

**INFORMATION NEEDS, INFORMATION SEEKING BEHAVIOUR AND  
INFORMATION USE BEHAVIOUR OF RESEARCHERS AT THE FACULTY OF  
VETERINARY SCIENCE, UNIVERSITY OF PRETORIA AND HOW THESE NEEDS  
ARE BEING MET BY THE INFORMATION SUPPORT DELIVERED BY THE  
JOTELLO F SOGA LIBRARY**

**by**

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## DECLARATION

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I declare that the dissertation, ***Information needs, information seeking behaviour and information use behaviour of researchers at the Faculty of Veterinary Science, University of Pretoria and how these needs are being met by the information support delivered by the Jotello F Soga Library***, which I hereby submit for the degree **Magister Informatonis Scientiae** at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

The author, whose name appears on the title page of this dissertation, obtained the applicable research ethics approval to conduct the research described in this work. The author declares that she has observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the policy guidelines for responsible research.



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30 April 2015

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## LIST OF ABBREVIATIONS AND ACRONYMS

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ACRL -	Association of College and Research Libraries
ARC-OVI -	Agricultural Research Council – Onderstepoort Veterinary Institute
ASERL -	Association of Southeastern Research Libraries
CPUT -	Cape Peninsula University of Technology
DOAJ	Directory of Open Access Journals
DoHET -	Department of Higher Education and Training
ESI -	Essential Science Indicators
ISI -	Institute for Scientific Information
ISP -	Information Search Process
IT -	Information Technology
LIS -	Library and Information Science
NRF -	National Research Foundation
OCLC -	Online Computer Library Center, Inc.
SADC -	Southern African Development Community
SSA -	Sub-Saharan African
UP -	University of Pretoria
US -	United States
USA -	United States of America

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## ABSTRACT

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Higher education institutions in South Africa are pressured to produce high quality and quantity research output. In order to produce research, information is needed. Very little research has been done on the information needs of veterinary science researchers and the role and services of veterinary libraries. The aim of this study was to determine what the information needs, information seeking behaviour and information use behaviour of veterinary researchers are, and how these needs are being met by the library. Researchers and information specialists at the Faculty of Veterinary Science, University of Pretoria, were used as a case study. Both quantitative and qualitative data were collected by means of questionnaires, focus group interviews, a citation analysis and LibQual results (only as additional information). Descriptive statistics and thematic analysis were used to analyse the data. The study found that the information needs of researchers are influenced by the research environment, they need access to information and information resources and prefer electronic information sources. Although many of the information needs are addressed by current library services, a number of potential areas of improvement were identified. These include technical support with accessing online collections, support with research methodology and publishing, improved collection building practices and dedicated library spaces for researchers. Findings revealed a considerable gap between researchers' expectations from information specialists and their own perceptions of roles to fulfil. Researchers are often not aware of the information organising skills and expertise of information specialists. It is recommended that information specialists need to make researchers aware of their skills and expertise. The study contributes to the limited literature on the information behaviour of veterinary researchers and libraries supporting their needs.



## CHAPTER 1:

### INTRODUCTION AND BACKGROUND ON THE RESEARCH PROBLEM

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#### 1.1 INTRODUCTION

The traditional relationship between faculty researchers and the librarian has shifted radically in recent years because of factors such as technological innovations, digital access developments and networking opportunities and tools (Fry & Talja 2004; Herman 2001; Kroll & Forsman 2010; Neal 2009; Schonfeld & Guthrie 2007). Research libraries need to respond to the complex challenges and opportunities in new research environments and need to develop new processes, systems, tools and skills to support and assist the diverse needs of researchers (ASERL 2001:2). Several publications and studies, among others the Association of Southeastern Research Libraries (ASERL 2001), Brophy (2008), De Beer (2003), Fourie (2004), Haines, Light, O'Malley & Delwiche (2010) and Kroll and Forsman (2010), describe the new role of the librarian. Libraries thus have a notion of what support has to be given to the researchers they serve, but the question remains whether this support really meets the complex and dynamic information and research needs of faculty researchers. The aim of this study is to determine what support is needed from the librarians in order to meet the spectrum of information and research needs of faculty researchers and to support their information seeking behaviour as well as information use behaviour.

Research results from decades of user studies indicate differences in information needs and information behaviour of scholars of different fields of research and disciplines (Case 2007; Haines *et al.* 2010; Krikelas 1983; Sheeja 2010). What applies to findings from one discipline cannot without empirical evidence be translated to another. Since literature offers limited evidence on the information needs of veterinary science researchers, this study aims to address this gap.

Studies by Kahn (2011) and Pouris (2006) illustrate the emphasis on the research output of universities. In view of pressure from the National Research Foundation (NRF) in South Africa to increase research output in the international research environment, as well as encouragement for institutions to feature on national and international ranking lists of higher education institutions, South African universities compete ever more industriously for acknowledgement in the international research arena.

The University of Pretoria, which Pouris and Pouris (2010) refers to as one of the six South African universities to be included in the “top 1% of the world’s institutions cited in the international scientific literature”, strives to turn out high-quality research and scientific articles published in accredited journals, by a number of rated and recognised scientists. As a recognised research-intensive university, research is thus central to the University of Pretoria’s strategic plan (<http://www.up.ac.za/about-up/article/258153/vision-mission-values>).

The Faculty of Veterinary Science shares this vision. Animal health and wellbeing are important for humans, the economy and society as a whole. Veterinary research in South Africa is therefore essential in addressing “the complex needs of the various sectors of society that need veterinary input” (Swan & Kriek 2009:113).

With an increase in research, it might be expected that an increase in research support needs will be a consequence in the dynamic and competitive academic environment. It is therefore necessary to assess the current state of supporting services and resources from the library against the needs and expectations of the research environment and the information-seeking behaviour and information use behaviour of the researchers.

## **1.2 BACKGROUND**

A brief background of the Faculty of Veterinary Science, University of Pretoria, as well as an overview of the services and products provided by the Jotello F Soga Library, will serve as an introduction in order to place the study in better perspective.

### **1.2.1 Faculty of Veterinary Science, University of Pretoria**

The Faculty of Veterinary Science of the University of Pretoria at Onderstepoort (<http://www.up.ac.za/vet>) is the only faculty in South Africa that offers professional training of veterinarians and veterinary nurses, as well as postgraduate specialists in 22 veterinary clinical disciplines. By the end of 2014, 111 academic employees worked in the five academic departments of the faculty, which include Anatomy and Physiology, Paraclinical Sciences, Companion Animal Clinical Studies, Production Animal Clinical Studies and Veterinary Tropical Diseases. There are also four research centres, namely Equine Research, Veterinary Wildlife Studies, Pharmacovigilance and Biomedicine, as well as other research support facilities, such as the Onderstepoort Training Animal Unit, faculty laboratories and the Onderstepoort Veterinary Animal Hospital. Fifty-two percent of permanent academic staff members are involved in supervision of postgraduate students.

The number of postgraduate students enrolled at the Faculty of Veterinary Science, University of Pretoria for the period 2011 to 2014 is portrayed in Table 1.1. Postgraduate students make up 22 percent of the total student body. International students account for 35 percent of the total number of postgraduate student numbers.

<b>Qualifications:</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>TOTAL:</b>
<b>Honours</b>	46	42	31	37	<b>156</b>
<b>Masters</b>	164	171	163	176	<b>674</b>
<b>Doctoral</b>	74	78	80	90	<b>322</b>
<b>TOTAL:</b>	<b>284</b>	<b>291</b>	<b>274</b>	<b>303</b>	<b>1152</b>

**Table 1.1: Number of postgraduate students enrolled at the Faculty of Veterinary Science, University of Pretoria for the period 2011 to 2014**

### 1.2.2 Jotello F Soga Library

The Jotello F Soga Library at the Faculty of Veterinary Science, University of Pretoria is one of the only two academic veterinary libraries to serve South Africa (and southern Africa) with information services. The library of the Agricultural Research Council (Onderstepoort Veterinary Institute) is the other veterinary science library.

Jotello F Soga Library is committed to the overall vision and mission of the University of Pretoria Library Services and offers customised services to clients of the Faculty of Veterinary Science. In addition to traditional library services such as interlibrary loans and information resource access services, strong emphasis is placed on delivering online services through a website with access to a collection of multi-disciplinary electronic books, journals and databases, as well as digital and institutional repositories, electronic theses and dissertations, subject portals, library blogs, online tutorials, online research support and the library's and faculty's e-newsletters ([www.library.up.ac.za/vet/index.htm](http://www.library.up.ac.za/vet/index.htm)).

The library has six full-time and two part-time employees, of whom five are professional librarians and three are library assistants. Three of the professional librarians (information specialists) are allocated to supporting the information needs of specific departments. Their faculty support services include collection development; management and maintenance of the digital and institutional repositories; creating subject portals; literature searches; alerting services; advising on research methodology; providing support and advice on copyright, plagiarism, referencing techniques and the use of information management tools such as

RefWorks and EndNote, offering information literacy training, marketing and outreach services.

When referring to “librarian” in this dissertation, it will imply “professional librarian”.

### **1.3 REASONS FOR THE STUDY**

Although a number of information services are currently provided to researchers at the Faculty of Veterinary Science, University of Pretoria, it is not clear if these services are meeting the information needs of researchers fully. Research addressing the information needs, information seeking behaviour and information use behaviour of veterinary science researchers is limited to only a few studies. More in-depth knowledge is needed to address the information needs of this user group. Taking into account the challenges mentioned in previous sections, it is necessary for the library to know what exactly the information needs, information seeking behaviour as well as information use behaviour of veterinary science researchers are in order to make suggestions for more effective and efficient support. In addition, it is necessary to determine how and to what extent the different research methods are able to contribute to research on and insight into the information needs, information seeking behaviour and information use behaviour of veterinary science researchers, in order to make recommendations for future research on this topic. The findings of the study will be used to recommend ways to improve information services to researchers at the Faculty of Veterinary Science, University of Pretoria. Findings on the information needs, information seeking behaviour and information use behaviour of veterinary science researchers will also contribute to information behaviour theoretical perspectives.

### **1.4 PROBLEM STATEMENT AND SUB-PROBLEMS**

Increased pressure for quality research in the dynamic academic research environment necessitates reconsideration of the support offered by the library and the role of the information specialist as the provider of research support in academic institutions.

This leads to the following research question that needs to be addressed:

What are the information needs, information seeking behaviour and information use behaviour of researchers at the Faculty of Veterinary Science, University of Pretoria, and how are these needs being met by the information support delivered by the Jotello F Soga Library?

In order to address the research problem, one first needs to address the following sub-questions:

1. What has been reported on the information needs, information seeking behaviour and information use behaviour (nationally and internationally) of the following: veterinary researchers, veterinary faculty staff, postgraduate students in veterinary science and veterinary practitioners?
2. What has been reported (nationally and internationally) on information support by academic and research libraries to the following: faculty, researchers and postgraduate students?
3. What are the information needs, information seeking behaviour and information use behaviour of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria?
4. What information support services and products are currently offered by the Jotello F Soga Library?
5. How can the Jotello F Soga Library address the information needs and support the information seeking behaviour and information use behaviour of the researchers at the Faculty of Veterinary Science, University of Pretoria and fill gaps in the library service?

## **1.5 CLARIFICATION OF KEY TERMS**

### **1.5.1 Information needs**

An early definition of an information need was offered by Taylor (1962), who described an information need as an “actual, but unexpressed” need for information. Case (2007:5) defines an information need as “a recognition that your knowledge is inadequate to satisfy a goal that you have”, while Dervin (1992:68) defines it as “a compulsion to make sense of a current situation” and states that communication is central in the process of finding information to “fill the gap”. An information need is thus a conscious or unconscious recognition that a persons’ knowledge is inadequate to satisfy a goal, and in the scope of this study, will therefore refer to a need arising from a knowledge gap experienced in completing research and a need to make sense of issues related to such research. Wilson (2006:661) mentions that it is not easy to understand the concept “information need”; this concept will therefore be discussed in more detail in Chapter 3 (section 3.2.2).

### **1.5.2 Information seeking behaviour**

Information seeking can be seen as a reaction to an information need, which according to Wilson (2000:49) is the “purposive seeking for information as a consequence of a need to satisfy some goal”. In this study, information seeking may involve the totality of information-related products and services researchers may perceive to have a potential purpose to fill the gaps in their current knowledge regarding the research in which they are involved. Information seeking actions include the actions researchers are willing to take in order to fill these knowledge gaps. Information seeking behaviour will be discussed in more in detail in Chapter 3 (section 3.2.2).

### **1.5.3 Information use behaviour**

Wilson (2000:50) defines information use behaviour as the physical and mental act of a person to incorporate new-found information into his (or her) existing knowledge base. Information use behaviour will also be discussed in more detail in Chapter 3 (section 3.2.2).

### **1.5.4 Research**

Lumley and Benjamin (1994:4) refer to research as the examination of incomplete and limited knowledge by assessing known information, defining “unanswered questions” and devising organised methods to answer them in meaningful ways. Webb, Gannon-Leary and Bent (2007:35) define the research process as a systematic or methodological investigation in order to “discover, interpret or revise facts or theories”, which involves the discovery of knowledge. Although both sources mention that it is not only confined to university departments, Allan (2010:5) adds that “research and knowledge creation are a central part of university life” and academic libraries need to play an important role in research processes. As progress and quality in a university environment are usually dependent on the publication of research work, scientific research is an essential requirement for postgraduate students and academic staff of universities (Lumley & Benjamin 1994:11).

Lumley and Benjamin (1994:8) also refer to another kind of research, namely clinical research. Clinical research is done mainly in the medical field and can be described as the “detailed examination of unusual individual cases” and the auditing of personal or group activities that are able to “provide critical information on current progress and may direct future clinical practice”. Clinical research is often laboratory-based.

