confidence, no clear understanding, and ambiguous later become explicit, more focused, and specific as the search process builds up. The Information Search Process (ISP) by Kuhlthau presents a holistic view of information-seeking from the user's perspective in the following six stages: task initiation, selection, exploration, focus formulation, collection and presentation. Kuhlthau's model is presented in the figure 1 below and the brief description of the chart is also provided below.
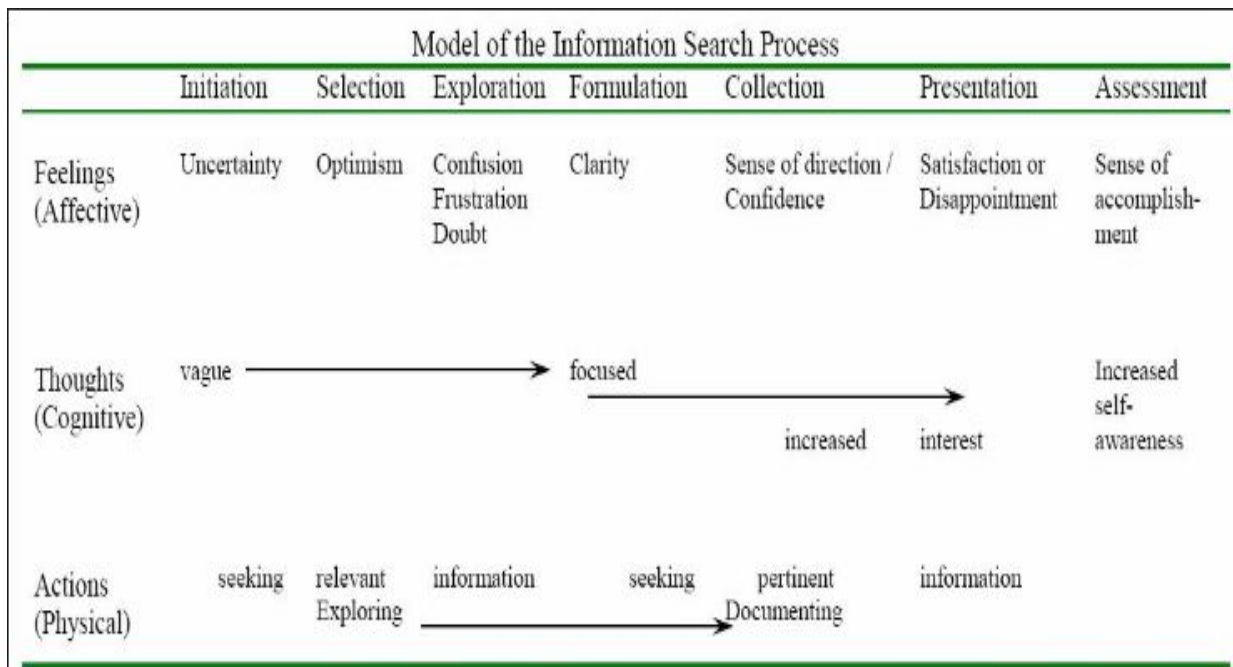
Figure 1: Information Search Process extracted from (Kuhlthau 2013)

Initiation: Information seeker would firstly realize that he/she needs information. For example if a student is given an assignment, he/she starts to realize the need for information to fulfil the given task. The fact that the student cannot finish the assignment based solely on her own knowledge, anxiety and uncertainty becomes apparent.

Selection: The moment an information seeker embarks on the process of searching information, he/she must have had a good understanding of the desired information. In this stage, an information seeker has identified the problem. The ability to identify the problem would certainly give the seeker a hope that he/she would possible find what he/she is looking for. The moment information is selected; the state of confusion within the seeker fades away.

Exploration: This stage will determine whether or not the seeker gets what he/she is looking. This is where the seeker is faced with much information to choose from, and this could impose

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yet again the state of uncertainty and also state of confidence as stated by Kuhlthau (2013). Of course, this will be dependent on the seeker's understanding of his/her problem area.

Formulation: The information seeker is now at the stage where he/she finds the grounds and the confusion has settled due to the fact the he/she understands what is out there and how to tackle his/her topic. The information found is resolving apprehensions within the information seeker, and confidence starts to build up.

Collection: The collection stage is where the seeker grabs what he/she has been looking for and makes use of that information. This stage is reached if previous stages have been performed well. The mere fact that this stage is reached, means that the journey of an information seeker was productive and successful.

Presentation: This is the final stage whereby the seeker has accomplished what he/she was looking for and is now presenting whatever he/she has found. This is the stage where the seeker would be able to judge and also assess if his/her information-seeking journey was a success or not. If the information-seeking journey was a success, definitely the steps would be repeated over and over for information-seeking purposes.

2.4.2. Marchionini Model

The Information-seeking model from Marchionini (1995) is used as the fundamental concept in this study. This is mainly because it represents information-seeking in electronic environments, which is closely relevant to the purpose of this study. Research discloses that most of the models were formulated at a time when electronic methods of information-seeking were still in the evolving stage and also unfamiliar, "and there is a requirement for up-to-date research which

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takes into account the impact of the major technological developments of recent years, such as the Internet" (Al-Suqri 2011: 2). Electronic methods of information-seeking are a strong focus in this study, therefore there is a great need for up-to-date and appropriate models.

Some of the models have been revisited to accommodate the shifts in information technology used. Marchionini (1989a) noted that information-seeking is a special case of problem solving and it consists of a few steps, starting from recognition of the problem until evaluating the results. The search processes from Marchionini are seen as an appropriate model for this study because today's students are heavily engaging in the e-environment. Marchionini (1995: 51-58) proposed the following eight steps: Recognize and accept an information problem, define and understand the problem, choose a search system, formulate a query, execute search, examine results, extract Information, and reflect/iterate/stop. Information-seeking starts off with acknowledgement and coming into terms that there is a problem, this will go on until the problem is resolved or else and individual will abandon the task of acquiring the required information (Marchionini 1995).
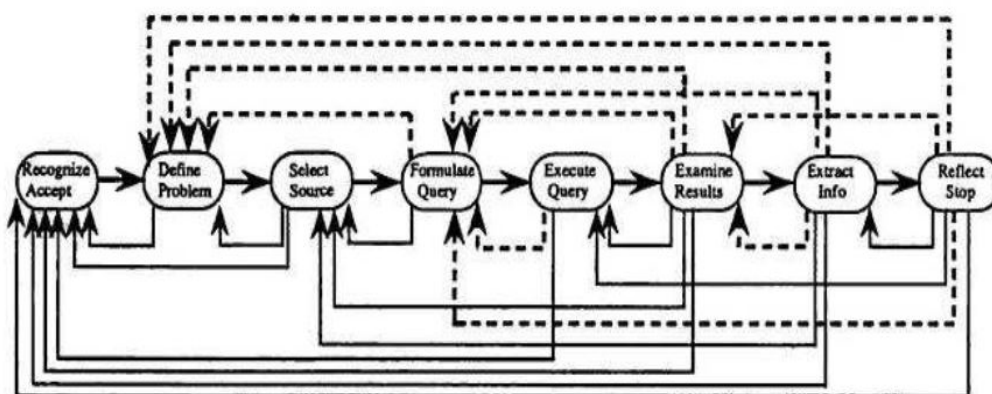
Figure: 2 Marchionini Model – Extracted from: (Marchionini 1995: 51)

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- *Recognize and accept an information problem*

Recognizing and accepting an information problem could be triggered for a number of reasons, however Marchionini (1995: 51) believes that recognizing and accepting an information problem can be internally motivated. One of the reasons could be a student being given an assignment to do and suddenly he/she realizes that an assignment cannot be done on his/her own knowledge alone. The moment he/she realizes that, it means he/she has accepted that there is an information problem; therefore he/she will need the problem solver (information).

Marchionini and White (2007: 207) affirm that "a problem formulation activity follows acceptance and involves the information seeker conceptualizing the bounds of the information need, imagining the nature and form of information that will meet the need". It is stated that "acceptance is influenced by knowledge about the task domain, by the setting, by knowledge of search systems, and by the information seeker's confidence in his/her personal information infrastructure" (Marchionini 1995: 51). An information seeker will therefore gather the thoughts around the information problem before moving to the next step where he/she has to define and understand exactly what is his/her information problem.

The masters and doctoral students at DUT could be going through Marchionini's steps, however there are underlying factors as he further argued that "the problem may be suppressed or accepted" (Marchionini 1995: 51) . Suppression could be caused by many factors like "how much will it cost?", "where do I start?" and consequently an information seeker may end up not looking for that particular information. Most tertiary institutions, within libraries, have made provisions for the students to have easy access to a number of e-resources. This, in a sense, eliminates both the issue of the cost and the confusion as to where to start.

- *Define and understand the problem*

Marchionini (1992: 157) believes that "recognizing and defining an information problem initiates information-seeking". This step is defined as the critical stage because it remains active as long as information-seeking progresses, in the sense that this stage can be revisited at any given time. Marchionini (1995: 51) asserted that "to understand and define the problem, it must be limited, labelled, and a form or frame for the answer determined". Defining a problem is solely dependent on the understanding of the information seeker; however "during problem definition the information seeker represents the problem internally as a task with properties that allow progress to be judged and determines a general strategy to use for subsequent steps" (Marchionini 1995: 51).

- *Choose the system*

Marchionini (1995: 52) states that "the stage of choosing a search system is dependent on the information seeker's previous experience with the task domain, the scope of his/her personal information infrastructure, and the expectations about the answer that may have been formed during problem definition and task development". The knowledge of content is a determining factor in choosing a search system and focusing searching. Knowing the content is likely to help the information seeker to know where and what will best provide the desired results: for example, in the field of Engineering, the database that would be ideal is that of the Institute of Electrical and Electronics Engineers (IEEE).

Having such knowledge will help the seeker in choosing the right system to solve his/her information problems. The information seeker's personal background, abilities and experiences are critical factors in choosing the system. The seeker may choose the system based on the advice of a friend or colleague.

Librarians can also take part in helping an information seeker to identify relevant sources and systems. Marchionini (1995: 52) affirms that, "in libraries, information seekers may ask a reference librarian where to begin searching; they may consult an index or a card catalogue, and eventually one or more journal or book primary sources". Marchionini (1992: 158) argued that "whether the information problem is well defined or not, users must choose an information source to begin their search".

- ***Formulate the query***

Formulating the query involves identifying keywords and concepts, identifying and clarifying synonyms, broader terms and narrower terms for each concept. The formulation of keywords for "query formulation involves matching understanding of the task with the system selected" and in many cases, the first query formulation identifies an entry point to the search system and is followed by browsing and/or query reformulations" (Marchionini 1995: 53).

The reason behind formulating keywords and considering synonyms is to find possible terms that would best represent the content as it is described in the system using controlled vocabulary. Controlled vocabulary is the set of controlled terms used to represent information at a larger scale. However Marchionini (1995: 54) stated that "the problem of representing concepts in document sets is a fundamental problem in information science and should be considered from several perspectives".

Marchionini (1995: 53) also noted that "the mapping function most commonly takes words (rather than phrases or concepts) associated with the task onto the set of words that serve as entry points (indexed words or controlled vocabulary) to the system content". This means that when searching for information, success is dependent on how that piece of information was indexed and classified and how controlled terms were used in representing information. If information was clearly

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represented with controlled terms, it is likely to be retrievable by information seekers provided they also use these terms.

Marchionini (1992) noted that "electronic systems have made many of their greatest contributions to information-seeking at the query formulation phase". It is apparent in the research that "progress in augmenting information seekers' mapping of task vocabulary to system vocabulary has been more difficult, but human-computer dialogues and machine inference have yielded promising directions for aiding semantic mappings" (Marchionini 1995: 53).

- *Execute search*

It is stated that "execution of the physical actions to query an information source is driven by the information seeker's mental model of the search system" (Marchionini 1995: 55). Basically, the formulated query is now put into real action by typing the keywords formulated into search engine or database. Marchionini (1995: 55) came up with a relevant example of executing a search: "for a card catalogue, execution may entail selecting proper drawers and using alphabetical ordering rules; for an online database, execution may entail typing the query and sending it with a special key press (e.g. return); for a hypertext, execution may entail browsing the database by following available links provided by the author".

Marchionini (1995: 55) believes that "search execution is one of the most obvious changes wrought by electronic environments since information seekers perform much more constrained physical actions at workstations than they do in libraries or offices".

- *Examine the results*

After execution of the query there would be results; therefore those results should be examined. Marchionini (1992: 158) stated that "systems typically respond to queries with sets of 'hits' from

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which the user determines which function to call next (often a call to examine individual records)". This stage involves the examination of the results by the information seeker to measure progress toward achieving the goal of the information-seeking undertaking.

Marchionini (1995: 55) is of the view that "this examination is dependent on the quantity, type, and format of the response and involves judgments about the relevance of information contained in the response". The returned results will be then judged by the information seeker to see if it is relevant to what he/she is looking for. The "examination of specific items for relevance is obviously affected by the type (primary, secondary, numeric, graphic, textual, etc.) and the quantity of information in the retrieved set". "This activity tends to take the most time of all the information-seeking activities as people read/view/listen to intermediate and primary content" (Marchionini and White 2007: 208)

- *Extract information*

There is a relationship incapable of being disentangled between judging information relevant and extracting the relevant information for all or part of the problem solution. To extract information, an individual looking for information applies skills such as reading, scanning, printing, listening, classifying, copying, and storing information. Marchionini (1992: 159) stated that "once relevant information has been located, users must study, copy, and integrate this information so that it may be applied to the original problem". As information is extracted, "it is manipulated and integrated into the information seeker's knowledge of the domain" (Marchionini 1995: 57) . Electronic tools for cutting and pasting already offer significant advantages for information extraction of text, static and moving images, and sound.

- *Reflect / iterate / stop*

An information search is not often completed with only a single query and retrieved set. In most cases, the initial retrieved set serves as feedback for further query formulations and executions. Subsequently "deciding when and how to iterate requires an assessment of the information-seeking process itself, how it relates to the acceptance of the problem and the expected effort, and how well the extracted information maps onto the task" (Marchionini 1995: 58). The information seeker may decide to stop or repeat the above stages, that decision is dependent on whether he/she gets the intended information or not. If he/she gets relevant information he/she may stop but if he/she does not then iteration begins. Marchionini (1995: 58) argued that "determination of a stopping function may depend on external functions like setting or search system or on internal functions like motivation, task domain knowledge, and information-seeking ability"

2.5. IT in Libraries

There are many information retrieval systems available which may pose a challenge to some information seekers as to where to start. Fourie (2013: 556) stated that "in academic contexts there are, for example, the library catalogue, databases and journal platforms, Google Scholar, repositories and digital libraries". The following are information retrieval systems, which are also IT related tools available at DUT Library.

2.5.1. Library Website

A library web site is an integral part of a library's identity. Connell (2008: 121) believes that "many patrons visit a library's virtual location -- its web site -- more than they visit its physical location". Library web sites function as portals for research, marketing tools, and places for information about libraries. "LIS has evolved drastically through the application of Information and Communication Technology and because of technological innovations coupled with

digitisation efforts, many libraries provide websites that reflect their various current activities" (Aharony 2012: 764).

According to Aharony (2012: 765) "academic library websites provide information about libraries and library services as well as access to online catalogues, electronic databases, digital collections and different library tutorials; academic library websites are thus gateways to information for faculty and students". Students communicate with the library personnel via a library website which then make it easy for students to achieve their information needs anywhere they are. Connell (2008:121) affirms that "students can ask reference questions online, conduct research in databases, place interlibrary loan requests online, and obtain academic articles electronically".

2.5.2. Online Public Access Catalogues (OPACs)

An OPAC is a computerized catalogue containing bibliographic records of the items in a library. Ariyapala and Edzan (2002: 57) define an OPAC as a computerized catalogue containing records of the items in a library or any institutional organization, which is used for the storage and retrieval of information. Students usually use OPACs to find books from the library's collection. It seems clear that we have propelled beyond early OPAC conceptions to new generation OPACs that tender both added functionality and improved interfaces.

Marchionini (1992: 160) pointed out that "today's OPACs are part of integrated systems that provide remote access to scores of library catalogues and other information services, in spite of the fact that these systems have improved scope, they generally suffer from underlying command-driven interfaces". Mi and Weng (2008: 6) argued that "the OPAC's public interface and searching capabilities together function as a finding aid" and further stated that it is the gateway

to library resources. However the current interface, searching capabilities and the bibliographic display are components which also have direct impact on users.

2.5.3. Institutional repositories

Crow (2002: 4) defines institutional repositories as "digital collections capturing and preserving the intellectual output of a single or multi-university community: they provide a compelling response to two strategic issues facing academic institutions". Users use an institutional repository to fulfil their information needs. The following factors: technological development, fairly large increases in the overall volume of research, and increasing state of being unsure over who will handle the preservation and archiving of digital scholarly research material have evolved and combined to create new anticipations in the academic community for the production, and distribution of scholarly communications and to drive a rethinking of the relative roles of authors, librarians, and publishers (Crow 2002: 5).

2.5.4. LibGuides

LibGuides is the web 2.0 library knowledge sharing system; LibGuides are groups of web pages for research aid, subject guides, and useful platforms compiled by information specialists and librarians. Librarians employ LibGuides to create an appealing multimedia content, share knowledge and information, and advertise library resources to the community. "Academic, public, and special libraries find LibGuides an ideal solution for providing subject guides, information portals, course guides, community guides, research help, faculty/teacher support" (State University of New York Jamestown Community College 2014).

Chapter 3
3. Research Methodology

3.1. Introduction

The chapter three of this study attempts to explain the research methodology and approaches that will be employed in carrying out the study. The chapter also explain the geographical area where the study was conducted and the study design; the population and sample are defined and explained. The instrument used to collect the data, including methods implemented to maintain validity and reliability of the instrument are described. The main aim of this study is to have an in-depth understanding of how masters and doctoral students interact with the information technology tools made available by DUT library so that the tools could best match their information needs and their information-seeking behaviour.

To explore this trend and its consequences on user behaviour, the following research questions were developed for this study:

Research question

- What information-seeking behaviour do masters and doctoral students exhibit? – What are their information needs?

- To what extent are masters and doctoral students aware of available library electronic resources?

- How do masters and doctoral students use library IT tools in fulfilling their information needs? - How do they interact with the e-environment of the DUT Library?

- Do masters and doctoral students face challenges in navigating the Integrated Library System (ILS)?

- What can DUT Library do to support masters and doctoral students' information behaviour?

3.2. Research approach and design

Research designs are procedures for collecting, analyzing, interpreting and reporting data in research studies (Creswell and Plano 2007: 58). Creswell and Plano (2007: 58) further argued that "research design refers to the structure of an enquiry: it is a logical matter rather than a logistical one". There are different types of designs available for researcher to choose from, including qualitative, quantitative and mixed methods. In order to achieve the objectives of the study the researcher used a mixed method approach; however, the study is largely qualitative. The researcher chose this approach because "the qualitative approach is often employed to answer the 'whys and hows' of human behaviour, opinion, and experience — information that is difficult to obtain through more quantitatively-oriented methods of data collection" (Guest, Namey and Mitchell 2012: 1). Qualitative methods, as stated by Powell and Connaway (2010: 2), "focus on observing events from the perspective of the individuals involved and attempt to understand why people behave the way they do".

Mixed method approaches complement each other and contribute to a better understanding of information behaviour throughout this exploratory study. Mixed methods research is believed to provide strength that offsets the weaknesses of both quantitative and qualitative research. Creswell and Plano (2007: 9) argued that this type of method "provides more comprehensive evidence for studying a research problem than either qualitative or quantitative research alone". According to Creswell and Plano (2007: 6) "mixed methods research involves both collecting and analyzing quantitative and qualitative data".

This design was chosen to meet the main objective of the study, which is to gain a greater understanding of masters and doctoral student's information behaviour. The main and guiding research question was, ''what role does the Integrated Library System (ILS) play in masters and doctoral student's information-seeking behaviour at DUT library?" The study was an exploratory

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survey because it provided an opportunity to define new terms and clarify existing concepts, i.e. behaviour, opinions, abilities, beliefs, and knowledge of a particular individual, situation or group (Lynn University Library 2013).

3.3. Research setting

The study was conducted at Durban University of Technology (DUT), which falls under the Coastal Region, EThekwini Municipality in the Province of KwaZulu-Natal of South Africa. DUT has six campuses, two of which are main campuses, and those campuses are ML Sultan and Steve Biko Campus. The two main campuses are being studied because most of our postgraduate students often visit these campuses and the main reason is that there are Research Commons at each campus.

3.4. The study population and sample

3.4.1. Population

A population is the aggregation of all individual units of interest relevant to a study research topic. A target population is the set of elements to which one desires to apply the findings of the study (Daniel 2012). According to Burns and Grove (2005: 779) "a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study". The population of interest in this study is masters and doctoral students of DUT.

3.4.2. Sampling

"Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population" (Mugo 2002: 1). Sampling is about drawing a subset (which could be in small numbers or large) and measuring quantitative or qualitative features of a unit of analysis (Eller, Gerber and Robinson 2013: 116). There are two types of sampling, which are probability and non-probability sampling. Eller, Gerber and Robinson (2013: 117) stated that a probability

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sampling approach is where each of the units in the population of interest has an equal chance of being selected. With non-probability sampling, its where the members of population do not have an equal chance of being selected, therefore one cannot conclude from that specific case that data is representative of the overall population (Eller, Gerber and Robinson 2013).

The researcher opted for non-probability sampling, adopting purposive sampling because it was not possible to take a true probability sample from the population for the purpose of this study. Time and cost predicated this decision on the side of the researcher. "Purposive sampling is a non-probability sampling procedure in which elements are selected from the target population on the basis of their fit with the purposes of the study and specific inclusion and exclusion criteria" (Daniel 2012: 87). Eller, Gerber and Robinson (2013: 127) believe that "the purposive sampling approach can be defined as a non-probability sample that is drawn and specifically based on the existing knowledge of population characteristics in order to serve a specific need of a study question".