The focus of this study will be on scientific and clinical research done at the Faculty of Veterinary Science, University of Pretoria.

### **1.5.5 Researcher**

As research can be done by any “thinking person” (Lumley & Benjamin 1994:4), it is difficult to give a single definition for the term “researcher”. Webb *et al.* (2007:36) also mention that not all researchers are allied to research or academic institutions. Even when referring to academic (scientific) researchers, Allan (2010:11) mentions that these researchers are not a homogeneous group and may include faculty involved in research projects, postgraduate full- or part-time students, students working as part of a research group or team or independently, campus-based students or distance students.

Unless otherwise stated, the term “researcher” will for the purposes of this study refer to scholarly researchers at an academic institution. It will include all relevant academics involved in faculty or institutional research projects, as well as masters and doctoral students.

### **1.5.6 Information specialist**

Several terms are used for a librarian supporting the information needs of researchers. Some authors refer to “academic librarian”, while others refer to “research librarian” (Law 2010; Mullins 2012; Neal 2009). Other well-used designations are the terms “subject librarian” (Pinfield 2001), “reference librarian” (Hart & Kleinveldt 2011) or “library and information professional” (Pantry & Griffiths 2009). Unless otherwise stated, the term “information specialist” will be used in this study when referring to the professional librarian supporting the information needs of researchers at an academic or research institution.

## **1.6 LITERATURE OVERVIEW**

The purpose of the literature analysis in this section is to briefly contextualise the research problem and supporting literature, as well as the gaps that will be addressed by this study.

Centuries ago librarians used to have a monopoly on access to information (Herman 2001:431). Developments in information and communication technology, the internet and network society, internet search engines, such as Google, as well as electronic databases and online scholarly publications resulted in a situation where information consumers are not necessarily library users anymore (Nicholas *et al.* 2010; Rowlands *et al.* 2008; Schonfeld & Guthrie 2007; Schonfeld & Housewright 2010; Schonfeld & Long 2010).

Several authors, among others Brophy (2008), Herman (2001), Kroll and Forsman (2010) and Neal (2009), discuss how users in the modern information environment are able to access a vast range of information resources easily and timely from their own computers.

The academic library therefore finds itself in a challenging position where it needs to re-evaluate and re-assess its role in supporting institutional research and knowledge creation for an often more sophisticated information user (Herther 2009; Rowlands *et al.* 2008).

In order to develop better understanding of what researchers need from the library, one cannot ignore the context in which researchers function. Context in information behaviour studies has been emphasised by several authors, among others Case (2002; 2007; 2012), Courtright (2007), Johnson (2003; 2009), Leckie, Pettigrew and Sylvain (1996) and Wilson (1981; 2000; 2006). The information needs, information seeking behaviour and information use behaviour of researchers in South Africa are influenced on various levels by developments and decisions in the broader South African research environment (Darch & de Jager 2012; De Jager 1991; Hart & Kleinveldt 2011).

Researchers in South Africa are expected to increase the number and quality of research outputs, as research and knowledge production in South Africa are high-priority strategies for the South African government and research funding and academic (research) remuneration for higher education institutions are linked to the quality and quantity of research output and research activities of researchers (Diab & Gevers 2009; Habib & Morrow 2007; Jeenah & Pouris 2008; Kahn 2011). Meeting national and institutional goals regarding research and research output are also a priority at the Faculty of Veterinary Science of the University of Pretoria (Swan & Kriek 2009).

Given that researchers need information in order to perform research (Allan 2010; Mullins 2012; Pantry & Griffiths 2009), the feeling is that demands in the research environment predict challenges, opportunities and new roles for the information specialist of the future (Corrall 2010; Johnson 2011; Ross & Sennyey 2008).

Research by the Association of College and Research Libraries (ACRL 2010) investigated the value and contribution of the academic library in the context of the performance of the overarching institution. One of the conclusions of this study is that academic libraries need to measure their contribution to institutional performance and therefore need to demonstrate their impact on institutional strategies and achievements. Meeting the requirements for more adequate information support and enabling researchers to do more productive research may assist the academic library in demonstrating its value in a challenging research environment (Brown 2010; Matthews 2007; Munde & Marks 2009). To provide more effective and efficient information support services to researchers, information specialists need to understand “the complex process of identifying information needs” of their users (Devadason & Lingam 1997:41).



Many publications on information behaviour exist. Case (2007:14) mentions that “information seeking is a topic that has been written about in over 10 000 documents from several distinct disciplines” and refer to a 1902 study by Charles Eliot as one of the earliest studies on human information use reported. Review articles by Case (2007; 2012) and Courtright (2007) discuss research on human information behaviour, which focuses on a large spectrum of user groups. Information needs of researchers in a variety of disciplines, such as engineering researchers (Yu-Ping & Hao-Ren 2010), forestry researchers (As 2004) and genetics and bioinformatics researchers (Tennant 2005) were also reported.

It has, over many decades, been well argued that researchers from different disciplines have different information needs and take different approaches to satisfy these information needs. Several authors, among others Gannon-Leary, Bent and Webb (2008), Herman (2001), Schonfeld and Guthrie (2007) and Sheeja (2010), have found that the information needs of researchers from the natural sciences are different from those of their colleagues in the social sciences. Haines *et al.* (2010) even refer to different needs between researchers and clinicians in the same college or department.

In order to address the information needs of researchers of different disciplines, several authors, among others Allan (2010), Brophy (2008) and Schonfeld and Guthrie (2007), argue that libraries need to have more information about their users as well as the subject field in which they are involved and suggest formal academic qualifications in the discipline they support. Gannon-Leary *et al.* (2008) and Tennant (2005) disagree with this idea when arguing that research is becoming more multidisciplinary and therefore the needs for information support and literature more diverse.

In South Africa, research in veterinary science plays a significant role (Swan & Kriek 2009). Not only does it contribute to human and animal health in this country, but it also plays an enormous role in the health of animals and people in the rest of Africa and other parts of the world. Access to information resources and information services to enhance research in veterinary science is thus an essential need. In order to provide effective information support to veterinary science researchers, it is necessary to understand the information needs, information seeking behaviour and information use behaviour of researchers in this discipline.

Not many library and information science studies are devoted to the veterinary discipline (Ikpaahindi 1985; Wales 2000). Several information behaviour studies focusing on researchers in veterinary science highlight the importance of access to information and information resources for researchers (Drake & Woods 1978; Raw 1987; Schmidt 1991),

while studies by Davies, Stutz and Thomson. (2000), Fleishman-Hillard (2008), Pelzer and Leysen (1991), Pelzer and Wiese (2005) and Wales (2000) indicate a preference by veterinary researchers and veterinary practitioners for online information products and services. The need for and use of online information products and services by researchers in other disciplines were also confirmed in other studies (including Hepworth 2007; Herman 2001; Mulligan & Mabe 2011; Nicholas *et al.* 2010; Rowlands *et al.* 2008; Schonfeld & Guthrie 2007).

Library collections, services, technology, space, staffing and the library as organisation are only some of the aspects that have been influenced by the changing needs of library users and the impact of digital and network technology (Brophy 2008; Fourie 2004; Neal 2009; Webb *et al.* 2007). In view of the enormous impact of this on the core responsibilities of the academic library, as well as the role and function of the information specialist, concern is raised that the recognition of the importance of the library in supporting research may be waning among researchers (Schonfeld & Housewright 2010). Several studies by associations and groups investigating this issue have been published in recent years, among others reports by the ACRL (2010), Ithaka (2010) and the Online Computer Library Center (OCLC 2010). These studies take global library and research trends into account, while focusing on the impact of the most recent technology and network developments. Most of these studies found that the relationship between researchers and the traditional library and university support for research has shifted radically and that researchers rely on traditional library services for research information to a much more limited extent. Several authors, among them Goetsch (2008), Ilesanmi (2013), Johnson (2011), Mullins (2012), Neal (2009) and Pinfield (2001), agree that the role of the academic librarian is changing and that this poses great challenges in order to meet the evolving information needs of faculty and researchers in the technology-driven society.

The literature shows that the research environment puts pressure on institutional research activities and output. As a result of this, researchers' information needs are evolving and changing. In order to stay relevant in this changing environment, information specialists need to align their roles and functions strategically with the information needs of researchers and develop information services to address challenges and enhance their role in opportunities provided by the dynamic research environment.

The literature will be reviewed and analysed in more detail in further chapters.

## 1.7 RESEARCH METHODOLOGY

The primary goal of the research methodology is to meet the initial aim of the research project and to provide answers to the research questions and sub-questions (Struwig & Stead 2007).

As a first step in the investigation of the information needs of researchers, a literature study was conducted. A literature study of the subject field helped in defining key concepts and laying a framework for the research design (Glavan 2006:6). The scope of the literature analysis that supported the study and empirical component is noted in section 1.6 of this chapter.

The empirical component of the study employed mixed methods research and included both a qualitative and quantitative approach in the methods of data collection and analysis.

Data collection methods included the following:

- Questionnaire for researchers (and postgraduate students) at the Faculty of Veterinary Science, University of Pretoria
- Questionnaire for information specialists at the Jotello F Soga Library, Faculty of Veterinary Science, University of Pretoria
- Focus group interviews with researchers and (postgraduate students) at the Faculty of Veterinary Science, University of Pretoria
- Focus group interview with information specialists at the Jotello F Soga Library, Faculty of Veterinary Science, University of Pretoria
- Citation analysis of the 2012 and 2013 research output of researchers and post-graduate students at the Faculty of Veterinary Science, University of Pretoria
- LibQual results (only as additional information)

Questionnaires addressed the information needs, information seeking behaviour, information use behaviour, current support to researchers and the current and future role of the information specialist in information support to researchers. It collected both quantitative and qualitative data. Focus group interviews built on the data collected from the questionnaires and did mainly collect qualitative data. Data regarding decisions for publication outlets were collected by means of a very simple citation analysis of the 2012 and 2013 research output of the Faculty of Veterinary Science, University of Pretoria. As additional information, LibQual results of the 2005, 2009 and 2013 surveys conducted at the University of Pretoria were used to give more insight on the attitudes of researchers to the services provided by the library.

The study used descriptive statistics to analyse quantitative data and thematic analysis was employed to analyse the qualitative data.

Researchers and information specialists at the Faculty of Veterinary Science, University of Pretoria, were used as a case study. The population of researchers included all academic staff as well as masters' and doctoral students at the Faculty of Veterinary Science, University of Pretoria (a total of 397). The questionnaire was sent to the whole population of researchers. The population of information specialists consisted of the three information specialists at the Jotello F Soga Library who are designated to support the information needs of researchers. Data were collected from all three by means of a questionnaire. For the focus group interviews with researchers, purposive sampling was used. For the focus group interview with information specialists, all three information specialists were included.

Reliability, validity and triangulation were ensured. The use of more than one research instrument addressed reliability and the use of multiple sources of evidence addressed validity. It also employed face validity, content validity, external validity and interpretive validity, as explained in more detail in Chapter 5. Triangulation was addressed by means of the use of multiple methods to explore the same subject and using both quantitative and qualitative approaches in analysing the data. Data collected through the different methods were compared.

The applicable research ethics approval required in terms of the University of Pretoria's code of ethics for researchers and the policy guidelines for responsible research has been obtained.

## **1.8 DEMARCATION OF THE FIELD OF STUDY**

The study is limited to researchers, including academic staff and postgraduate students employed and registered at the time of the study (2011 – 2014) at the Faculty of Veterinary Science, University of Pretoria, South Africa. The Faculty of Veterinary Science is situated on the Onderstepoort campus of the university some 20 km north west of the Hatfield main campus and 15 km due north of the city centre of Pretoria (Tshwane). It is the only Veterinary Science faculty in South Africa and plays a leading role in veterinary education, research and community engagement in the Southern African Development Community (SADC) region and further afield in Africa.

The study also included information specialists employed at the time of the study at the Jotello F Soga Library at the Faculty of Veterinary Science, University of Pretoria. For the

purpose of this study only the three information specialists responsible for information support to veterinary researchers were included in the investigation.

In the context of this study, information needs, information seeking behaviour and information use behaviour of veterinary researchers as well as support by veterinary libraries are primarily emphasised and investigated. Communication of information (research output) is examined against the background of the South African research environment.

## **1.9 VALUE OF THE STUDY**

Although many studies exist on the information behaviour of faculty and postgraduate researchers, very few focus on veterinary science. Although there has been an increase in publications, information behaviour studies on researchers in the South African context are seldom undertaken. This study can therefore provide valuable insight into the information needs, information seeking behaviour and information use behaviour of veterinary science researchers. This might also hold value for research on the information behaviour of researchers in general in the South African research environment. The research may also identify gaps in addressing the information needs of this user group to improve library services.

## **1.10 OUTLINE OF CHAPTERS**

The dissertation is divided into eight chapters.

Chapter 1 introduces the study and provides an overview of the research project. It also indicates the scope of the study, as well as the methodology. It also covers background information, reasons for the study, the problem statement and aim of the study, a brief literature analysis and the value of the study.

Chapter 2 provides a brief overview of the South African research environment, the importance of research in veterinary science in South Africa and its link to information needs, information seeking behaviour and information use behaviour. Attention is also given to the South African veterinary research output and how it links with global trends.

Chapter 3 explores what has been reported internationally and nationally on the information behaviour of researchers, basic and clinical science researchers, as well as veterinary science researchers. It also gives a brief overview on the terminology on information needs, information seeking behaviour and information use behaviour. Different approaches to study information behaviour of researchers are also discussed briefly.

The future of the academic library and the role of the librarian in supporting faculty and researchers of the institution is discussed in Chapter 4. It reviews several recent studies in the Library and Information Science (LIS) profession.

Chapter 5 discusses the methods to collect data and the research instrument(s). A discussion of the research techniques and instruments for data collection, population and sampling and strategies for data analysis, ways to address validity and reliability as well as ethical considerations is included. This is linked to the literature analysis.