A purposive sample of twenty subjects was selected from the two campuses, ML Sultan and Steve Biko. The sample included five doctoral students and fifteen master's students. Available subjects were entered into the study until a sample size of twenty was reached. This was an exploratory study; however the researcher is not attempting to make conclusive analyses, therefore the small sample is sufficient. This is in line with what Creswell and Plano (2007: 112) stated: that "in terms of numbers, rather than selecting a large number of people or sites, the qualitative researcher identifies a small number that will provide in-depth information about each person or site".

3.5.   Data collection methods and instruments

Creswell (2013: 145) argues that "data collection involves much more: it involves gaining permission, conducting a good qualitative sampling strategy, developing means for recording information both digitally and on paper, storing the data, and anticipating ethical issues". Creswell (2013: 146) further looks at "data collection as a series of interrelated activities aimed at gathering good information to answer emerging research questions". There are various data collection methods that a researcher could employ: some of those are observations, questionnaires, interviews and focus groups interactions. The above-mentioned data collection methods have their own strengths and weaknesses.

The researcher employed questionnaires as the data collection method for this study in order to explore the information behaviour of masters and doctoral students at DUT. This method was selected because it gives the respondents a total freedom when answering the questions. The freedom the participants have involves time, their physical space and being able to respond at their own pace. The researcher constructed questionnaires with mainly open-ended questions and few more closed-ended questions. Open-ended questions give participants a chance to open up about their experience; in this instance about their information behaviour.

3.5.1. Data collection instrument

A questionnaire is a printed self-report form designed to elicit information that can be obtained through the written responses of the subjects. According to Babbie (2007: 246) a questionnaire is "a document containing questions and other types of items designed to solicit information appropriate for analysis". The "information obtained through a questionnaire is similar to that obtained by an interview, but the questions tend to have less depth" (Burns and Grove 1993: 368). The researcher used open-ended questions whereby participants were asked to provide in-depth answers.

The researcher also used closed-ended questions whereby the participants were asked to select answers from a list provided. Data was collected with the aid of questionnaires to investigate the behaviour of students while interacting with e-environments within DUT campuses and off-campus. The questionnaires were hand-delivered to the two Research Commons at DUT. The researcher is aware of the advantages and disadvantages connected with the use of questionnaires.

3.5.1.1. *Advantages of questionnaires*

According to Blumberg, Cooper and Schindler (2008: 298) "self-administered surveys of all types typically cost less than personal interviews". With questionnaires one can contact a large number of people at a relatively low cost (postal, hand delivered and telephone). Participants can take more time to collect facts to answer the questions and give detailed answers. Questionnaires are considered more impersonal, providing greater anonymity than other communications models. Surveys must be concerned with protecting respondents' privacy and assuring confidentiality of responses (Fink 2013: 1).

3.5.1.2. *Disadvantages of questionnaires*

Questionnaires sent to a corporation without a personal name will often not be returned as the general mail office of the corporation might not know to whom the questionnaires should be forwarded (Blumberg, Cooper and Schindler 2008: 298). Blumberg, Cooper and Schindler (2008: 299) believe that a major limitation of self-administered questionnaire concerns the type and amount of information that can be secured. Non-response error is also one of the weaknesses of questionnaires. It is believed that the response rate in questionnaires is typically low. The researcher planned to conduct follow-ups to try and counteract this weakness.

3.5.2. Data analysis and interpretation

Blumberg, Cooper and Schindler (2008: 690) stated that "once the data begin to flow in, attention turns to data analysis". This section discusses data preparation, which includes editing, coding

and data entry. The researcher cleaned and edited the data before the analysis and interpretation process. Cleaning of data involves editing, which "detects errors and omissions, corrects them where possible, and certifies that minimum data quality standards have been achieved" (Blumberg, Cooper and Schindler 2008: 441). The reasons why the researcher has to do some cleaning and editing of data are, as stated by Blumberg, Cooper and Schindler (2008: 690), that data should be:

- accurate

- consistent with the intent of the question and other information in the survey

- uniformly entered

- complete

- arranged to simplify coding and tabulation.

The researcher organised data by means of coding using software called Statistical Package for Social Sciences (SPSS) edition 22. The researcher coded data while bearing in mind the objectives of the study. According to Blumberg, Cooper and Schindler (2008: 692) "coding involves assigning numbers or other symbols to answers so that the responses can be grouped into a limited number of classes or categories". The researcher used content analysis for open-ended questions; Blumberg, Cooper and Schindler (2008) believe that coding open answers is useful in grasping the structure of the information collected. Berelson (1952) described content analysis as "a research technique for the objective, systematic, and quantitative description of the manifest content of a communication". Content analysis measures the semantic content or the "what" aspect of a message (Blumberg, Cooper and Schindler 2008: 696). Using SPSS, the content was then represented by codes allocated by the researcher.

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3.6. Ethical Considerations

Ethics is the study of "right behaviour" and "addresses the question of how to conduct research in a moral and responsible way: these are moral principles, and standards of behaviour that guide moral choices about our behaviour and our relationships with others" (Blumberg, Cooper and Schindler 2008: 154). Conducting research in an institution or anywhere else requires permission to collect data from individuals and sites and this permission can be gained at three levels: as Creswell and Plano (2007: 113) indicated, from individuals who are in charge of sites; from people providing data (and their representatives); and from campus-based institutional review boards (IRBs).

Daniel (2012: 239) believes that participation in research imposes a burden on participants and it is unethical to subject participants to any unnecessary burden. Therefore it is necessary to recognise and protect the rights of human subjects. It is observable that "the conducting of research requires not only expertise and diligence, but also honesty and integrity" (Grove, Burns and Gray 2013: 159). The benefits of the study, the participant's rights, and protection were explained. The researcher observed these ethical issues and took into consideration all other related matters as follows:

3.6.1. Approval from the university

According to Blumberg, Cooper and Schindler (2008: 157) "securing informed consent from participants is a matter of fully disclosing the procedures of the proposed survey before requesting permission to proceed with the study". Before the researcher embarked on collecting any data from the participants, the researcher received clearance from the Faculty Committee for Research Ethics, under the Faculty of Engineering, Built Environment and Information Technology, University of Pretoria. The researcher was given a go-ahead to conduct the research.

3.6.2. Informed consent

The researcher anticipated and addressed ethical issues because the researcher drafted a letter of consent giving the participant an opportunity to clearly understand the objectives of the study and also giving them an opportunity to accept or decline from participating in the study. The letter of consent formed an agreement between the researcher and the participants. Having received the consent of the respondents, the researcher was obliged to stick to the procedures outlined in the agreement (Blumberg, Cooper and Schindler 2008).

3.6.3. Harm and risk

The participants were also assured that they would not be exposed to any dangers of any sort: however the participants were given an option to retreat from participating in this study if they felt exposed to any dangers.

3.6.4. Privacy, confidentiality or anonymity

The participants were assured of their right to privacy, ensuring that their personal information was kept confidential at all times and will be discarded once the study is completed.

3.7.   Conclusion

This chapter discusses the methods the researcher used in conducting this study. Since the study was largely a qualitative research design it employs a purposive sampling strategy. The questionnaire method was used to collect data and "SSPS" software was used to analyse the data. Data was presented in tables, charts and graphs to ease interpretations of the findings. The key ethical research considerations like anonymity, confidentiality and informed consent were followed strictly.

Chapter 4
4. Presentation and Discussion of Findings

4.1. Introduction

This chapter presents and discusses the findings from the self-administered questionnaires which were distributed to masters and doctoral students of DUT. The first part of this chapter will present the findings in the same sequence as questions and themes arranged in the instrument and the second part will discuss the findings.

The researcher distributed twenty five (25) questionnaires to masters students with intention to get fifteen (15) respondents. The researcher also distributed fifteen (15) questionnaires to doctoral students with a hope of getting five (5) doctoral students.

Data is presented in tables and charts in accordance with the advice of Govaert (2010: 2) who states that "data are generally represented in a rectangular table with n rows for the individuals and p columns corresponding to the variables".. Open ended questions are separately arranged because the answers are narrative and have been analyzed using content analysis. The closed ended questions are also arranged separately using tables and charts.

4.2. Type of respondents

It is important to describe the kind of respondents from whom the data was collected; this gives a clear understanding and characteristics about them. The characteristics involve their qualifications, faculties and the year of their study. The sample size consisted of twenty (20) respondents and they were categorized into fifteen (15) masters and five (5) PhD students. Fifteen of the masters students returned the questionnaires, giving a response rate of 100% for that group

and making 75% of the entire sample. The response rate for the PhD students was also 100% which made 25% of the entire respondents.

4.2.1. Qualification pursued

The total number of participants who were intended to partake in this study was twenty (20) inclusive of masters and PhD students. The pie chart below shows the 75% (15) which were masters and 25% (5) which were PhD students participated in this study. The chart shows that the researcher managed to receive 20 respondents out of twenty that was intended, making a 100% response rate in both masters and PhD qualifications. **Figure 1** below presents the qualification pursued in percentages.
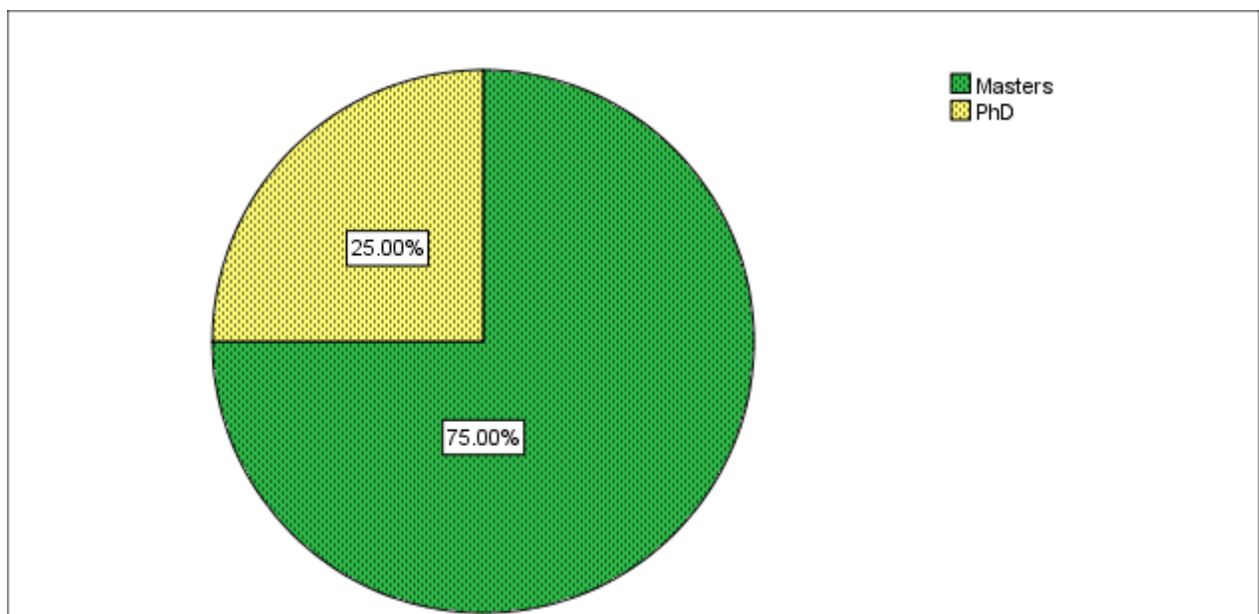
Figure 3: Qualification pursued

4.2.2. Year of study

The **Table 1** below shows that, of the fifteen masters students who participated in this study, nine (9) of them were doing 1st year and three (3) were doing 2nd year and another three (3) were doing 3rd year. In the PhD level out five (5) students two (2) of them were doing their 1st year, another two (2) were doing 2nd year and one (1) of them was doing 3rd year.