Chapter 6 reports on the data collected, presents the findings of the research project and discusses the research outcomes.

Chapter 7 continues the discussion on the findings of the research project and presents a framework in which recommendations are outlined, as well as links to relevant information behaviour models.

Chapter 8 summarises the findings and recommendations and includes the conclusion, limitations of the study and suggestions for further research.

## CHAPTER 2:

### BACKGROUND ON RESEARCH IN SOUTH AFRICA

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#### 2.1 INTRODUCTION

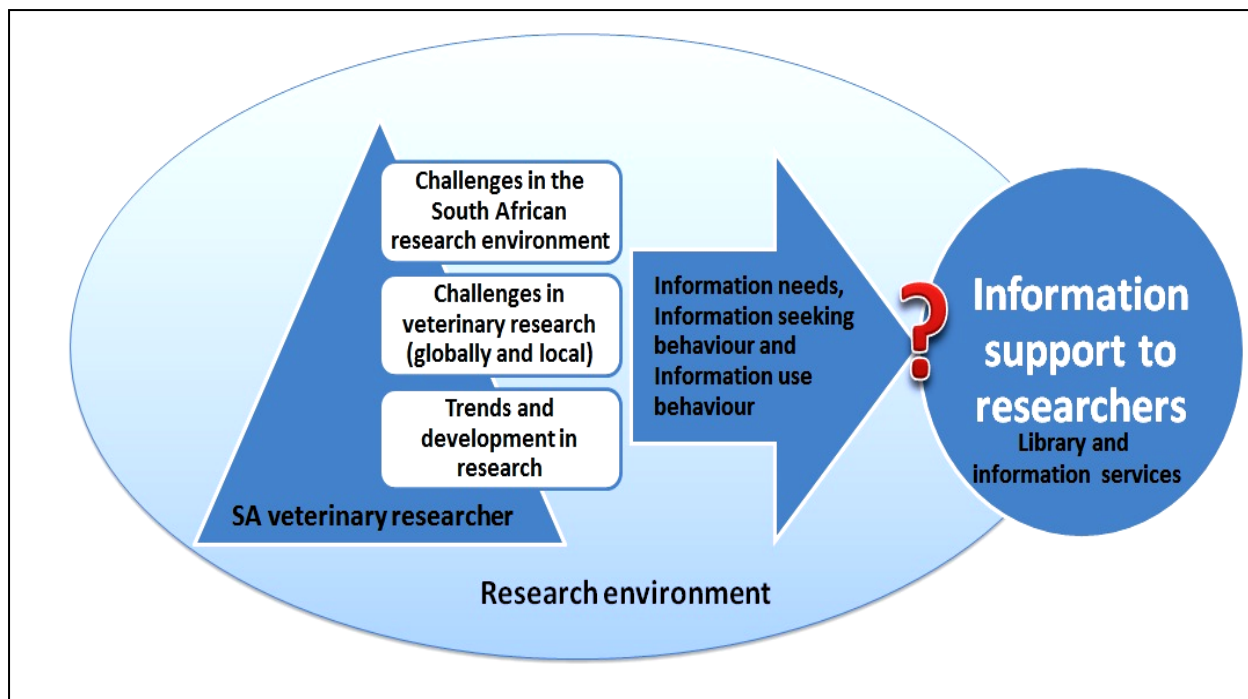
In a review of studies on research on information needs, information seeking and use, Courtright (2007:273) emphasises the importance of examining information practices as part of a “process that takes place within specified situations and contexts”. Johnson (2003:735) also agrees with the importance of context in information behaviour research when saying that “context is central to most theoretical approaches to information seeking”. Context is defined by Kari and Savolainen (2007:46) as “all those things which are not an inherent part of information phenomena, but which nevertheless bear some relation to these”.

Context in information studies view the information user in the context of his situation, and has been applied in a number of studies, including those by Allen and Wilson (2003), Foster (2004), Lamb, King and Kling (2003), Leckie *et al.* (1996), Mackenzie (2003), McKnight (2006), Musoke (2007) and Wilson (1981), to mention only a few.

In order to put this study in context of the researcher as information user, the current state of research in South Africa and the importance attached to research (especially in the veterinary science field) will be discussed briefly. Although this discussion mainly serves as background to the study, these trends may result in identifying different information needs of researchers and postgraduate students that may need to be investigated further.

Munde and Marks (2009:111) argue that the existence of academic libraries is attributable to the value librarians are adding to teaching, learning and knowledge production and dissemination. They suggest that it is important to assess and report the contributions of the library as “an enabler of faculty success” towards research and teaching in the university. In order to provide effective and efficient support and services to the university, librarians therefore need to be aware of developments in higher education, as well as research environments (Brown 2010; Matthews 2007).

Figure 2.1 reflects on the environment in which the veterinary researcher in South Africa exists.



**Figure 2.1: The linkage between the research environment and information and research support needs in veterinary research**

Figure 2.1 illustrates that the research environment of the veterinary researcher in South Africa may be influenced by trends and developments in the global research environment, higher education, challenges in the South African research arena and/or challenges in veterinary science, in South Africa as well as internationally (Sooryamoorthy 2015). The discussion in this chapter will start with a brief overview of current trends in the South African research environment. With more emphasis on quality research, teaching and learning, pressure to develop more skilled researchers, as well as to deliver more internationally competitive, high-quality research output, the South African research environment faces several challenges (Habib & Morrow 2007; Jeehah & Pouris 2008; Kahn 2011; Molo, Gravett & Petersen 2009; Pouris 2010a). These will be discussed, with special reference to the role of the NRF in addressing them.

Several critical needs for research in veterinary science exist on the international as well as the local front (National Research Council 2005; Swan & Kriek 2009). These challenges also have an impact on the environment of veterinary researchers in South Africa. In this chapter the following aspects will be discussed to provide background information on veterinary research: the importance of veterinary research for human and animal health; global trends in veterinary science; veterinary research in South Africa; the importance of information in veterinary research and the role of the library in supporting veterinary research. Special reference will be given to the role of the Jotello F Soga Library at the University of Pretoria.



## 2.2 THE SOUTH AFRICAN RESEARCH ENVIRONMENT

After years of scientific isolation, mainly because of international protest against the policies of the apartheid government prior to 1994, South Africa started to experience a growth in research productivity after 1994 (Habib & Morrow 2007; Kahn 2011; Moloji *et al.* 2009). According to Jeenah and Pouris (2008:351), the South African government realised the value of science and research in the improvement of quality of life and creation of wealth in the country when expenditure on research and development is increased.

Several authors however agree that the South African research environment still faces a variety of challenges in order to generate new knowledge (Kizza, Muchie & Waema 2010), produce more skilled researchers (Kahn 2011) and align its growing research productivity to reflect global trends (Jeenah & Pouris 2008). The following section will give a brief background overview on research in South Africa and some of the challenges linked to it.

### 2.2.1 Background to the South African research environment

Taking into account that research in Africa is mostly concentrated in two countries, of which South Africa is one and Egypt the other, it is clear that the African continent “is lagging substantially behind the rest of the World both in science and technology”, according to a study by Pouris and Pouris (2009:308). Tijssen (2007) explains that South Africa accounts for 31 percent of Africa’s research output and together with Egypt, the joint contribution is 52 percent.

Several other authors (Kahn 2011; Moloji *et al.* 2009; Pouris 2010b; Sooryamoorthy 2013) also report that, with respect to research, African countries perform very poorly when compared globally. Kizza *et al.* (2010) explain that very few African countries can sustain at least one good research university and that the quality of research in most African countries is underdeveloped. Other problems related to the poor research output in Africa are the lack of basic accessible data and information, a knowledge gap regarding research aspects, poor infrastructure and a lack of career prospects for researchers (Tijssen 2007).

Although South Africa is the dominant producer of research publications on the African continent, Jeenah and Pouris (2008:354) report that “South Africa’s growing research productivity does not reflect global trends”. An increase in publications for the period 1995 – 2006 in most of the 22 disciplines on the ISI list is reported, but South Africa’s average for all disciplines is still below the global average. Barnard, Cowan and Müller(2012:759) found that “even in the best performing disciplines, the work of most South African researchers remain[s] quite far from the frontier, and has a comparable impact to that of researchers in

the non-core disciplines of small late-coming economies such as Ireland, Israel, Finland and Taiwan.” They compared South Africa’s best performing disciplines by their competitiveness according to the relative ISI rankings (ISI Thompson Reuters 2008) and found that in multidisciplinary research, South Africa is ranked 16<sup>th</sup>, similar to Israel; in the field of environment and ecology, like India, it is ranked in the 22<sup>nd</sup> position and it is in position 23 with Finland in plant and animal science.

King (2010) also explains the small contribution of South Africa to research in the world, stating that in the period 2004 – 2008, South Africa contributed only 1.55 percent to the world share in the field of plant and animal science (at that stage the largest share of any main discipline), while the contribution to research in the environment and ecology was only 1.29 percent of the world share. According to Pouris (2010a:153), South Africa produces only 0.55 percent of the world’s total scientific literature output.

Macgregor (2007) investigated reasons why South Africa is not effectively supporting disciplines, such as clinical medicine and plant and animal science, in which it excels, and found that Government is not focussed on areas of established excellence. He also mentions a lack of university-based funding from Government, a lack of research support initiatives and ineffective implementation of identified research priorities by the South African government. Pouris (2010b) explains the tendency in research priorities of the South African government as being affected by the natural wealth of the country, relevant health challenges and international interests.

Cherry (2010:726) explains the problems in South Africa’s science and research output as due to lack of strong leadership and a strong advocate for science and research in government, inadequate funding and excessive emphasis on applied research. Another concern is the lack of world-class researchers in South Africa. Barnard *et al.* (2012:768) mention that in 2012 there were only 44 world-leading, or A-rated, researchers in South Africa.

Habib and Morrow (2007) mention some of the barriers to research productivity in South Africa as inadequate academic remuneration, onerous working conditions, the tension between advancing equity on the one hand and realising academic excellence on the other, obstacles that undermine institutional collaboration within the higher education system and science council sectors and poor quality senior managers in research departments. Habib and Morrow (2007:125) describe management in higher education and research in South Africa as problematic owing to “forces of inertia and conservatism” and explain this from a political view. They refer to South Africa’s historical inequalities in education, which resulted in pressure to balance racial and gender composition in management positions. This

resulted in several barriers to maintain quality management in research institutions. As an example, they mention the increase in long-term vacancies due to unsuitable candidates for positions needed to be filled by previously disadvantaged groups. Incidents of misunderstanding and conflict, due to different cultural backgrounds, are also mentioned as results of this problem.

Several initiatives have been implemented in order to encourage research and knowledge production in South Africa. Diab and Gevers (2009:280) mention that there has been greater emphasis on research support initiatives to strengthen research and development in South Africa since 1996 and refer to several incentives to encourage researchers to increase research output. Some of these initiatives include an increase in research funding, the introduction of the National Research and Development Strategy in 2002 and performance monitoring and compensation for research output and publications by higher education institutions.

An important goal of Government is to recruit more postgraduate students by funding postgraduate training and university researchers in natural as well as social sciences. Another way to support this goal is through the implementation of a research-chair scheme. According to Cherry (2010:727), this includes five-year support packages as well as replacement posts in departments in order to release top researchers from teaching and enable them to concentrate on their graduate studies and research linked to it. Because of financial constraints this project is still slow to be implemented to its full capacity (Kahn 2011).

Other interventions contributing to the South African research landscape are the initiation of centres of research excellence, major equipment and active institutional research development offices and initiatives (Diab & Gevers 2009).

The role of the NRF in supporting and strengthening research and research output in South Africa will be discussed in more detail in section 2.2.4. The next sections will briefly discuss the higher education system in South Africa, as well as some background information on research output and scholarly publications.

## **2.2.2 Higher education in South Africa**

According to Kizza *et al.* (2010:216) the research and innovation capacity of a country is based on the strength of its research universities. In 2004 South Africa started reforming its higher education system, merging and incorporating small universities into larger institutions,

and renaming all higher education institutions "universities". The number of institutions was reduced from 36 to 23 state-funded tertiary institutions.

Although the 23 universities are large in terms of student numbers, their research capacity is still very low when compared to other international universities (Macgregor 2007). Diab and Gevers (2009:45) report that the South African higher education sector accounts for 23 percent of research expenditure and 33 percent of human resources engaged in research. In 2007 approximately 50 000 postgraduate students (masters and doctoral level students) were enrolled at South African universities. Chetty (2010:727) however reports that the graduation rate of doctoral students is still very low. South Africa awarded only 23 doctoral degrees per million of the population in 2003, which is very low in comparison to other emerging countries, such as Brazil with 42 and South Korea with 172 per million. The Council of Higher Education (2009; 2013) however reports a slight increase from 822 doctoral graduates in 2000 to 1176 in 2005 and 1 423 in 2010. The largest growth was in the social sciences and the smallest in engineering and applied technologies.

Only a few South African universities perform fairly well internationally in terms of research output. Inglesi and Pouris (2008) identified six South African universities that are included in the 2005 US Essential Science Indicators database of the Institute for Scientific Information (ISI). This database provides information on the top 1 percent most cited institutions worldwide during the most recent 10 years across 22 scientific disciplines. The six South African institutions listed in this database are: University of Cape Town; University of Pretoria; Orange Free State University; University of Witwatersrand; University of KwaZulu–Natal and Stellenbosch University.

Macgregor (2007) refers to the Shanghai Jiao Tong ranking, which ranks the top 500 world universities. Only four South African universities are on this list, namely the universities of Cape Town, Witwatersrand, KwaZulu–Natal and Pretoria. The University of Cape Town is still the only South African university included in the "top 200" international rankings of universities worldwide (Times Higher Education 2015).