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		What year of study i.e. 2nd year PhD/Masters			
		1st Year	2nd Year	3rd Year	Total
What qualification are you pursuing	Masters	9	3	3	15
	PhD	2	2	1	5
Total		11	5	4	20

Table 1: Year of study cross-tabulation

The **Table 2** below shows that from the entire respondents across all levels and disciplines eleven (11) of which were 1st years, constituting 55% of the respondents, five (5) of which were 2nd years, constituting 25% of the respondents and four (4) were doing 3rd year which also constituted 20% of the respondents. The percentages and numbers are shown in the table below.

|	Frequency	Percent	Percent	Cumulative Percent
1st Year	11	55.0	55.0	55.0
2nd Year	5	25.0	25.0	80.0
3rd Year	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Table 2: Year of study and percentages

4.2.3. Disciplines of respondents

The majority of the respondents were studying Management Sciences: they constituted seven (7) masters respondents and four (4) PhD students as shown in **Table 3** below. The seven (7) masters and four (4) PhD students of Managements Sciences constituted 55% of the sample as presented in the **Figure 2** below. The rest of other faculties were sitting at 10% of which were all masters students where all were represented by two respondents, except Engineering which was represented by one (1) respondent coming from the Engineering faculty, making 5% of the respondents.

|		What qualification are you pursuing		
		Masters	PhD	Total
Please tick your Faculty	Arts	2	0	2
	Engineering	0	1	1
	Applied Science	2	0	2
	Accounting & Informatics	2	0	2
	Health Sciences	2	0	2
	Management	7	4	11
Total		15	5	20

Table 3: Disciplines of respondents
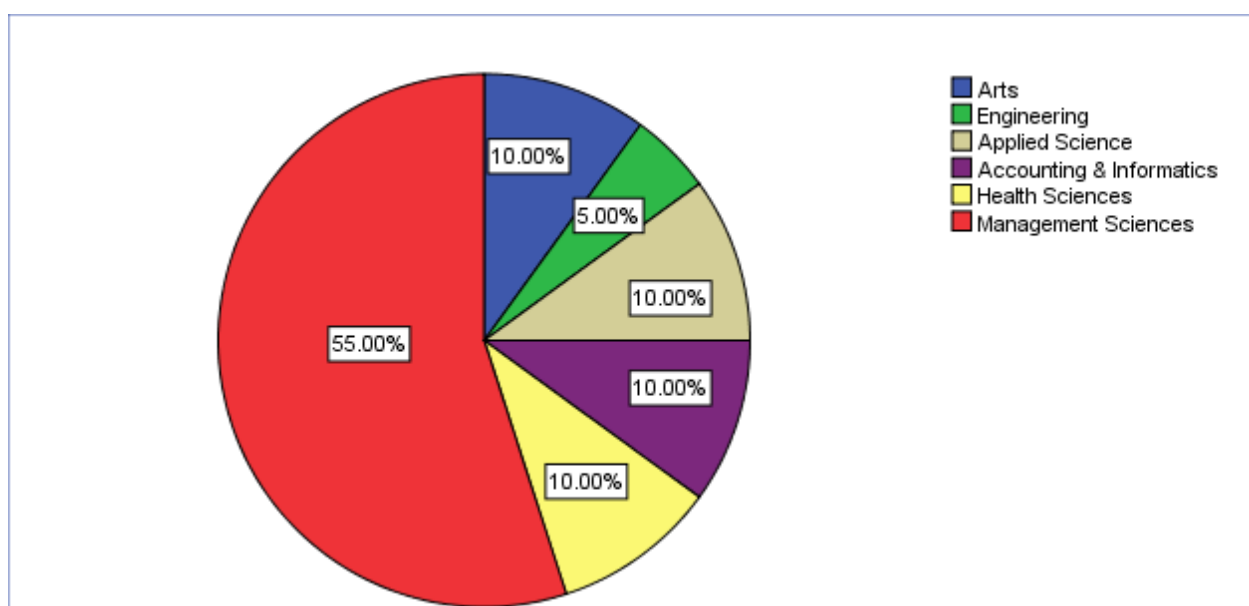
Figure 4: Disciplines in percentages

4.3.   Information searching and preferred formats

Out of twenty (20) respondents, seventeen (17) of them prefer electronic formats when searching

for information within the library, while three (3) of them prefer the printed format of information.

When respondents were asked why they prefer print or electronic, those who prefer the electronic

format stated that "electronic information is easily accessible, easy to share and carry it all around

without any hassles".
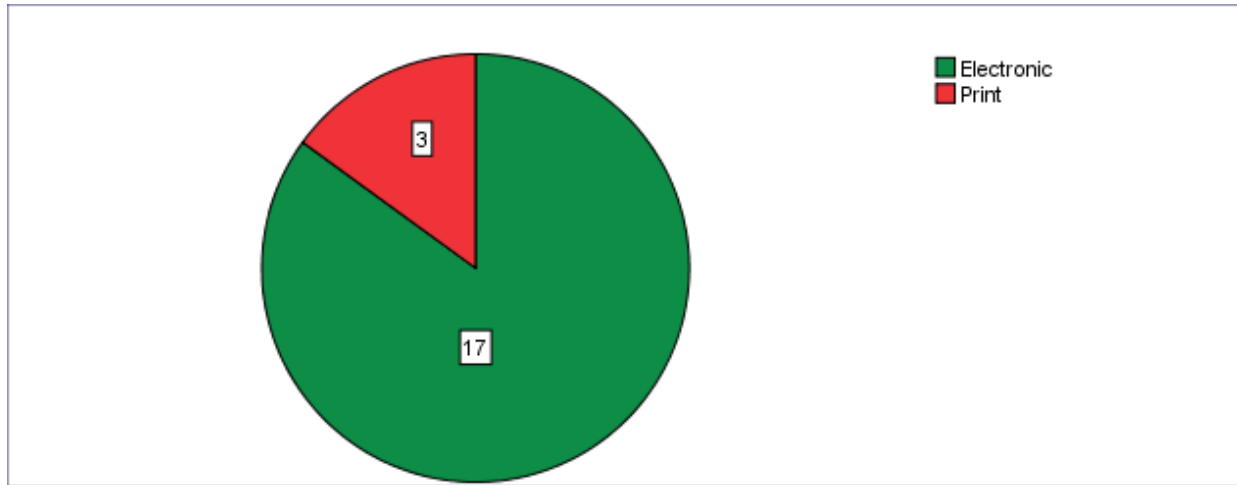
Figure 5: The preferred format

The respondents who prefer printed format pointed out that "printed format is the reliable format one could ever get and use". That means that 85% of the respondents prefer electronic version of information over printed materials while 15% prefer printed format.

			What qualification are you pursuing		
If "yes", in what format do you prefer?			Masters	PhD	Total
Electronic	What year of study i.e. 2nd year PhD/Masters	1st Year	7	2	9
		2nd Year	3	2	5
		3rd Year	2	1	3
	Total		12	5	17 (85%)
Print	What year of study i.e. 2nd year PhD/Masters	1st Year	2		2
		3rd Year	1		1
	Total		3		3 (15%)
Total	What year of study i.e. 2nd year PhD/Masters	1st Year	9	2	11
		2nd Year	3	2	5
		3rd Year	3	1	4
	Total		15	5	20

Table 4: Year of study, qualification and the format preferred cross tabulation

The Table 4, above, depicts that the 85% (17) of those respondents were made by twelve (12) masters students and all five (5) PhD students who preferred electronic format. From the twelve (12) masters students seven (7) were doing 1st year, three (3) were doing 2nd year and two (2)

were doing 3rd year. The 15% (3) who prefer printed format was made up by three (3) masters students only whom two (2) of them were doing 1st year and one (1) was doing 2nd year as shown in Table 4 above.

		If "yes", in what format do you prefer?		Total
		Electronic	Print	
Please tick your Faculty	Arts	1	1	2
	Engineering	1	0	1
	Applied Science	1	1	2
	Accounting & Informatics	1	1	2
	Health Sciences	2	0	2
	Management	11	0	11
Total		17	3	20

Table 5: Faculty and preferred format cross tabulation

The **Table 5** above shows that, of the 85% of respondents who prefer electronic format, eleven (11) of them came from Management Sciences, two (2) from Health Sciences and one (1) respectively came from Faculty of Arts, Accounting & Informatics, Applied Sciences and Engineering. Of the 15% who prefer printed format each respondent came from the respective faculties Arts, Applied Science and Accounting & Informatics.

The 85% (17) of the participants who prefer information in an electronic format were then asked why they prefer information in this format. They said the following: "it is easy to access, understand and share information amongst each other", "it saves time and also it is convenient". The respondents also stated that most journals are electronic and the electronic format has current information. The 15% (3) of the participants who prefer the information in a printed format stated that, "it is easy for me to comprehend something that is printed". Another comment they made was "it is easy for me understand something that I carry all the time". The respondents also stated

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that, "I prefer printed format because information is easily readable in print and it is the most appropriate format for learning".

4.3.1. Abilities in using library electronic resources

The respondents were asked to indicate their abilities in using a number of library resources. Amongst those resources there were OPAC (library catalogue) and Summon (the DUT Library discovery tool). The **Table 6** below shows that at masters level only two (2) respondents were extremely confident in using Summon, followed by two (2) who were very confident, four (4) who were confident, another four (4) were fairly confident and two (2) who were not confident at all. One respondent did not answer this section.

		Ability in Summon				
		Not confident	Fairly confident	Confident	Very confident	Extremely confident
		Count	Count	Count	Count	Count
Qualification pursued	Masters	2	4	4	2	2
	PhD	1	2	0	1	1

Table 6: Qualification and ability in using Summon cross tabulation

In the PhD level only one (1) respondent was extremely confident in using Summon, one (1) was very confident, two (2) were fairly confident and one (1) was not confident.

4.3.2. Participants familiarity with electronic resources

Participants were requested to tick any library resources they were familiar with. The list included the following resources: Summon, OPAC, eBooks, Institutional repository, databases, e-journals and Google Scholar.

	Frequency	Percent	Percent	Cumulative Percent
Not selected	12	60.0	60.0	60.0
Selected	8	40.0	40.0	100.0
Total	20	100.0	100.0	

Table 7: Summon familiarity

The Table 7, above, indicates that twelve (12) respondents did not tick Summon as the resource they were familiar with but only eight (8) respondents showed that they were familiar with Summon.

	Frequency	Percent	Percent	Cumulative Percent
Not selected	16	80.0	80.0	80.0
Selected	4	20.0	20.0	100.0
Total	20	100.0	100.0	

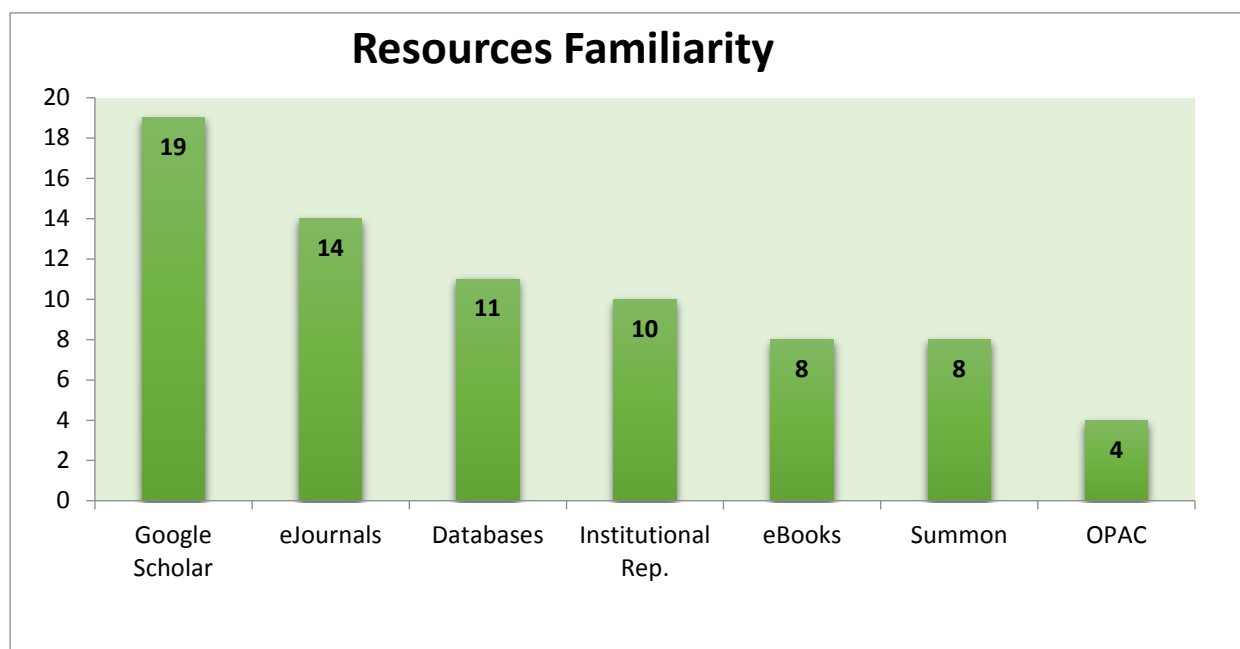**Table 8:** OPAC familiarity

The **Table 8** above shows that sixteen (16) respondents were not familiar with the library catalogue (OPAC) and only four (4) were familiar with the OPAC.

Figure 6: Resources familiarity

The respondents were asked which one of the resources (as presented in the **Figure 5** above) are they familiar with and they were given an option to select more than one: the list was Summon – library's discovery tool, OPAC – the library's catalogue, eBooks, databases, institutional repository, e-journals and Google Scholar. The results, as shown above in the bar chart, indicate that Google Scholar, selected by nineteen (19), was the resource most respondents were familiar with, followed by e-journals with fourteen (14) ticks, databases with eleven (11) ticks, institutional repository with ten (10) ticks, eBooks and Summon sitting at eight (8) ticks respectively and the library catalogue (OPAC) was the least sitting at four (4) ticks.

It came as a surprise that the OPAC was the least-selected option amongst the list because it is believed that it is amongst the most heavily-used resources in the library. In fact it is supposed to be the leading resource because it holds records of all of the library's collection and it should be the user's point of departure when searching for information. Almost all respondents are familiar with Google Scholar: this is an interesting finding because DUT academic and Library staff seems to have an idea that students are reliant to Google Scholar and indeed research has proven that idea.

4.3.3. Summon: the DUT Library discovery tool

Summon is the DUT Library's discovery tool, which is used to search for information in a variety of formats from hard to soft copies. It works like Google as it has one search box that harvests information from a number of other resources, from OPAC to databases, institutional repository, eBooks and e-journals.

		Do you use SUMMON??		
		No	Yes	Total
Qualification pursued	Masters	5	10	15
	PhD	2	3	5
Total		7	13	20

Table 9: Qualification pursued and the use of Summon cross-tabulation

The respondents were asked if they use Summon; **Table 9,** above, shows that five (5) masters students responded "no" and ten (10) responded "yes". In the PhD level two (2) respondents selected "no" and three (3) selected "yes". In the total sample seven (35%) of respondents do not use Summon and 13 (65%) respondents do use Summon.

The interesting part is that when respondents were asked if they use Summon 65% of them answered "yes" and 35% answered "no". The reason why this is interesting is because in the above question where respondents were asked if they are familiar with Summon they only selected Summon eight times, which is 60%. This shows that the majority of the users in the library are using Summon yet they are not necessarily familiar with it. The 65% of respondents who answered "yes" constituted thirteen (13) respondents of which ten (10) of them were masters students and three (3) of them were PhD students. Those who answered "no" constituted five (5) masters and two (2) PhD students, which were seven (7) in total making 35% of the sample.

4.4. Information Literacy (IL) attendance

Information Literacy (IL) training offers both basic and advanced trainings and this training is developed by the library to provide user education on how to use the library. The primary focus of this training is to teach users on how to use Online Public Access Catalogue (OPAC), Summon (discovery tool), databases and other library resources.
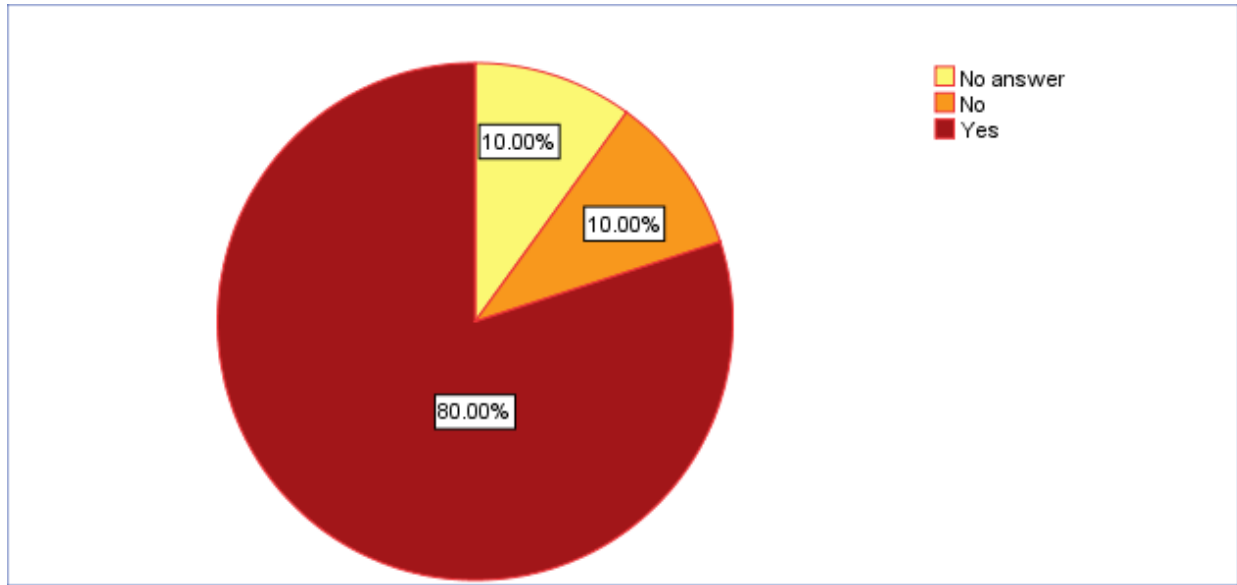
Figure 7: Information Literacy attendance

Respondents were asked if they have attended any of these IL trainings arranged by the library. Out of fifteen (15) masters students, twelve (12) answered "yes" and two answered "no" and one (1) did not answer and this was taken as a missing value. Out of five (5) PhD students, four (4) of them answered "yes", one (1) did not answer and this was also taken as a missing value.

The 20% of the respondents who did not attend IL training were requested to specify as to why. The 5% (1) of those respondents said "I do not know about this training", 5% (1) said "I was never invited", other 5% (1) said "I do not need this type of training" and the last 5% (1) did not answer.

		IL training attended?		OPAC Familiarity		Summon Familiarity	
		No	Yes	Not selected	Selected	Not selected	Selected
		Count	Count	Count	Count	Count	Count
Qualification	**Masters**	2	12	11	4	9	6
	PhD	0	4	5	0	3	2

Table 10: IL attendance, OPAC and Summon familiarity cross tabulation

It is interesting to note that out of twelve masters students who have attended IL trainings only four have indicated that they are familiar with the OPAC, as indicated in the **Table 10** above. All four PhD students have indicated they are not familiar with the OPAC yet they have indicated

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that they have attended the IL trainings. Of the total number of both masters and PhD respondents only four (4) out of twenty (20) indicate that they are familiar with the OPAC. The rest of the respondents (16) are not familiar with the OPAC. Summon is the tool whereby all students are expected to start off their searching and could potentially retrieve or access information from a number of resources, for an example from the catalogue, databases, eBooks. But for some reasons Summon was one of the resources with minimum selections in terms of familiarity.