Diab and Gevers (2009:67) however state that "the full mobilization of the talent pool of the nation is both the biggest challenge and the biggest opportunity in taking the country's science to new heights in the service of national development and competitiveness". In order to address this, a fundamental reformation of the South African school system is needed (Cherry 2010). Pouris (2010b) mentions that too few South African pupils are enrolling in higher education in comparison to countries such as the United States and European countries. Because of racial inequalities that still exist, in spite of a democratic political system implemented after the end of the apartheid system in 1994, universities are still

attracting fewer black students, especially in science disciplines. A shortage of teachers in mathematics and science subjects is another problem the education system in South Africa needs to address. With fewer students earning university entrance qualifications in mathematics and physical science, Pouris (2010b) mentions that a shortage of students in research careers in science exists.

A large spectrum of challenges in higher education in South Africa thus needs to be addressed before the country will be able to reach its full potential as an international research contributor (Moloi *et al.* 2009).

To investigate the current state of research in South Africa further, the following section will examine aspects related to research output and scholarly communication in South Africa.

### **2.2.3 Research output and scholarly communication in South Africa**

Vaughan (2008) mentions that the two primary research outputs recognised by the Department of Education are research publications (including accredited journals, books, book chapters and peer-reviewed conference proceedings) and postgraduate qualifications, including research master's and doctoral graduates.

South African researchers were isolated for many years and there was little opportunity for international collaboration. During these years research output and scholarly communication were very low (Kahn 2011). Diab and Gevers (2009:54) report that there has been an increase of 6 percent in South Africa's total output in ISI-indexed journals for the period 1995 to 2007. Tongai (2013) reports that South African researchers increased their paper publication numbers from 3 617 in 2000 to 7 468 in 2010.

In order to encourage the country's research output, South Africa has a system of state funding of research output through a list of approved journals managed by the national Department of Higher Education and Training (DoHET). This means that when South African academics and researchers publish in one of the identified journals, their institutions may qualify for a publication subsidy (Diab & Gevers 2009).

Bibliometric methodology, such as Thomson Reuters (ISI) Web of Science (formerly ISI Web of Knowledge), is used to measure and compare research output across countries. In order to receive incentives from the NRF, researchers are encouraged by the DoHET to publish in Thomson Reuters (ISI) Web of Science indexed journals. This encourages researchers to publish in high-quality, internationally visible and accredited journals (Vaughan 2008). Although the number of South African journals indexed in the Thomson Reuters (ISI) Web of Science has risen from 26 to 66 between 2005 and 2010 (Kahn 2011:30), Diab and Gevers

(2009:53) warn that local journals in developing countries (including South Africa) are still not covered well in this database. Therefore, apart from the Thomson Reuters (ISI) Web of Science indexed journal list, researchers can also publish in the so-called “accredited journals” of the national DoHET. This list of more than 250 local journals across all fields of science is compiled and managed by the national DoHET and described as highly reputable local publications.

The DoHET’s list of accredited journals is compiled from journals included in Thomson Reuters (ISI) Web of Science, the International Bibliography of the Social Sciences and South African journals selected by the DoHET for this purpose. In March 2015 the list consisted of 273 South African journal titles.

With a reward system for research publishing, more South African journals indexed in the Thomson Reuters (ISI) Web of Science in which to publish, and a more open system for collaboration with foreign researchers, Kahn (2011) foresees a slight increase in future research. Inglesi-Lotz and Pouris (2011) also found in a study on research output of social science researchers that this reward system had a positive impact on research output, with an average increase of 24.5 percent research articles in the social sciences after five years of implementation of the system. Sooryamoorthy (2013) also reports growth trends from 415 records in 1975 to 1 416 in 2005 in the production of scientific knowledge in the natural sciences in South Africa. This is an average increase of 40 percent more publications for every five-year period.

In addition to universities, the other main contributors to research output in South Africa are staff employed by science institutes and councils, such as the Council of Scientific and Industrial Research, Human Sciences Research Council and the Agricultural Research Council, as discussed in the report edited by Diab and Gevers (2009).

#### **2.2.4 The role of the National Research Foundation in research and research output in South Africa**

The NRF plays a leading role in research funding and academic (research) remuneration. Jeenah and Pouris (2008:351) mention that research output is factored into the funding formula (in the case of research activity) at all universities in South Africa. Through funding, human resource development and the provision of the necessary research facilities, the NRF plans to facilitate the creation of knowledge, innovation and development in all fields of science and technology in South Africa (Inglesi-Lotz & Pouris 2011). Funding from the NRF is therefore largely directed towards academic research, development of high-level human

resources and supporting the nation's national research facilities (<http://www.nrf.ac.za/information-resources/manuals-and-guidelines>).

After being established in 1980 by its predecessor, the Foundation for Research Development, the main goals of the NRF are, according to Pouris (2007:439), as follows: to provide independent and objective information on South Africa's research capacity in different disciplines; to reinforce the importance of international competitive research, to stimulate competition between researchers and to be used by universities to position themselves as research-intensive universities. It can also serve as a tool to measure the promotion and recruitment of staff. Before this stage, the rating approach of researchers was solely based on previous performance and research output. It was only in 2007 that a linkage between researcher evaluation and rating with funding support was announced by the NRF (Inglesi-Lotz & Pouris 2011).

The research scenario in South Africa is currently highly influenced by the NRF's rating of researchers on various levels, ranging from category A to C, as well as categories P and Y for younger and upcoming researchers. This system allows researchers to benefit directly in the form of project-related research funding and support for postgraduate students (<http://evaluation.nrf.ac.za/content/evaluation/apply.htm>).

According to Inglesi-Lotz and Pouris (2011), A-rated researchers are top international scholars in their field and recognised by their peers for the quality and impact of their research. B-rated researchers also receive considerable international recognition in their research field, while C-rated researchers are established researchers with a sustained research productivity record. Young scholars, showing potential for future international careers, are ranked P and Y researchers.

In order to be evaluated and ranked, individual researchers need to apply to the NRF by submitting an application form (after approval by the applicant's institutional research administration) to the Monitoring and Evaluation unit of the NRF, which then sends it to members of subject-specific specialist committees, which recommend it to peer reviewers. Reviewing is based on the following criteria: quality of the research-based output of the previous seven years, impact of the research in the field as well as on adjacent fields and an estimation of the researcher in the field from both a South African as well as an international perspective. The report from the reviewers is then returned to an assessment panel of the Monitoring and Evaluation unit of the NRF, which recommends a rating (Inglesi-Lotz & Pouris 2011).

Both Inglesi-Lotz and Pouris (2011:50) and Sooryamoorthy (2013) mention that the linking of researcher evaluation and rating with financial support may have an impact on the quality and quantity of research publications, as well as on their international exposure, owing to better motivation systems and offerings (for example promotion and research resources).

The impact of incentives from the NRF is visible in research results published by the University of Pretoria in the 2013 research report (<http://www.up.ac.za/en/research-innovation/article/271011/research-reports>). According to the vice-chancellor and principal, Prof. Cheryl de La Rey, the University of Pretoria is top rated in terms of the number of accredited publication units and there has been an increase from 223 UP researchers with NRF ratings in 2008 to 251 in 2009, while this number has grown to 375 in 2013. In 2012 there were ten UP researchers in the top 1 percent of scientists in the world, but this number increased to 15 in 2013. (The 2014 research report was not yet available at the time of writing of this study.)

In the University of Pretoria 2013 research report, the dean of the Faculty of Veterinary Science, Prof. Gerry Swan, mentioned that all 2013 publications of this faculty were in ISI-accredited journals. The number of NRF-rated researchers at the Faculty of Veterinary Science increased from nine in 2005 to 27 in 2013.

Although there are still many challenges for improving this funding and evaluation system, Pouris (2007:439) mentions the following: "Linking ratings with funding is the most important recommendation for improving the present system, with likely benefits for the National Research Foundation, researchers and the reviewers who provide the evaluations."

### **2.3 VETERINARY RESEARCH**

People are, more than ever before, aware of the linkage between animal diseases and human health. According to Pappaioanou (2004), all activities of veterinary research affect human health "either directly through biomedical research and public health work or indirectly by addressing domestic animals, wildlife or environmental health". This highlights the importance of veterinary research for global health, not only in South Africa, but all over the world.

The following section will give an overview of the importance of veterinary research and will focus on global trends in this discipline. To ensure better understanding of the context of this study, veterinary science and veterinary research in South Africa will be discussed in more detail. An overview of the importance of information, as well as library support for veterinary researchers in South Africa, will conclude this section.



### **2.3.1 The importance of veterinary research for human and animal health**

A report on the critical needs for research in veterinary science by the National Research Council (2005) suggests that veterinary medicine is fundamentally a human health activity, as human health is affected by all activities of veterinary scientists. Some of the important outcomes of veterinary research regarding human health and well-being are to ensure food security and safety; to prevent and control emerging infectious zoonoses; to protect the environment and ecosystems; to assist in bioterrorism and agro-terrorism preparedness; to advance treatments and control for non-zoonotic diseases (such as vaccines – preventable illnesses and chronic diseases); to ensure public health and to engage in medical research. The veterinary profession is therefore the important link between “agriculture and human health, animals and the environment” (Murray & Sischo 2007:279).

Bogdan *et al.* (2010), as well as Gibbs and Anderson (2009), mention that research in veterinary science is essential for health advancement. But, in spite of an increased demand for veterinary research (Murray & Sischo 2007), a study by the National Research Council (2005:vii) found that its workforce has not increased in recent years. The report by the National Research Council (2005) states that the types and priorities of resources dedicated to human and animal health need to be re-evaluated in order to address the greatly increased demands for veterinary research.

### **2.3.2 Global trends in veterinary research**

In order to bring human and animal health together, Pappaioanou (2004:161) suggests the following actions: cultural changes of both disciplines that have been operated separately for decades; overcoming the organisational complexity of animal health at all levels; expanding the view of what activities comprise veterinary medicine; better and more efficient communication between veterinary researchers and physicians across disciplines; improving and providing leadership on controversial issues and a better understanding of how to operate strategically and politically.

Pappaioanou (2004:155) also suggests greater awareness in the world about food security and safety, epidemiology, issues related to protecting the environment and biodiversity, as well as bioterrorism. Other contributing issues in the global veterinary environment mentioned by Swan and Kriek (2009:109) are the globalisation of animal and public health, international trade in animals and animal products, emerging diseases, biomedical research and “changes in the relationship between animals and humans within the context of a one-health approach”. All these issues indicate unprecedented opportunities for linking human and animal health research.

Murray and Sischo (2007) also found that because of its diversity and linkage to other disciplines the veterinary profession faces several challenges. One of these is the straining of resources in order to address the wide spectrum of needs and expectations of society.

There is however a movement that addresses the previously mentioned challenges in the interdisciplinary nature of veterinary medicine. Conrad *et al.* (2009:268) discuss the evolution of a transdisciplinary “One Medicine – One Health” approach to global health education at the University of California, Davis. This concept involves all health professionals, including veterinarians, “to work collaboratively and comparatively to improve human health”. It also includes all relevant aspects, such as research, public health investigations, training and outreach, and makes use of technology in an attempt to simulate a global virtual learning environment.

The implications of this new global movement, incorporating all aspects of health as well as a variety of disciplines, may have a huge impact on information support and services (Munde & Marks 2009), not only regarding information resources, but also in terms of providing specialised support. Dell (2010) emphasises the importance of communication and the availability of resources, information and data in this concept. Veterinarians will therefore need support and training in the methods of reporting and communication of data and observations. This may be a challenge that can be addressed by information specialists.

### **2.3.3 Veterinary research in South Africa**

Animal health and wellbeing are important for humans, the economy and society as a whole (Bogdan *et al.* 2010). Veterinary research in South Africa is therefore essential in addressing “the complex needs of the various sectors of society that need veterinary input” (Swan & Kriek, 2009:113).

Most veterinary research activities in South Africa are focussed in the Onderstepoort geographical area and include the Faculty of Veterinary Science of the University of Pretoria, the University of Pretoria Biomedical Research Centre, the ARC – Onderstepoort Veterinary Institute (ARC-OVI) and its Exotic Diseases Division ([www.arc.agric.za](http://www.arc.agric.za)) and Onderstepoort Biological Products ([www.obpvaccines.co.za](http://www.obpvaccines.co.za)).

The Faculty of Veterinary Science of the University of Pretoria at Onderstepoort (<http://www.up.ac.za/academic/veterinary>) is the only veterinary faculty in South Africa and one of 46 veterinary faculties in Africa offering training for veterinarians. The previous undergraduate veterinary programme was an intensive training programme, consisting of a split degree structure of a three-year BSc (Veterinary Biology) degree and a four-year BVSc

degree. A six-year core-elective programme was introduced from 2011 onwards. A veterinary nursing diploma and a variety of postgraduate degree programmes are also offered.

The faculty has five academic departments responsible for teaching, research and service rendering. These are Anatomy and Physiology, Paraclinical Sciences, Companion Animal Clinical Studies, Production Animal Clinical Studies and Veterinary Tropical Diseases. There are also four research centres, namely Equine Research, Veterinary Wildlife Studies, Pharmacovigilance and Biomedicine, as well as other research support facilities, such as the Onderstepoort Training Animal Unit, faculty laboratories and the Onderstepoort Veterinary Animal Hospital.

By the end of 2014, 1 338 students were enrolled at the Faculty of Veterinary Science of the University of Pretoria. Of these, 1 035 were undergraduate and 303 postgraduate students. The faculty had 376 academic staff members. Fifty-two percent of permanent academic staff members are involved in supervision of postgraduate students.

Swan and Kriek (2009:112) remark that stimulation and development of postgraduate training and research in Africa is imperative, as a limited capacity for postgraduate training exists owing to inadequate financial resources, facilities and academic staff at most African institutions. Many students from Africa are therefore registered in a variety of postgraduate programmes offered at the Faculty of Veterinary Science of the University of Pretoria.

Research programmes are focussed on unique South African and African animal disease problems. Six research themes have therefore been selected to meet these needs, which include veterinary aspects of food safety and food security, wildlife and environmental health, molecular studies on infectious and parasitic diseases of animals, phytomedicine and ethno-veterinary medicine, equine and companion animal health and welfare and anatomical and physiological studies on animals (<http://www.up.ac.za/en/faculty-of-veterinary-science/article/16388/research>).

In response to global challenges in veterinary research, the Faculty of Veterinary Science of the University of Pretoria has also identified institutional and research themes in interdisciplinary areas of research. These themes are: biotechnology and the management of animal and zoonotic diseases, genomics, malaria, food, nutrition and well-being and energy (<http://www.up.ac.za/irt>).

In order to address the needs of humans and animals in South Africa better, a demand for better and more research in veterinary science is imperative (Gibbs & Anderson 2009).

Swan and Kriek (2009:111) mention that a well-developed strategic plan is in place to stimulate future research in veterinary science in South Africa. The goal of this plan is to develop innovative research programmes, ensure continuous high-quality research output and facilitate multi-disciplinary research in research niche areas unique to Africa. These niche areas include veterinary aspects of food safety and security, wildlife and environmental health, molecular studies on infectious and parasitic diseases of animals, phytomedicine and ethno-veterinary medicine, equine and companion animal health and welfare, as well as anatomical and physiological studies on animals.

More attention to research output in South Africa, especially in veterinary science and its sub-disciplines, will be given in chapter 6, where the 2012 and 2013 research output of the Faculty of Veterinary Science will be investigated by means of a citation analysis. The aim of the citation analysis will be to determine to what extent the Jotello F Soga Library collection is meeting the information needs of researchers of the faculty and to get more insight into the information behaviour of the researchers, based on where they publish and what they cite.

### **2.3.4 The importance of information in veterinary research**

Information is a key factor in any profession, as explained by Spink and Cole (2006:25) who state that “humans have been seeking, organizing and using information as they learned and evolved patterns of human information behavior for resolving problems related to survival, work and everyday life”. Based on research on information seeking of engineers, healthcare professionals and lawyers, Leckie *et al.* (1996) developed a model to assist in understanding the information seeking of professionals.

Information is also a very important resource in the veterinary profession (Dell 2010; Gibbs & Anderson 2009). Professor SS van den Berg, President of the South African Veterinary Council, said in June 2006 that “The intellectual capabilities and enterprising spirit of most veterinarians are tested on an almost daily basis ... [and] ... there is an ongoing increase in knowledge and understanding of just about every facet of veterinary science ...” (South African Veterinary Council 2006).

The report by the National Research Council (2005:167), among several other recommendations, recommends that the veterinary workforce be expanded and suggests that the provision of adequate research resources may lead to enduring advances in animal and human health. It refers to research resources as “libraries, databases, data-management resources, electronic communication systems (such as systems for sharing clinical information), specialized populations of animals, and collections of research

materials, such as DNA, serum, anatomical and pathological specimens, and histological materials” (National Research Council 2005:162). There is thus a need for information, information resources and information support in order to ensure more effective and efficient access to; preservation of and use of information needed to address all aspects related to research in veterinary science. However in order to understand these information needs and provide the right information resources and services, it will be useful first to investigate the way in which researchers behave and act when dealing with the above-mentioned aspects.

Although there are not many studies that focus mainly on the information behaviour of researchers in the veterinary discipline, research on veterinary practitioners, such as studies by Nel and Fourie (2010), Pelzer and Leysen (1991), Pelzer and Wiese (2005) and Wales (2000), provides more insight, especially in information behaviour in the online environment. The focus of studies by Chikonzo and Aina (2001) and Ikpaahindi (1985) was veterinary scientists at universities in Africa. Information behaviour studies on researchers in disciplines other than veterinary science will however also be included in order to form a more complete picture of the information behaviour of veterinary researchers in South Africa.

Chapter 3 of this study will address the information needs of veterinary researchers as described by previous information behaviour research studies. The next section of this chapter will give background information on the current support veterinary researchers receive from the Jotello F Soga Library at the Faculty of Veterinary Science, University of Pretoria.

### **2.3.5 Role of the library in supporting veterinary research**

Academic libraries traditionally supported research by selecting, organising and making materials available for research purposes, but technological and networking developments opened a new era for e-research (MacDonald & Uribe 2008). Shuler (2007:711) describes this new culture of scholarship as depending on accessibility, speed and information liquidity.

Several authors, among them Fleishman-Hillard (2008), Nel and Fourie (2009) and Pelzer and Wiese (2005), report the veterinary community’s preference for digital libraries and electronic information. Researchers however use the internet and digital libraries not only to access information, but also for collaboration with peers, sharing ideas, networking (formal and informal) and communication (Borgman & Furner 2002).

MacDonald and Uribe (2008) say that the increased digital universe will have significant implications for data storage, publishing, confidentiality, preservation and curation and that the actors in the research lifecycle include researchers as well as librarians, technologists,

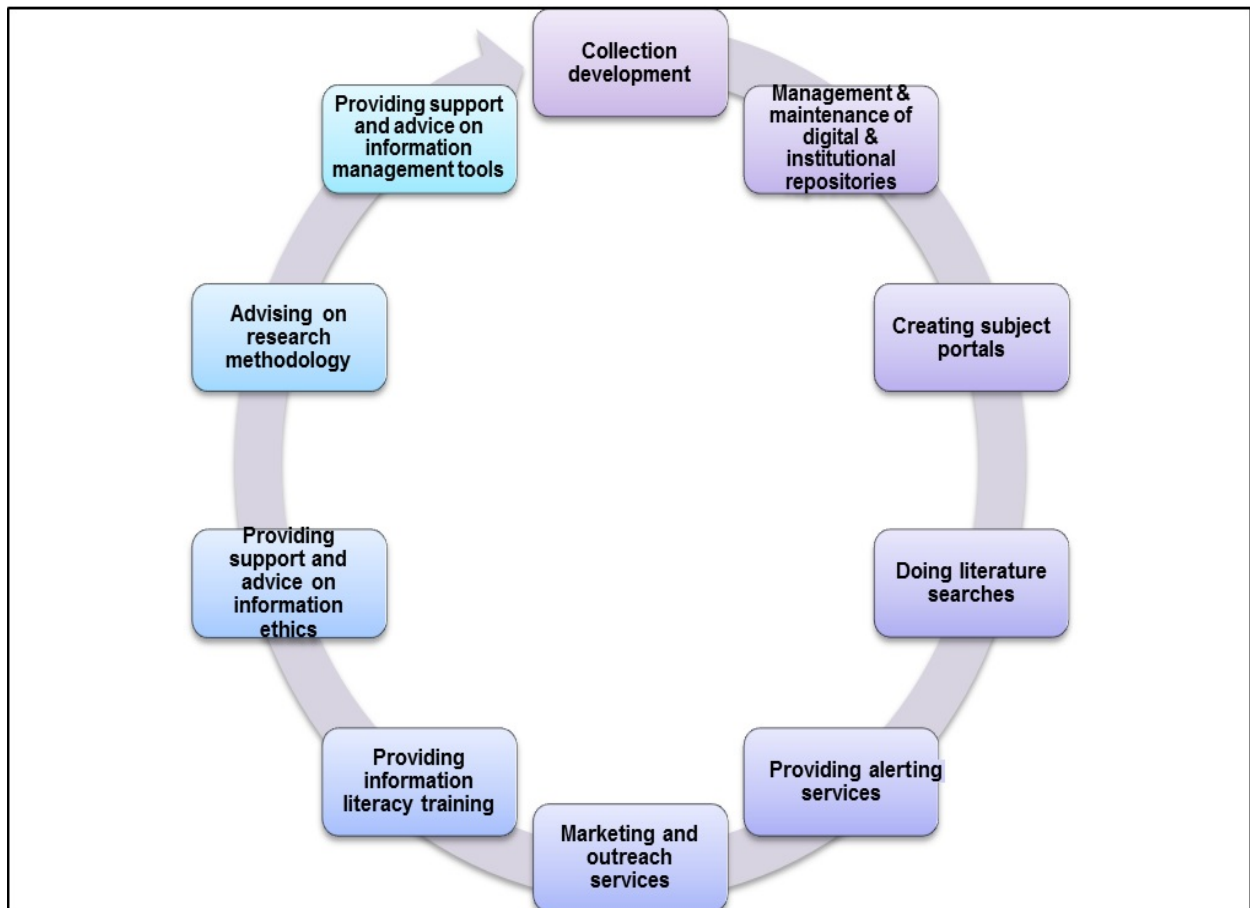
publishers and policymakers. They refer to important issues and tools, such as open data, Web 2.0 for social networking and data preservation, numeric and special visualisation tools, mashups, new forms of data publishing (such as e-Research, metadata, variable-data publishing, etc.) and other data management activities.

The information behaviour of researchers and academic scientists received generous attention over the last decades (Case 2007; Niu *et al.* 2010; Raza, Fatima & Upadhyay 2010; Tenopir *et al.* 2003). Hemminger, Vaughan & Adams (2007:2205) attribute this interest to factors such as the need of researchers for rapid communication of research results, their prompt adoption of technology and researchers' acceptance and support for different types of digital content.

Information needs are not stagnant (Case 2007) and their impact on the library and information profession cannot be ignored (Law 2010). With more demand to increase both the quantity and quality of research output, it might be expected that an increase in research support needs will be a consequence in the dynamic and competitive academic environment. It is therefore necessary to evaluate and assess the current state of supporting services and resources from the library against the needs and expectations of the research environment.

The Jotello F Soga Library at the Faculty of Veterinary Science of the University of Pretoria is one of only two academic veterinary libraries to serve South Africa (and southern Africa) with information services. The library of the ARC-OVI is the other veterinary science library.

The Jotello F Soga Library is committed to the overall vision and mission of the University of Pretoria Library Services and offers customised services to clients of the Faculty of Veterinary Science. In addition to traditional library services such as interlibrary loans and information resource access services, strong emphasis is placed on delivering online services through a website with access to a collection of multi-disciplinary electronic books, journals and databases, as well as digital and institutional repositories, electronic theses and dissertations, subject portals, library blogs, online tutorials, online research support and the library's and faculty's e-newsletters ([www.library.up.ac.za/vet/index.htm](http://www.library.up.ac.za/vet/index.htm)). Figure 2.2 provides a graphical illustration of support services to veterinary researchers.



**Figure 2.2 Information support services provided by the Jotello F Soga Library**

An important purpose of an academic library is to centralise knowledge within the faculty and academy (Law 2010). New trends in research, such as electronic scholarship, ethical, intellectual property and copyright issues, open access and new ways of research communication highlight the challenges for the information specialist in the academic environment (Brown 2010; Read 2007). Knowledge of the information behaviour of the researcher in this dynamic research environment is essential to assist in the development of information support products and services in the context in which the researcher operates.

## 2.4 CONCLUSION

The main purpose of this chapter was to give more insight into the South African research environment and to provide a context of reference of the conditions in which research is produced in South Africa. The pressure for competitive, quality research output in South Africa was highlighted.

The veterinary science profession plays an important part in the research output of the country. This discussion also highlighted challenges that need to be addressed by library and information support services for veterinary researchers.

It is clear that opportunities for information specialists to support researchers in this dynamic environment do exist (Brown 2010; Law 2010; Neal 2009). The next chapter will focus on the information behaviour and information needs of researchers and ways in which these can be met by the academic library. It will also include a discussion on the theoretical aspects of information behaviour studies, as well as an overview of previous research in this regard.



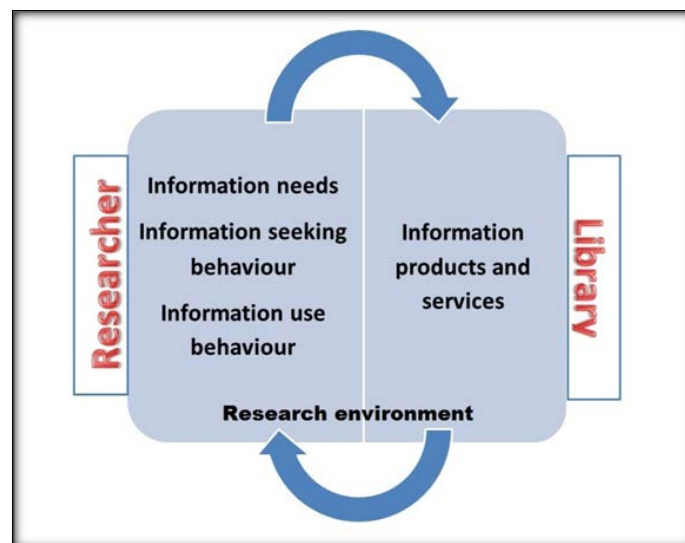
## CHAPTER 3:

### INFORMATION NEEDS, INFORMATION SEEKING BEHAVIOUR AND INFORMATION USE BEHAVIOUR OF VETERINARY RESEARCHERS

#### 3.1 INTRODUCTION

The aim of this study is to form a comprehensive understanding of the information needs of veterinary researchers in order to determine what support is needed from the academic library and information specialists. To find out if the current library services and support to researchers meet the identified information needs, the study needs to focus on the researcher as well as the information products and services provided by the academic library.

Figure 3.1 provides an illustrated overview of the problem statement. On the one side it indicates the researcher with information needs and behaving in a certain way when dealing with information. On the other side is the academic library, which provides a range of products and services to support the information needs of its users (researchers). Library services and products need to be aligned with the information needs of researchers, while information needs of researchers are sometimes based on services and products available (awareness of sources). This is indicated by the arrows in figure 3.1. Both the researcher and the library are affected by trends, opportunities and challenges in the research environment. In order to balance the needs of the researcher with the information and research supporting products and services, it is necessary to investigate both aspects against the background of events in the current research environment (addressed in Chapter 2).