4.5.   Searching strategies used to search the information sources in order to get relevant information.

In the questionnaire the graphic was presented depicting the Marchionini Information Search Process (ISP) model and participants were asked if they follow the search model if they are looking for information in the library.
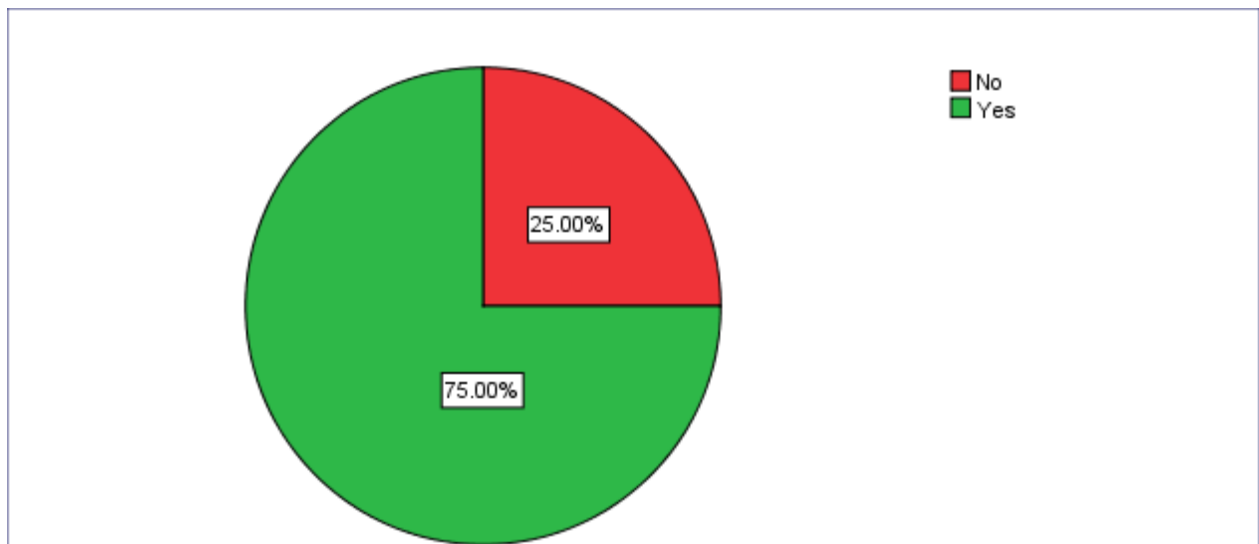
Figure 8: The use of Marchionini's Information Search Process (ISP) Model

Out of twenty (20) respondents across all faculties 75% of them responded "yes" and 25% responded "no". The 75% was constituted by eleven (11) masters students and four (4) PhD

students. The 25% was made up by four (4) masters and one (1) PhD respondents, as indicated in the **Table 11** below.

		What qualification are you pursuing		
		Masters	PhD	Total
Do you follow Marchionini	No	4	1	5
Info Search Process Model?	Yes	11	4	15
Total		15	5	20

Table 11: Marchionini ISP and qualification pursued cross tabulation

4.6.   Reference management software

Reference management software is bibliographic software that students and scholars use to manage citations and references. There are different types of application. To mention a few: EndNote, RefWorks and Reference Manager. DUT officially uses EndNote and students are trained by the librarians on how to use this application. The participants were asked if they use these applications. Table 12 and Figure 6 show figures and percentages how participants responded.

	Frequency	Percent	Percent	Cumulative Percent
No	6	30.0	30.0	30.0
Yes	14	70.0	70.0	100.0
Total	20	100.0	100.0	

Table 12: The use of reference management software
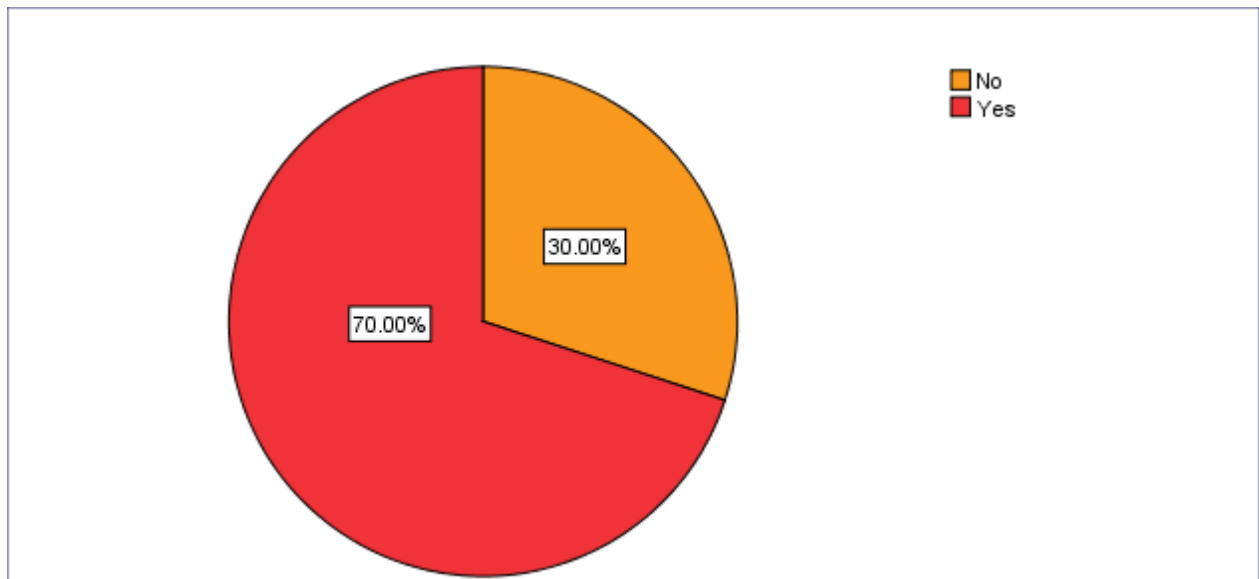
Figure 9: The use of reference management software

Out of the sample of 20 respondents, fourteen (70%) of the respondents said they use reference management software and six (30%) said no. Of the 30% of those who are not using this software, 5% of them did not provide any reasons why they are not using reference management software. The other 5% of those who are also not using these applications felt that these tools are too difficult to use, and the 15% preferred doing their references manually and 5% felt that these applications have too many technological problems.

The above **Figure 7** represents the total number of 30% (6) participants who are not using reference management software. Of the 70% (14) of participants who are using these applications, 11 of them are using EndNote and 1 is using RefWorks, as shown in the **Table 13** below.

| | | What qualification are you pursuing | | |
		Masters	PhD	Total
If "yes", which one do you use?	EndNote	11	2	13
	RefWorks	1	0	1
Total		12	2	14

Table 13: Reference management software and qualification pursued cross tabulation

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Of the thirteen (13) respondents who are using EndNote as their reference management software, eleven of them are masters and two (2) of them are PhD students. The one (1) respondent who was using RefWorks was studying at the masters level, as indicated in **Table 13** above.
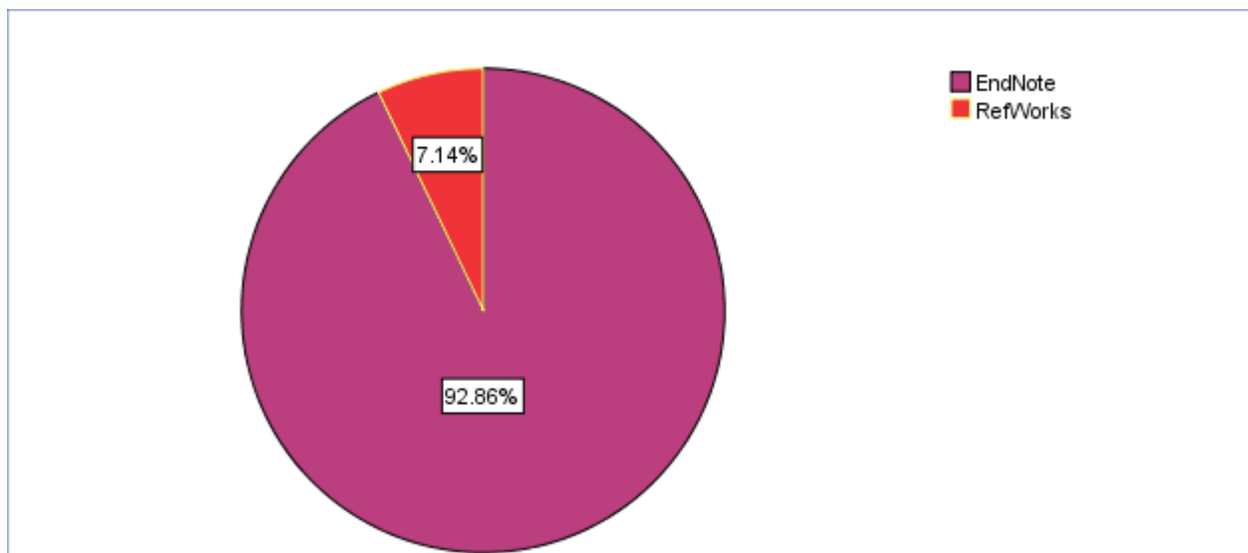
Figure 10: The use of Reference Management Software

4.6.1.   Social Media usage

The participants were asked if they do use social media for research purposes in the library, 15 (75%) of them said "no" and 5 (25%) of them said "yes", as shown in **Table 16** and **Figure 9** below.

Do you use social media?	Frequency	Percent	Percent	Cumulative Percent
No	15	75.0	75.0	75.0
Yes	5	25.0	25.0	100.0
Total	20	100.0	100.0	

Table 14: Social media

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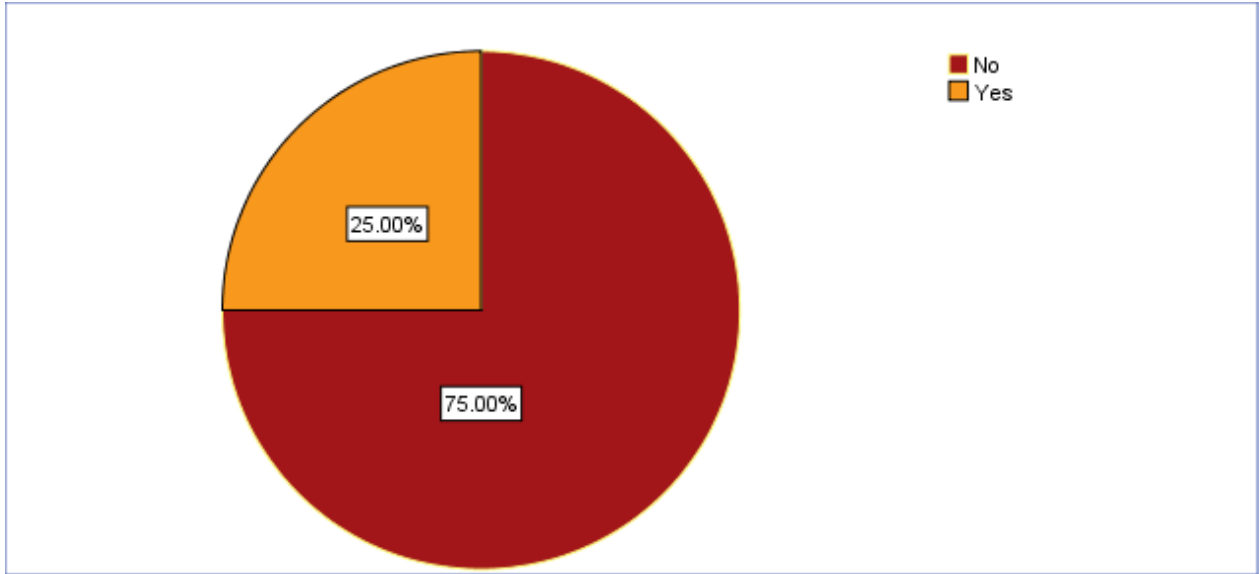
Figure 11: The use of social media

The 75% of these respondents who said "no" were made up of eleven (11) masters and four (4) PhD students. The 25% of respondents who said "yes" were made up of four (4) masters and one (1) PhD student.

4.7. Challenges face by the respondents when searching for information

Participants were asked if they face any challenges when navigating the library's electronic resources: 80% of the participants across all faculties answered "no", and 20% answered "yes". Of the 80% of the participants who said "no", eleven (11) of them were masters students and five (5) of them were PhD students. The 20% of the participants who said "yes" constituted four (4) masters students.