**Figure 3.1: Relationship between researchers and the library regarding information**

The focus of this chapter will be on the information needs, information seeking and information use of researchers and postgraduate students in veterinary science. Because literature on information behaviour in veterinary science is limited (Weiner, Stephens & Nour 2011), publications from other disciplines will also be included.

An overview of general perspectives on information needs, information seeking behaviour and information use behaviour of researchers will introduce the discussion. It will briefly look at the history of research on information behaviour and the relationship between information needs, information seeking and information use and how models can assist researchers to form a better understanding of the information needs, information seeking behaviour and information use behaviour of researchers and postgraduate students.

This will be followed by a literature analysis covering previous studies on the information needs, information seeking and information use of researchers in general, but also specifically in veterinary science. The impact of the discipline and technology on information needs will be highlighted here. The researcher will also briefly consider the satisfaction of information needs, before identifying important factors affecting the information seeking behaviour of researchers and postgraduate students. Information use of researchers will be viewed in the context of the use of libraries and library collections, electronic information sources, researcher collaboration as well as information presentation and communication (publication and scholarly communication).

### **3.2 GENERAL PERSPECTIVES ON INFORMATION NEEDS, INFORMATION SEEKING AND INFORMATION USE OF RESEARCHERS**

This section briefly reviews research on the information needs, information seeking and information use of researchers. It looks at information behaviour studies in general; how the concepts information need, information seeking and information use link into each other and will, also briefly, refer to the contribution of models.

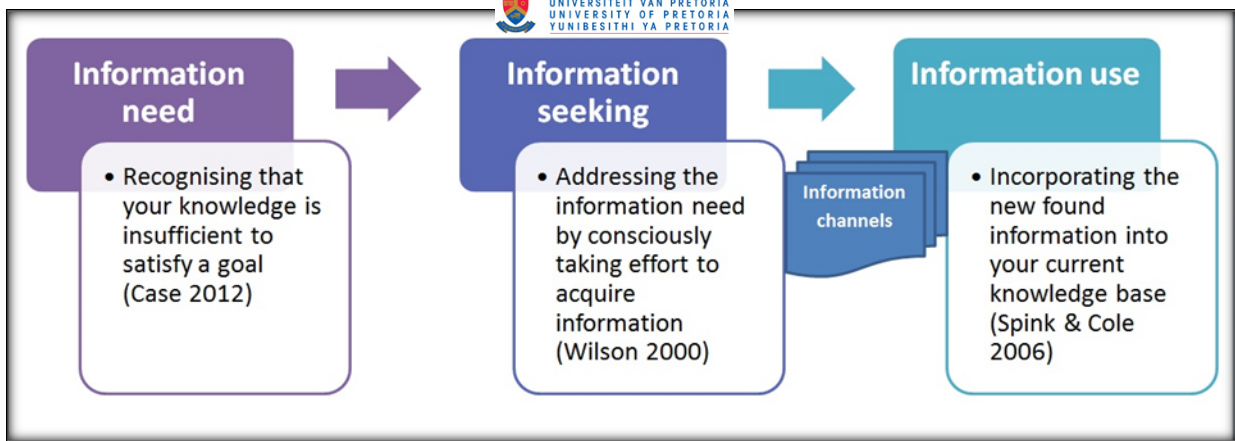
#### **3.2.1 Brief overview of information behaviour studies**

Publications by Bates (2010), as well as Case (2002, 2007, 2012) and Fisher, Erdelez, and McKechnie (2005), together with reviews by Courtright (2007), Fisher and Julien (2009), Spink (2000) and Spink and Cole (2006), are some indications of the profound interest in this field of study. Devadason and Lingam (1997:41) motivate studies of information behaviour as due to the “turbulent and changing information environment” and say that libraries need to understand “the complex process of identifying information needs” of their users in order to ensure efficient and effective information services.

Human information behaviour research involves all spectra of user groups. Case (2007), Webb *et al.* (2007) and Wilson (2006) point out that information seeking behaviour studies from the 1940s to the 1970s were dominated by investigations of scientists, especially engineers. However, since the 1980s the focus has shifted towards other disciplines, such as the social sciences and humanities. Case (2007) and Courtright (2007) also refer to several studies on researchers and students, such as the works of Chowdhury, Gibb and Landoni (2011), Hyldegård (2006), Mellon (1986), Salazar, Marmolejo, Angeled and Malagon (2007) and Spence, Reddy and Hall (2005). Information behaviour studies in the health-related environment became more prominent during the 1990s, while a few authors also addressed the role of emotion in the information behaviour of healthcare professionals, as seen in publications by Julien, McKechnie and Hart (2005), as well as in the compilation of work edited by Nahl and Bilal (2007) and a review by Fourie (2009). Information behaviour studies on professionals in the workplace include among others engineers (Du Preez 2007; Kwasitsu 2003; Leckie *et al.* 1996), healthcare professionals (Gorman 1995; McKnight *et al.* 2002; McKnight 2006), privately practising dentists (Landry 2006), geography teachers (Bitso & Fourie 2011), veterinarians (Nel & Fourie 2010) and lawyers (Wilkinson 2001). Studies on the information needs of veterinary science researchers are however limited to only a few (Wales 2000).

### **3.2.2 Relationship between information needs, information seeking and information use**

As this study wants to shed light on the information needs, information seeking behaviour and information use behaviour of researchers, it is necessary to review how these concepts relate to one another. The following discussion will be based on the visual illustration of these concepts as depicted in Figure 3.2. Although operational definitions were provided in Chapter 1, the purpose of this discussion is rather on how these concepts link to each other. The information illustrated in Figure 3.2 serves as a summary based on insights gained from the literature noted in the preceding sections. Although Figure 3.2 does not reflect the interactive nature of the seeking of information and the full complexity of information behaviour, information seeking behaviour and information use behaviour, these are acknowledged.



**Figure 3.2: Relationship between information needs, information seeking and information use**

An information need is the recognition that one’s knowledge is inadequate to satisfy a specific goal (Case 2007; Dervin 1992; Ingwersen & Järvelin 2005). A key component describing an information need is “uncertainty reduction” (Berger 1987; Berger & Calabrese 1975; Bradac 2001; Kuhlthau 2004).

Research by Wilson *et al.* (2002) investigated the uncertainty concept as a useful variable in understanding information seeking behaviour of faculty and research students engaged in research projects. They also confirmed affective as well as cognitive dimensions involved in information problem solving. One of the main results of an information need may thus be the motivation (derived from some sort of uncertainty) for an action to seek information.

Wilson (2006:661) mentions that it is not easy to understand the concept “information need” and that many studies do not address the central question of this concept, which is, “why the user decides to seek information, what purpose he believes it will serve and to what use it is actually put when received”. Wilson (2006:663) refers here to information needs as secondary needs arising from a desire to satisfy primary needs. In this case, primary needs relate to human needs, as studied by psychologists and divided into three interrelated categories: physiological needs, affective needs and cognitive needs. These needs are thus not primarily responsible for information seeking or use, but they can rather “trigger” information seeking. He therefore suggests not referring to “information needs” as such, but rather to “information seeking towards the satisfaction of needs.”

For the purpose of this study the emphasis of the term “information need” will be on “uncertainty” as the motivation for information seeking (Case 2012; Dervin 1992; Ingwersen & Järvelin 2005; Kuhlthau 2004; Wilson *et al.* 2002). The term “information need” will therefore be used when referring to the state where the researcher recognises that his knowledge base is insufficient to address a certain topic in his field or aspect related to the research in which he is involved.

When a person becomes aware of an information need (knowledge gap) and addresses it by taking conscious steps or actions to acquire information, information seeking occurs (Wilson 2000:49).

When a user finds information and incorporates this new information into his or her existing knowledge base, it is called information use (Spink & Cole 2004). Spink and Cole (2006:28) remark that information use is sometimes misinterpreted and difficult to understand. Some studies on information use refer to the use of information sources rather than to the user's "accessing channels to information sources". The latter makes it possible to differentiate between information seeking and channel (source) use on the one side and information use on the other; as well as between real use and potential use of information (e.g. when a source was found, but the information in it was not used) (Dervin 1992).

As information use behaviour involves the incorporation of newly found information into a person's existing knowledge, it is further possible to distinguish between internal use behaviour (comparing, organising, categorising, etc.) and external use (listening, arguing, agreeing, applying, etc.) of information.

In the scope of this study, the operational definitions given in Chapter 1 (section 1.5) will be accepted.

Different models (discussed in the next section) have been reported to support studies on information needs, information seeking and information use.

### **3.2.3 Models supporting studies on information needs, information seeking and information use**

Case (2007:334) suggests the use of models to enable researchers to take all possible variables into account when studying information behaviour. According to Wilson (1981), a model is "... a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions". Models are graphic illustrations of the operational aspects of theory (Du Preez 2007:74) and are especially useful in the "description and prediction stages" when addressing a problem (Bates 2005:3). Models can develop into theories (Bates 2005) and aim to link theories to actions (Wilson 2005). Research models are therefore useful to give a systematic overview of the processes involved in certain actions. It assists the researcher to involve all relevant actions and provides a simplified overview of complicated processes. Many models of information behaviour and information seeking exist (Bates 2005; Case 2012; Spink 2000; Wilson 2005).

Several studies on the information needs, information seeking behaviour and information use behaviour of researchers and postgraduate students noted, among others, models by Krikelas (1983), Wilson (1981; 1996; 1997), Kuhlthau (2004) and Leckie *et al.* (1996) of specific interest. Although not directly, these individual models were in a way applied to the framework of this study and it will therefore be discussed briefly.

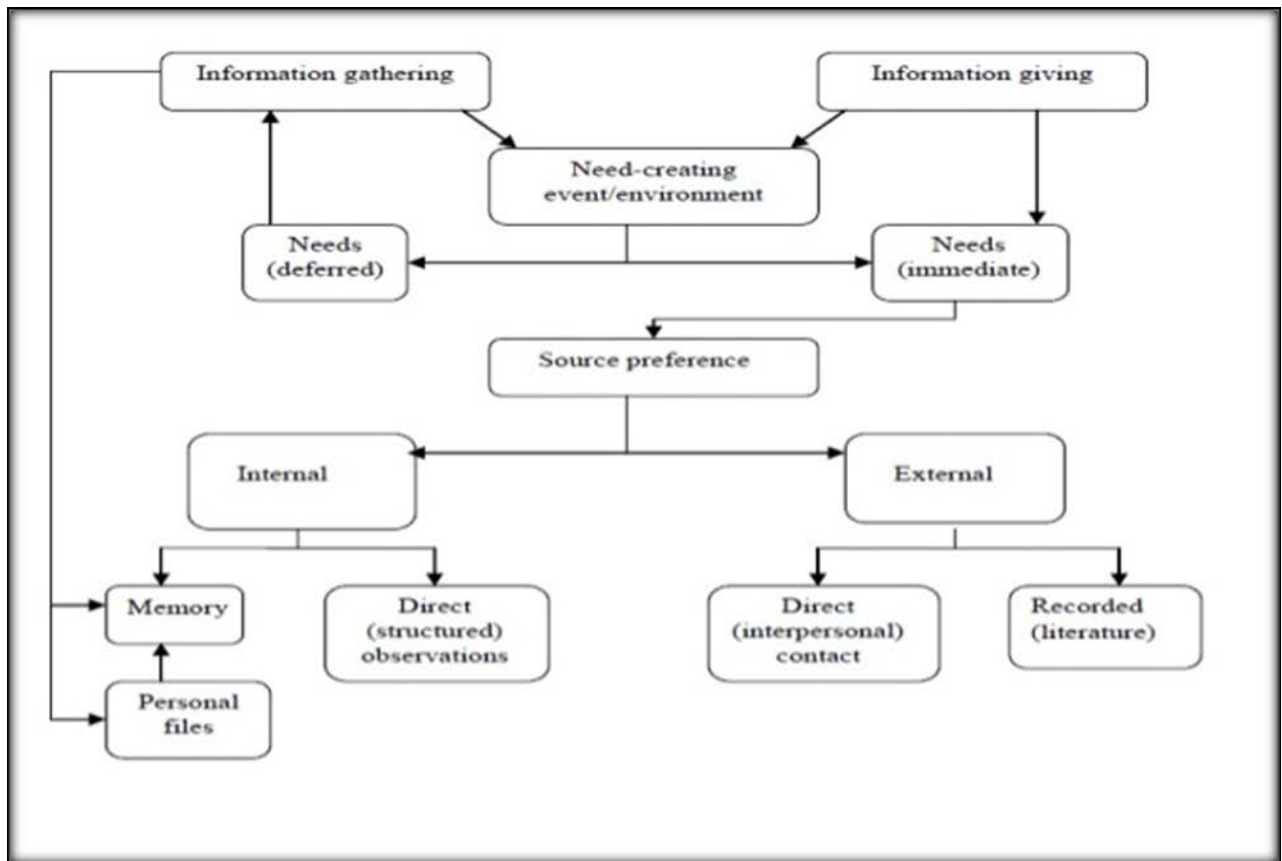
(a) Krikelas's model of information seeking (1983)

The Krikelas model (1983) (Figure 3.3) contains 13 components and is one of the first attempts at modelling the information seeking process. The Krikelas model is a one-dimensional flowchart indicating the perceived need as starting point for information seeking, followed by the processes of searching, finding and using information. As a result the user can either be satisfied or dissatisfied with the outcome. According to Case (2007:124), the emphasis of the Krikelas model is on uncertainty as a motivation for information seeking and the utilisation of sources of information.

An important aspect of this model is that it acknowledges information needs in the context of the user's environment. In the scope of this study, the research environment may lead to the need for information to address knowledge gaps regarding research and this may motivate the researcher to search for information and information resources. Failure to find information may result in repeating the information seeking process until the information need is satisfied (Krikelas 1983).

Criticism of this model is that it is too linear and does not define the complexity of the research process, and it ignores the aspects of analysis, synthesis and evaluation of information. It simply suggests that once the original information need has been satisfied, the search is over. The users' skills, characteristics, growth and learning in the information seeking process is ignored; the focus is solely on skills related to sources, while other information handling skills for effective information use are not taken into account (Henefer & Fulton 2005).

As this model emphasises the importance of the environment (need-creating event) as motivator for information seeking, as well as the fact that it deliberately highlights source preference as a component in information seeking, it is included in this discussion.

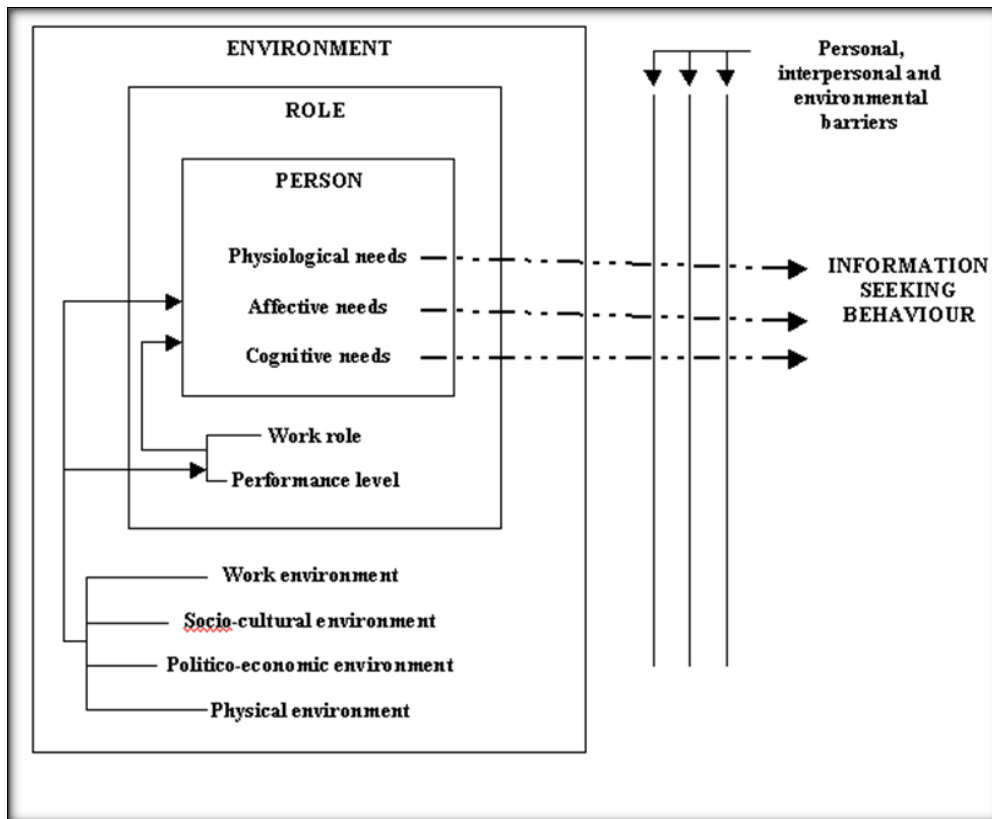


**Figure 3.3: Krikelas's (1983) model of information-seeking behaviour**

(b) Wilson's models of information seeking behaviour

Wilson's first set of three models was published in 1981. A revised, general model on information seeking behaviour (based on the second and third models of 1981) was published in 1996. Wilson published several other models, but for the purpose of this study, only some are noted here.

Wilson's 1981 model (Figure 3.4) of information seeking behaviour is one of the most cited models (Wilson 2000). It focuses on information needs and information seeking, searching and use are integrated within the goal-directed problem solving processes. The environment, role and physiological, affective and cognitive needs of an information user are included in the information seeking behaviour.



**Figure 3.4: Wilson’s 1981 model of information seeking behaviour (Wilson 2005:32)**

Wilson *et al.* (2002) published a non-linear model of information behaviour and focussed on uncertainty as motivation for an information need (Spink & Cole 2006:163). This comprehensive global problem-solving model defines the following four stages: problem identification, problem definition, problem resolution and problem solution (Wilson 2000:53).

Wilson’s 1996 model of information behaviour is an integration of different models. Similar to Krikelas (1983), Wilson’s 1996 model suggests that information seeking begins with a perceived need or “gap” perceived by the information user (Wilson 2000:53). It also views the information user in the context of his environment.

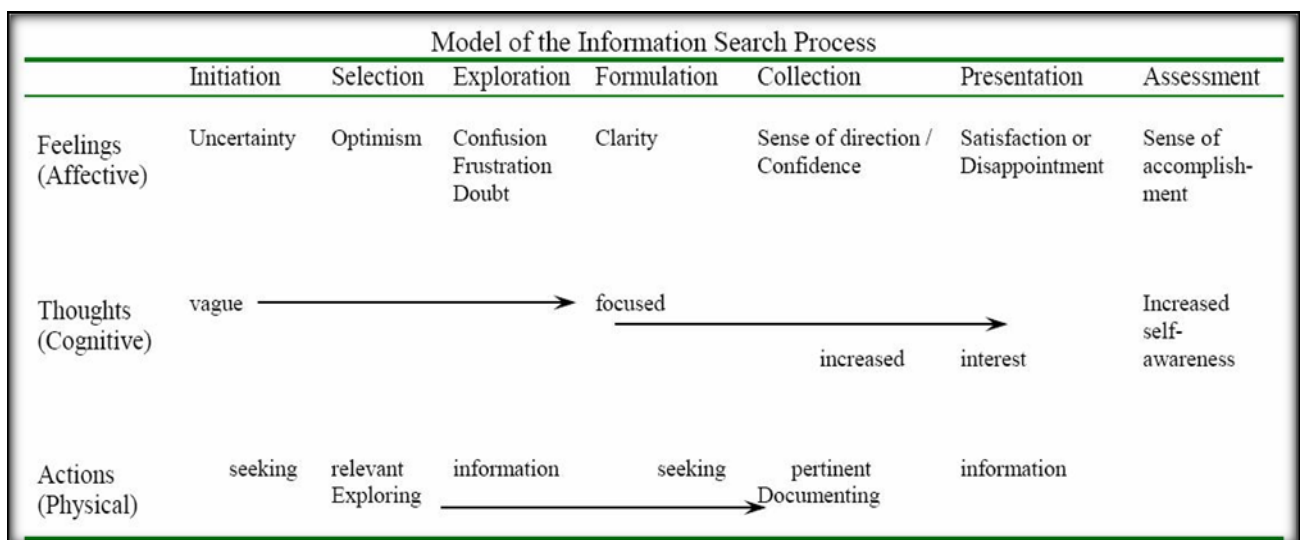
A variation of Wilson’s 1996 model was developed in 1997 and illustrated that information seeking behaviour of a user starts with a perceived need, leading to formal or informal efforts to approach information sources or services to find relevant information to address the need. The information user may also involve other people through information exchange or may want to share or communicate this information with other people.

Wilson’s models acknowledge the influence of the environment as well as work roles on a person’s information seeking behaviour. This may support this study in investigating researchers as part of the research environment.



(c) Kuhlthau's Information Search Process model

The Information Search Process (ISP) model of Kuhlthau (2004:44) has been used in several studies on the information seeking of researchers and students. This model focuses on the information search process and incorporates the affective (feelings) realm, the cognitive (thoughts) realm and the physical realm, which involves the actual actions (Kuhlthau 1991; 1993; 1999). According to Case (2007:122), Kuhlthau's ISP model is universally applicable to any domain, although a downfall may be that it does not take into consideration some other important factors usually involved in information seeking research, such as the type of information need and the use of available information resources. Kuhlthau (2004) used grounded theory as methodology in studies with high school students to develop her model. According to Weiler (2005:47), Kuhlthau's model is applicable to studies on a variety of user groups. Chowdhury (2011), Hyldegård (2006) and Spence *et al.* (2005) used it in studies on academic researchers, university students and healthcare teams respectively. A study by Kracker (2002), where research anxiety and perceptions of research by students were investigated, also used Kuhlthau's model. Kuhlthau (2004) suggests the use of her model to investigate researchers' experience with information during the research process, as well as to address library and information services and systems' responses to each stage in the information search process (Kuhlthau 2005:233). The following information actions to address information needs are identified: initiation, selection, exploration, formulation, collection, presentation and assessment. Kuhlthau's model is presented in Figure 3.5.



**Figure 3.5: Kuhlthau's Information Search Process**

Although Kuhlthau's model highlights the different realms involved in information seeking, this was not applied directly in the study.

(d) Leckie, Pettigrew and Sylvain model (1996)

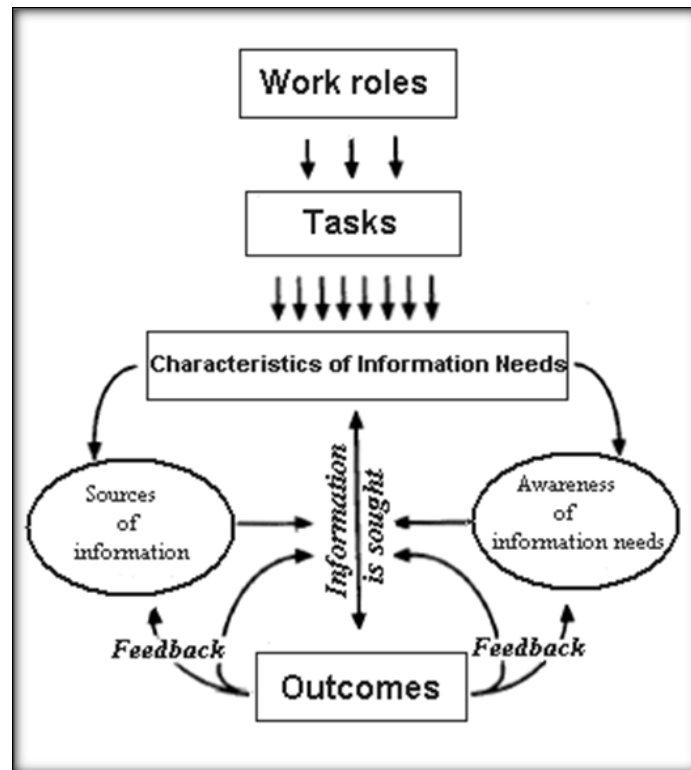
Focusing on the information seeking of professionals, the Leckie, Pettigrew and Sylvain model (1996) was developed from a literature review on research on the effects of work roles and tasks on the information behaviour of engineers, healthcare professionals and lawyers. This model was used in a number of studies focussing on information behaviour of professionals, including that of Landry (2006) on privately practising dentists, Du Preez (2007) on engineers and Bitso and Fourie (2011) on geography teachers.

The outline of the Leckie, Pettigrew and Sylvain model (1996) can be seen in Figure 3.6. Leckie, Pettigrew and Sylvain (1996:180) acknowledge the impact of work roles and tasks on information needs. Professional roles, such as those of service provider, administrator or manager, researcher, educator and student involve certain tasks (for example assessment, counselling and report writing).

According to the model, work roles and tasks are both components generating information needs. Information needs can be influenced by characteristics such as demographics, the importance or frequency with which information is required (Landry 2006:1897). Beliefs and attitudes are less relevant (Case 2007:128). Sources of information can be formal or informal, internal or external, oral, written or electronic. Knowledge and personal experience are also considered important variables.

The Leckie, Pettigrew and Sylvain model (1996) identifies the following variables as important factors affecting a professional's information awareness: accessibility of the source, cost involved, familiarity of using the source, packaging and usefulness of the source, the quality and accuracy of the information, timeliness and trustworthiness, helpfulness and overall reliability of the source. Outcomes can be successful or unsuccessful and therefore the model uses feedback loops to allow for opportunities to make other attempts to find the needed information via other sources or channels in case of negative outcomes.

An important component in the Leckie, Pettigrew and Sylvain model (1996) is the acknowledgement of work roles and tasks, as well as awareness of information needs and sources of information. This will be noticed in the data analysis and findings of this study.



**Figure 3.6: Leckie, Pettigrew and Sylvain model (1996) of information seeking of professionals (Leckie 1996:162)**

Based on the preceding discussion on models, it was decided to take selected aspects of Krikelas’s model of information seeking (1983), Wilson’s information behaviour models (1981), Kuhlthau’s model of the ISP, as well as the Leckie, Pettigrew and Sylvain model (1996), into consideration to develop a theoretical framework to guide this study. The application of these models in the framework for this study is reflected in Figure 3.7.

Figure 3.7 indicates the influence of work roles and tasks (Leckie *et al.* 1996), as well as a need-creating event or the environment (Krikelas 1983; Wilson 1981), on the implied information needs of researchers. The influence of the research environment on the information needs of researchers has already been discussed in Chapter 2 of this study. Work roles and tasks of veterinary science researchers may also affect their information needs. Primary as well as secondary needs are considered.

This framework reflects some of the findings noted and was aligned with the empirical component of this study. Aspects included in the investigation are work roles and tasks (specifically research and postgraduate supervision) and the research and need creating event that creates secondary needs. It also focused on the different actions to address the information need (specifically collection, selection and presentation) as well as information need satisfaction. Research is ongoing and the process can be repeated.