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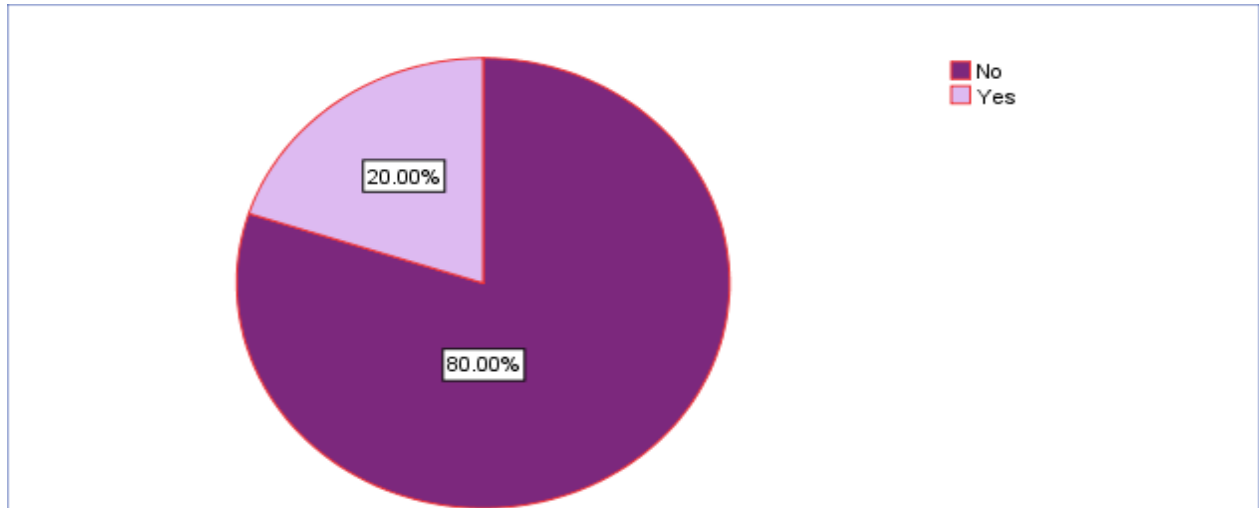
Figure 12: Challenges faced when searching for information

Four (4) respondents indicated that they do face challenges navigating the library's electronic resources. These respondents were all masters degree students, from the following faculties: Applied Sciences, Arts, Accounting and Informatics and Management Sciences. When they were asked to indicate the cause of the challenges, this is what they had to say: "It is difficult to use library's system", and "DUT Library does not subscribe to most databases, articles and databases are not linked".

		Do you face any challenges navigating the library's electronic resources?		
		No	Yes	Total
What qualification are you pursuing	Masters	11	4	15
	PhD	5	0	5
Total		16	4	20

Table 15: Qualification pursued and challenges faced cross tabulation

4.8. The fulfilment of Information needs

Participants were asked if the available online resources in the library do fulfil their information needs. Twelve (12) participants answered "yes" and these were masters students and five (3) answered "no" and all five (5) PhD students answered "yes" as indicated in the Table 15 below.

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		Do you think the available online resources in the library fulfil your information needs?		
		No	Yes	Total
What qualification are you pursuing	Masters	3	12	15
	PhD	0	5	5
Total		3	17	20

Table 16: Qualification pursued and available library resources

Participants were asked what they think DUT Library can do to support their information needs. The **Figure 11** below depicts that, out of twenty (20) respondents, five (25%) of them did not give any answer and three (15%) respondents said that the library should get more online resources, and five (25%) of them said "The library should get more trainings on how to use the library resources".
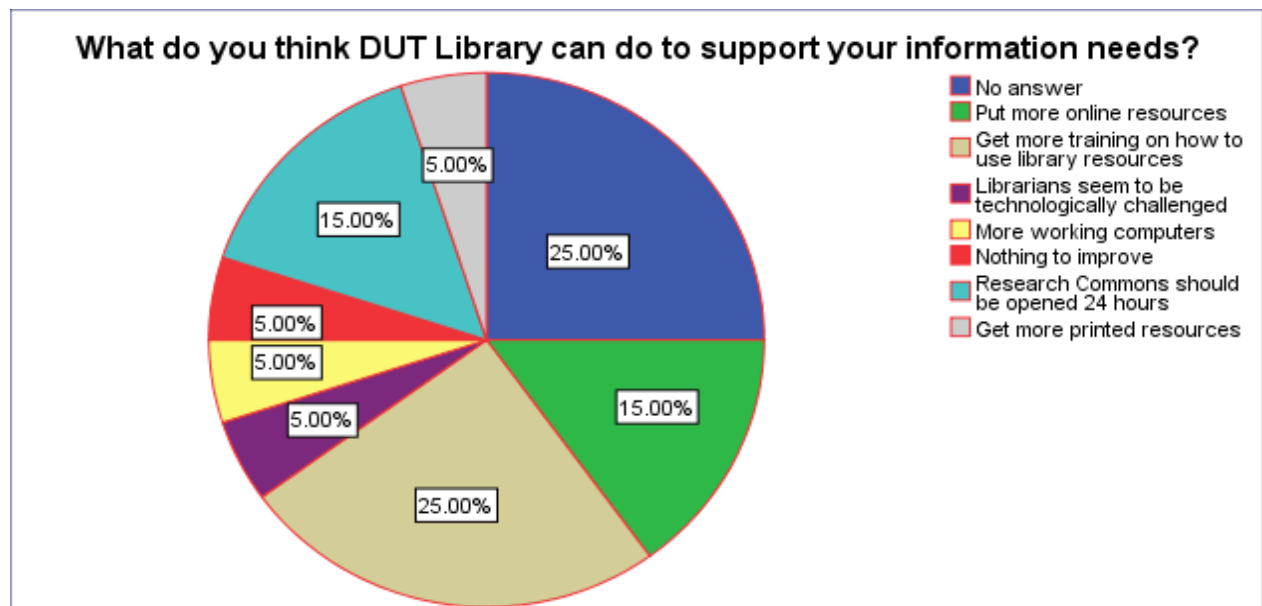
Figure 13: What library can do to support information needs

One (5%) respondent said "librarians seem to be technologically challenged"; another one (5%) respondent said the library should have more working computers. Another one (5%) respondent said "there is nothing to improve in the library: all is in order". Three (15%) of them said "research

commons should be opened 24 hours" and the last one (5%) of them said "the library should get more printed resources".

4.9. Conclusion

The chapter presented the key findings systematically as it was outlined in the questionnaire. The respondents seemed to be satisfied with the library resources; however, there are certain areas whereby the library can improve, the recommendations in the concluding chapter are based on the findings, which also points out those areas needing improvement.

Chapter 5
5. Summary, Conclusions and Recommendations
5.1. Introduction

This final chapter presents a summary of the findings as presented in the previous chapter and presents conclusions and recommendations.

Information Technology (IT) has a direct influence on information behaviour, ranging from the formats of information used and the way that information is searched, to the range of tools used. This is informed by the varied needs of the DUT students, which has a direct link to the way library services are offered.

Consequently, the library has no option but to embrace technology and also keep up with it all the time. The library used to keep video tapes (VHS) before but today this format is obsolete and the library is storing DVDs because technology has advanced and users also follow the trends: therefore the library cannot continue to keep something that is outdated and not appealing to the users. For an academic library to adequately address the information needs of its users, it is pertinent for the library to know more about the information the patrons use and value and what influences their information searching and usage.

The purpose of this study was to examine information-seeking needs of the postgraduate students at the two campuses of Durban University of Technology, ML Sultan and Steve Biko, and to assess if they are in a state of providing effective library services and IT-support. It is evident that the DUT Library has fulfilled all the necessities to meet the information demands of the students; however there are gaps to be filled. This research has tried to answer the following main question, as stated in chapter one: how has the integration of information technology influenced the information-seeking and searching behaviours of the masters and doctoral students

at DUT Library?

5.2.   Summary of the findings

This section exhibits the summary of the findings as presented in chapter four. The summary is

presented in accordance with the layout of the instrument used (questionnaire).

5.2.1. Information behaviour and search patterns

The study findings indicate that the DUT postgraduate students use a variety of sources in the

library ranging from print to electronic formats; however the study found that electronic format

takes dominance over printed format. The reason behind the dominance of electronic format over

printed format is that respondents found electronic formats more user-friendly, easy to access,

use and share. Above all, students stated that they prefer the electronic format because it carries

the current information as compared to the printed format. The study findings indicate that many

users lack skills in using the online resources offered by DUT Library, students have shown that

there is huge lack of confidence in interacting with the so-called popular resources in the library

like OPAC, Summon and eBooks.

The study indicates that the majority of respondents have no difficulties in navigating the

integrated searching system of DUT Library: moreover, those who have difficulties stated that

"there was not enough information for their field" and that "DUT does not subscribe to variety of

databases", indicating that this was because of a weakness in collection management rather than

the searching mechanisms.

Searching for information requires some skills in order to accomplish the desired information

goals. In order for someone to be able to search for information the individual has to understand

his/her problem. The information searching skills require a combination of formulating keywords

and combining search terms, narrowing down the broad terms into more specific terms and also bearing in mind the possibility of occurrence of synonyms. The findings of the study indicate that the majority of the respondents were following Marchionini's Information Search Process model and this is a clear indication that library's Information Literacy trainings have had a positive impact on the search behaviour of some students. Of those respondents who were not following Marchionini's model, the findings revealed that they preferred their own ways of searching. The findings showed that some respondents did not understand the question.

5.2.2. Awareness of availability of electronic resources at DUT

The DUT library uses a variety of online resources for its users to access information. These resources include the OPAC, Summon, eBooks, the DUT institutional repository, databases, e-journals and Google Scholar. The respondents were asked whether they were aware of the above-mentioned information sources that existed in the Durban University of Technology. The findings indicate that most respondents were not familiar with Summon, even though Summon is the priority when the IL sessions are conducted. Summon continues to provide those students who use it with relevant information as the findings suggested.

The study also found out that the OPAC is amongst the resources students were familiar with in the library while eBooks is one of the resources respondents were not familiar with. There was a fair balance of familiarity with the institutional repository. The respondents showed a greater familiarity in using e-journals. The greatest familiarity showed by respondents was with the use of Google Scholar: this shows that Google Scholar continues to be amongst the leading online resources students preferred.

Despite the fact that respondents were not familiar with some library online resources the findings

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exemplify that the online resources they were familiar with fulfil their information needs.

The study found out that the majority of the respondents did attend IL classes; some of those who did not attend were not aware of such training events, and some were not interested in such library interventions.

DUT subscribes to EndNote as its campus-wide reference management software. The use of reference management software has become a critical factor in research work but not every researcher has the same mentality. This has been found through this study that some researchers preferred arranging their references manually as compared to the usage of these bibliographic applications; however it interesting to note that the majority of the respondents were using EndNote. The respondents who were not using reference management software gave as a reason that they found it technological challenging and time consuming.

Researchers in many institutions are using social media as their collaborative tool: unfortunately that is not the case at DUT: the study found out that respondents were not using social media for research purposes.

5.2.3. Challenges faced by students in an electronic environment

Information technology is evolving at an accelerating rate; this advancement requires relevant skills to use and comprehend its value. Despite the fact that the majority of respondents do not face any challenges in using online resources one could not deny the fact that there were those who are struggling to use them. Amongst the challenges faced by the minority of respondents were that these online resources were difficult to use and that there are insufficient resources to use within DUT libraries. The biggest challenge was that respondents believed that Google Scholar was the only solution to their information needs as compared to the freely-available online

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resources to which DUT library subscribed. Some of the respondents remarked that they knew nothing about IL training sessions. Other respondents suggested that there were limited number of IL sessions for postgraduate students.

5.2.4. What can be done by the library

The respondents were asked whether the DUT Library was doing enough to support their information needs: the majority felt that the library was achieving this satisfaction of their needs; however, some felt otherwise. The respondents were asked what the Library can do to support their information needs. The following was amongst the answers they gave:

- The Library should put more emphasis on online resources

- The Library should organise more classes on how to use the library resources

- The Library should have more working computers

- The Research Commons should be opened 24 hours

- The Library should obtain more printed materials

- There is nothing to improve in the Library

Respondents also stated that there were technologically challenged librarians and that it is of the greatest concern to have such individuals in a field that embraces technology.

5.3. Conclusion

This study was designed to examine information-seeking needs and use of information resources of the researchers at the two campuses of Durban University of Technology, KwaZulu-Natal, South Africa, namely ML Sultan and Steve Biko, and to assess if they are providing effective library services and IT-support. The study investigated the following issues: information-seeking behaviour; information sources use; awareness of information sources in the university by postgraduate students; the sufficiency of resources; the use of information; and challenges faced by the student in the midst of seeking for information.

The study found that there is lot of work to be done in bringing information resources awareness within the university. Emmanuel and Jegede (2011: 252) argue that "it is pertinent that adequate knowledge about the information needs and seeking behaviour of the users is vital for developing library collections, services and facilities to meet their information needs effectively"; the study was trying to accomplish that mission.

5.4.   Recommendations

The findings of this study support the following recommendation for consideration by the Durban University of Technology Library, as well as other academic libraries in general:

- ***Information Literacy trainings***

As Information and Communication Technology (ICT) continues to emerge, there is a great demand for the Library to have more IL training, not only for postgraduate students but also for the undergraduate students. This is also informed by the respondents who indicated that they wanted more IL classes. The IL classes empower students to use the Library more competently. More IL classes will ensure that students are more familiar with the Library resources. Advanced-level IL sessions should be the priority for postgraduate students to ensure seamless access to information in all cost. These types of training sessions should focus on databases and incorporate information search processes and research strategies.

It was shocking to find out that students were not familiar with the use of the OPAC and Summon since these resources form the basis of the Library service. The researcher recommends that the Library should enforce the concept of integrating IL module across all programmes and that it should be compulsory. This will ensure that all students entering the University would have the necessary skills to confidently navigate the Library because they have been through IL training.

- *Library Marketing/ awareness*

Respondents indicated that there were not familiar with other Library resources, therefore the Library needs to bring awareness campaigns in promoting these resources. This can be achieved through brochures, website updates, meetings and the word of mouth. The use of displays is also recommended: however, displays should be clearly visible to the University community. The researcher also recommends the use of collaborative tools for researchers should also be promoted amongst the researchers.

- *Computer labs*

The study findings showed that respondents were complaining about malfunctioned computers in the Library. This gives an indication that the Library should get more computers and the maintenance plan should also be in place in making sure that these computers are functioning all the time.

- *Research Commons*

The Research Commons was created in response to the opportunities offered by ICT and a digital environment with a purpose to support research in the University. Respondents indicated that the Research Commons should be opened 24 hours a day. The researcher recommends that the Library should implement a self-service system whereby the researcher would be able to access the Research Commons even if there are no Library employees to supervise use, especially after hours.

5.5. Opportunities for further research

The usage of one instrument in this study could be one of its limitations, such that respondents could have misinterpreted or did not answer some questions and there was no follow up in such cases to ensure they understood the context. For further research such limitations could be minimised by using two more instruments, such as interviews or focus groups, to clearly

understand the information behaviour of postgraduate students. The study focused solely to DUT students, the researcher recommends further research should look at postgraduate students in all of the universities in KwaZulu-Natal or even in the entire South Africa.

Appendix A

Self-administered questionnaire

Title: The information behaviour of Durban University of Technology (DUT) masters and doctoral students with specific reference to the use of Information Technology (IT)

This questionnaire is intended to collect data from masters and doctoral students of DUT. The purpose of this study is to investigate information- seeking needs of the researchers at the two campuses of DUT, which are named ML Sultan and Steve Biko campuses, to ascertain if effective library services and IT support are being provided. Participants' personal details and data collected in this study will remain anonymous ensuring confidentiality of the participants.

Instructions: Please tick the appropriate box and fill in where required

A. Personal information

1. What qualification are you pursuing?

☐ Masters   ☐ PHD

2. What year of study i.e. 2nd year PhD/Masters

☐ 1st Year   ☐ 2nd Year   ☐ 3rd Year

☐ 4th Year   ☐ 5th Year   ☐ Other...................

3. Please tick your Faculty

☐ Arts   ☐ Engineering   ☐ Applied Sciences

☐ Accounting & Informatics   ☐ Heatlth Sciences   ☐ Management

B. What information-seeking behaviours do masters and doctoral students exhibit? –what are the information needs?

1. a)   Do you seek information from the library?

☐ Yes   ☐ No

b) If yes, in what format do you prefer?

☐ Electronic   ☐ Print

c) Why do you prefer information in that format?

…………………………………………………………………………………………………
…………………………………………………………………………………………………
……………………………………………………………………………………

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3. Please tick the appropriate box that describes your ability in using the library's online resources

Online resources	Extremely confident	Very confident	Confident	Fairly confident	Not confident at all
OPAC					
Summon					
Databases					
Institutional Repository					
e-Books platform					

4. a) Do you experience any difficulties when using either the online catalogue or the integrated library system to acquire information in the library?

☐ Yes   ☐ No

b) If yes, please explain what is your challenge

……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………………

5. a) Do you follow the steps as shown below when looking for information?

☐ Yes   ☐ No
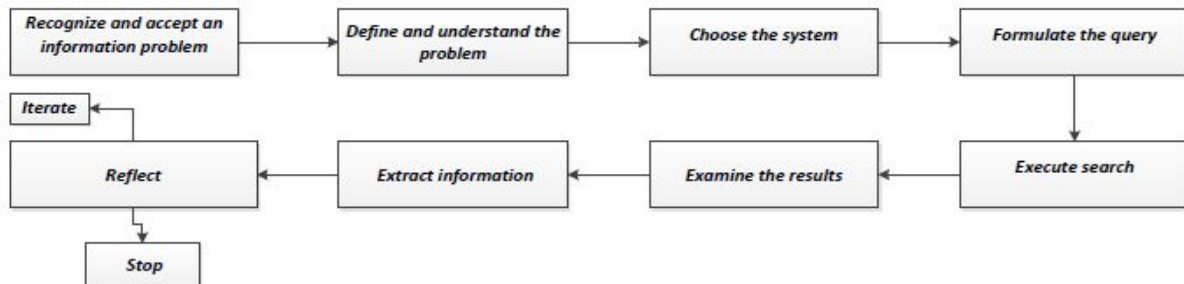
b) If no, please explain what is your preferred way of searching information

……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………..

C. **To what extent are masters and doctoral students aware of available library electronic resources?**

1. Which one of the following online resources are you familiar with? You may tick more than one.

☐ Databases

☐ Summon   ☐ OPAC/iLink   ☐ eBook platform

☐ Institutional Repository   ☐ e-Journals   ☐ Google Scholar

☐ Other, please specify…………………………………………

2. a) Do you think the available online resources in the library fulfil your information needs?

☐ Yes   ☐ No

  b) If no, which other online resources you would like to be introduced?
  ……………………………………………………………………………………………
  ……………………………………………………………………………………………
  ………………………………………………………………………………

3. a) When using online resources do you normally find what you need?

☐ Yes   ☐ No

  b) If no, please tell us what do you think is the cause of that
  ....
  ....
  ....

4. Where do you normally use these electronic resources?

☐ In the Library   ☐ On Campus   ☐ Off Campus   ☐ All of the above

5. a) Do you use Reference Management Software?

          ☐ Yes   ☐ No

  b) If yes, which one do you use?

☐ Endnote   ☐ RefWorks   ☐ Mendeley   ☐ Other, please specify

  c) If no, please tell us why
  ....
  ....

6. a) Have you attended any Information Literacy training(s) organized by the library?

☐ Yes   ☐ No

b) If no, please specify why
  ……………………………………………………………………………………………
  ……………………………………………………………………………………………
  ………………………………………………………………………………………

D. How do you use library electronic resources in fulfilling your information needs? – How do you interact with library's e-environment?
  1. a)   Do you use SUMMON? – Summon is the library's Discovery tool that works like Google?

☐ Yes   ☐ No

  b) If no, please tell us why
  ....
  ....
  ....

  2. a)   Do you use library's OPAC (Library Catalogue)?

☐ Yes   ☐ No

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   b) If no, please tell us why

....

....

3. What is your preferred tool to use in the library?

………………………………………………………………………………………………………

………………………………………………………………………………………………………

……………………………………………………………….

4. a) Do you use social media for research purposes in the library?

☐ Yes   ☐ No

   b) If yes, please tick the ones you normally use

☐ LinkedIn   ☐ ResearchGate   ☐ MyScienceWork

☐ Synapse   ☐ FaceBook   ☐ Twitter   ☐ BioMedExperts

☐ Other, please specify………………………

E. Do you face challenges in navigating library's electronic resources?

   1. a)   Do you face any challenges navigating the library's electronic resources?

☐ Yes   ☐ No

b) If yes, please tell us which are those challenges?

………………………………………………………………………………………………………

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F. What can DUT Library do to support masters and doctoral students' information needs?

   1. Do you think DUT Library is doing enough to support your information needs?

     ☐ Yes   ☐ No

   2. What do you think DUT Library can do to support your information needs?

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Appendix B

Informed consent form

(Form for research subject's permission)

(Must be signed by each research subject, and must be kept on record by the researcher)

1   **Title of research project**: *Information behaviour of Durban University of Technology Masters and Doctoral students with specific reference to the use of Information Technology (IT).*

2   I …………………………………………… hereby voluntarily grant my permission for participation in the project as explained to me by *Nhlanhla Nhleko.*

3   The nature, objective, possible safety and health implications have been explained to me and I understand them.

4   I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication.

5   Where recording is required, I have explicitly allowed to be recorded during the interview.

6   Upon signature of this form, you will be provided with a copy.

Signed: _____   Date: _____

Witness: _____   Date: _____

Researcher: _____   Date: _____

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