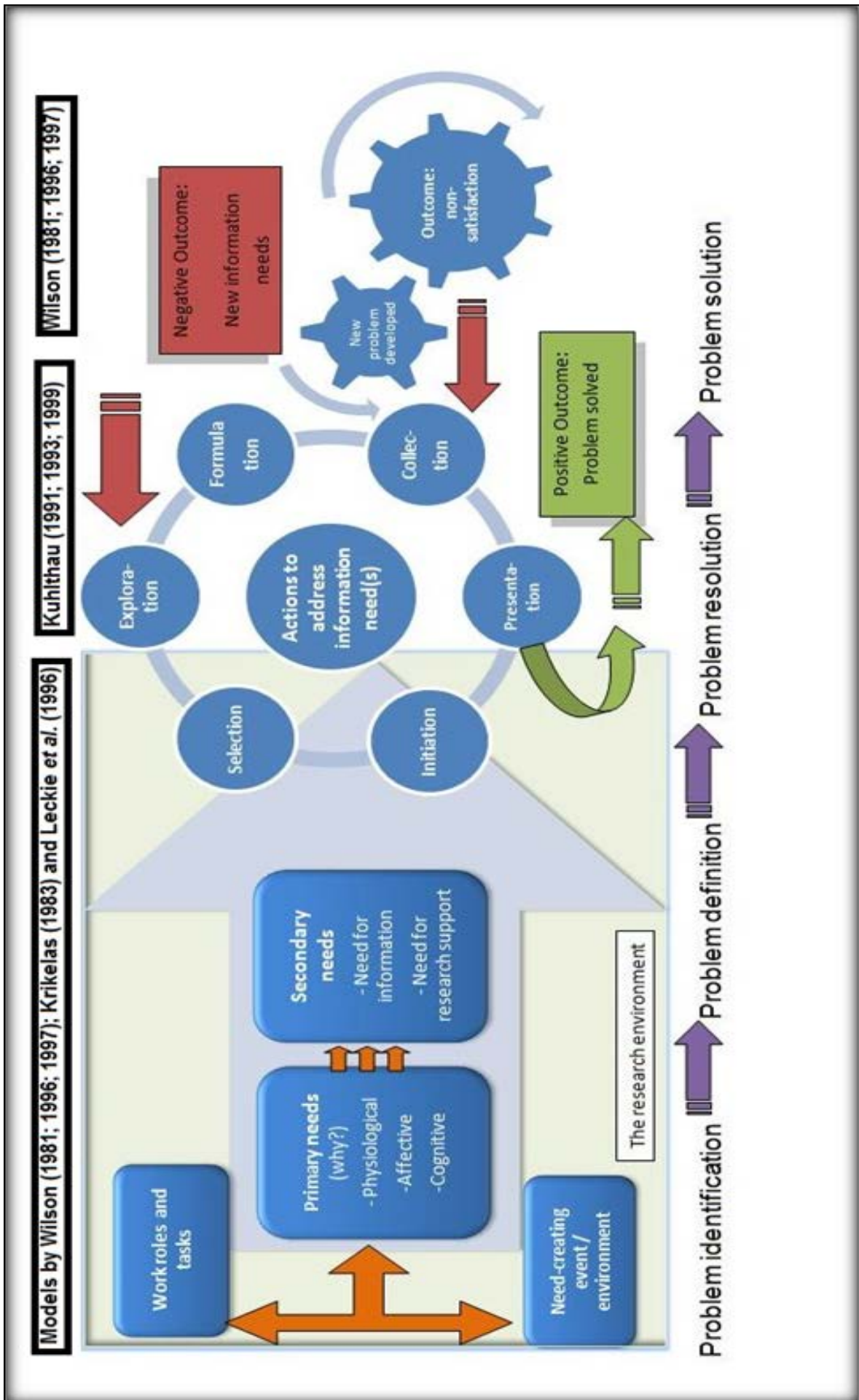


Figure 3.7: Application of different models in the framework for this study

### **3.3 INFORMATION NEEDS OF VETERINARY RESEARCHERS AND POSTGRADUATE STUDENTS**

Various studies have reported on information needs as well as factors motivating information needs of students and researchers in various disciplines (Ellis 1993; Fry & Talja 2007; Heïnstrom 2006; Lonnqvist 2007; Spence *et al.* 2005; Talja 2005). Such factors include the research environment (including the impact of the discipline and/or technology on the information need); work roles and tasks of researchers; as well as other motivational factors (such as financial rewards) and aspects related to demographics (e.g. age or level of education). In addition, the research environment (international and local) plays an important part in instigation and development of the information needs of researchers. Such environments were discussed in chapter 2. This section will thus only focus on the impact of a researchers' discipline and the impact of technology on the information needs of veterinary science researchers and postgraduate students.

#### **3.3.1 Impact of discipline on information needs**

Researchers from different disciplines have different information needs and take different approaches to satisfy these information needs (Gannon-Leary *et al.* 2008; Herman 2001; Schonfeld and Guthrie 2007; Sheeja 2010).

Some of these differences in discipline include, for example, a greater preference for electronic information among scholars in the scientific discipline, while keyword searching is also more important to these scholars than to their colleagues in the humanities, who prefer browsing and chaining search strategies (Fry & Talja 2007).

In order to address the information needs of researchers in different disciplines, librarians need to have more knowledge about the subject fields in which their users are involved (Allan 2010; Brophy 2008; Schonfeld & Guthrie 2007). Taking into account that the focus of this study is on veterinary science researchers, it is important to distinguish between information behaviour studies focusing on veterinary practitioners and studies that focus on veterinary researchers (scientists), veterinary scholars (students) and veterinary faculty (academic staff).

According to Swan and Kriek (2009), veterinary practitioners are responsible for the health of animals and they serve the general public and their animals. Nel and Fourie (2010:109) note that the information needs of veterinary practitioners might therefore be based mainly on problem solving and staying abreast of new information. Veterinary researchers are allied to a research institution, such as a university or college, and their work involves teaching and

learning, research projects and the creation of new knowledge (National Research Council, 2005:162). Because they are linked to an institution, veterinary researchers have access to a larger variety of information resources, services and supportive information products than veterinary practitioners who are mainly in private practice and have access to limited information sources. Veterinary researchers are supported by academic and research libraries, while veterinary practitioners are not necessarily linked to a library and the services it provides. One may thus assume that there will be differences between the information needs of veterinary practitioners and veterinary researchers. This is supported by Leckie *et al.* (1996:163), who warn that it is not recommended to generalise information seeking models of scholars to professionals, in view of aspects related to work constraints and access to information resources.

Studies by Chikonzo and Aina (2001) and Ikpaahindi (1985) address particularly the information needs of veterinary scientists. Chikonzo and Aina (2001) used the University of Zimbabwe veterinary staff to conduct “social survey research” on the information environment of veterinary researchers. This was done by means of a questionnaire, containing both closed- and open-ended questions. The aim of the first part of the questionnaire was to obtain personal data of respondents, while the second part addressed information needs, information seeking behaviour and the use of information sources. The research population consisted of the 70 staff members of the University of Zimbabwe Veterinary Science Faculty and included lecturers, technicians and veterinary nurses. The results of this study indicated that researchers needed support with research on new topics, preparing lecture notes and conference papers and for career development. Chikonzo and Aina (2001:111) also found that “...the veterinary library is the main information provider for the veterinary researchers, thus, there is a need to strengthen the library resources, as well as to provide constant training to the library staff.”

With more evidence of a preference for electronic information resources in veterinary science (Nel & Fourie 2010; Tennant & Cataldo 2002), a brief review of the impact of technological developments on the information needs, information seeking behaviour and information use behaviour of researchers in this discipline, as well as in general, is included in the next section.

### **3.3.2 Impact of technological developments on information needs**

An important factor that has an impact on the information needs of researchers is technological developments (Borgman & Furner 2002; Brown 2010; Law 2010; Neal 2009). Borgman and Furner (2002:4) describe the new way of doing research and dealing with

information as follows: “The cycle of scholarly activities is blending into a continuous, looping flow, as people discuss, write, share, and seek information through networked information systems.”

Gannon-Leary *et al.* (2008:57) found from a literature analysis of several studies on the information needs of researchers that because of the possibilities provided by technology, researchers from different backgrounds and disciplines increasingly work together to solve problems. This interdisciplinary research approach may affect library and research support services. Therefore an increased interest in collaborative information seeking is not only visible among researchers practising this behaviour, but also among researchers investigating this behaviour (Blake & Pratt 2006; Borgman & Furner 2002; Brown 2010; Sonnewald 2007).

The influence of technology on information behaviour studies is also visible in veterinary science. Earlier studies in veterinary science indicated a need for the library as main provider of information sources and support (Drake & Woods 1978; Raw 1987; Schmidt 1991). More recent studies by Biswas and Haque (2008), Fleishman-Hillard (2008), Haines *et al.* (2010), Pelzer and Wiese (2005), Shokeen and Kumar (2009) and Wales (2000) revealed a preference for online information products and services. Referring to veterinary practitioners, Nel and Fourie (2010:113) found that more veterinary professionals prefer the speed and convenience of the internet as their primary information resource.

With several other authors (Herman 2001; Nicholas *et al.* 2010; Schonfeld & Guthrie 2007) suggesting that the impact of electronic and online information resources and access to digital information cannot be ignored in investigations of information needs across all disciplines in the research environment, this study also included aspects related to the information needs of veterinary researchers in online and networked environments. These may include digital products and electronic information resources, such as electronic books, journals and reference works, websites, blogs and wikis, as well as communication on social networks, such as Facebook.

### **3.3.3 Information needs satisfaction**

Information need satisfaction was included in one of the earliest models to study human information behaviour, namely a model by Krikelas (1983). As discussed in section 3.2.3 and presented in Figure 3.3 of this study, it consists of four easy steps: first the need is perceived; then follows the search for information; the next step is to find the information and the process results in the use of the information. The outcome can be either satisfaction or dissatisfaction.

One of the few information behaviour studies directly addressing information need satisfaction of researchers is a study by Prabha, Connaway, Olszewski and Jenkins (2007). The purpose of this study was to identify how and why the information needs of researchers are satisfied. Prabha *et al.* (2007:85) identified the following factors indicating information need satisfaction: the objectives or motivations why users need information; characteristics of the information need; external variables that may have an influence on the need (such as setting, context and situation); internal variables such as motivation and searching skills of the information user and the phase of the project. This study focussed on information needs of faculty as researchers and students from all disciplines, using role theory and rational choice theory in human information behaviour. Prabha *et al.* (2007) found that undergraduate as well as postgraduate students stop looking for information as soon as they have found the required amount of information for an assignment. Time has an influence on a researcher's decision to stop looking for information and most researchers start with the internet when looking for information, followed by human sources (convenience). Faculty's criteria for stopping to search for information are based on publication requirements, deadlines and time. Similar findings were reported by Weiler (2005), who investigated motivation, critical thinking and learning as factors in information needs of undergraduate students. She also found that these students pay less attention to accuracy when accepting information, while convenience is the most important attribute when looking for information.

The end result of the information seeking process is eventually an outcome, which may be either positive or negative (Wilson 1981; 1996). A negative result may require the information user to seek further for information or to make changes to his or her approach to the information problem and, in some instances, to start all over again.

The next section will address the information seeking behaviour of researchers.

### **3.4 INFORMATION SEEKING OF VETERINARY RESEARCHERS AND POSTGRADUATE STUDENTS**

A large number of studies addressing the information seeking behaviour of researchers exist. The number of studies focussing on the information seeking of researchers in veterinary science is however limited. The following section will start with a discussion of literature on the information seeking behaviour of veterinary science researchers. It will also include studies on researchers from other disciplines for a more comprehensive contribution to the topic.

A study on veterinary science scholars by Weiner *et al.* (2011) reports on a preliminary investigation on the information seeking behaviour of first semester, undergraduate



veterinary students with a focus on information literacy. As in many other studies on undergraduate students, including those of Connaway *et al.* (2011), Heinström (2005), Weiler (2007) and York (2000), Weiner *et al.* (2011) found that the majority of these students start seeking for information for coursework on Google. According to Weiner *et al.* (2011:22) an understanding of the information seeking and use behaviour of undergraduate students may assist librarians in the development of appropriate information literacy training courses to equip students with skills and knowledge that will enable them eventually to become better researchers.

Another study on information seeking behaviour, with academic staff and postgraduate students from the Faculty of Veterinary Medicine, University of Glasgow, was conducted by Shiri and Revie (2003). This study specifically shed light on user-thesaurus interaction during information seeking, and highlighted the physical and cognitive activities involved. Topic complexity, topic familiarity, prior topic search experience and type of search were examined in this study. Pre- and post-search questionnaires, transaction logs and post-session interviews were used to gather data from 30 respondents.

Shiri and Revie (2003:524) found that “an increased number of cognitive and physical search moves were associated with more complex topics”. The type of search and prior topic search experience had no influence on the number of moves recorded. Although most of these findings have implications mainly for the designers of information retrieval systems, it can also assist librarians in identifying areas in which researchers may need support when seeking information. Some of the findings librarians need to take note of include that users need more assistance when searching for information on difficult or more complex topics and more experienced searchers with subject knowledge found it easier to search for information (Shiri & Revie 2003:523).

Some of the more recent studies focussing on information seeking behaviour of researchers include research by Al-Suqri (2011), Connaway *et al.* (2011), George *et al.* (2006), Hemminger *et al.* (2007), Hirsh and Dinkelacker (2004) and Raza and Upadhyay (2010). This section will review some of these and attempt to list some of the main attributes influencing information seeking of researchers and postgraduate students.

A national study of information seeking behaviour of academic researchers in the USA was conducted by Hemminger *et al.* (2007) and revealed that new technologies and information delivery systems are responsible for changes in the way researchers search for information. They found that researchers prefer electronic methods for searching and accessing scholarly information and highlighted the impact of collaborative information sharing among

researchers. According to Hemminger *et al.* (2007), there is a difference in the information seeking behaviour of researchers from different disciplines and demographics. Research findings by Nicholas *et al.* (2010) add to this; they report that natural science researchers prefer the use of e-journals and their information seeking is fast and direct.

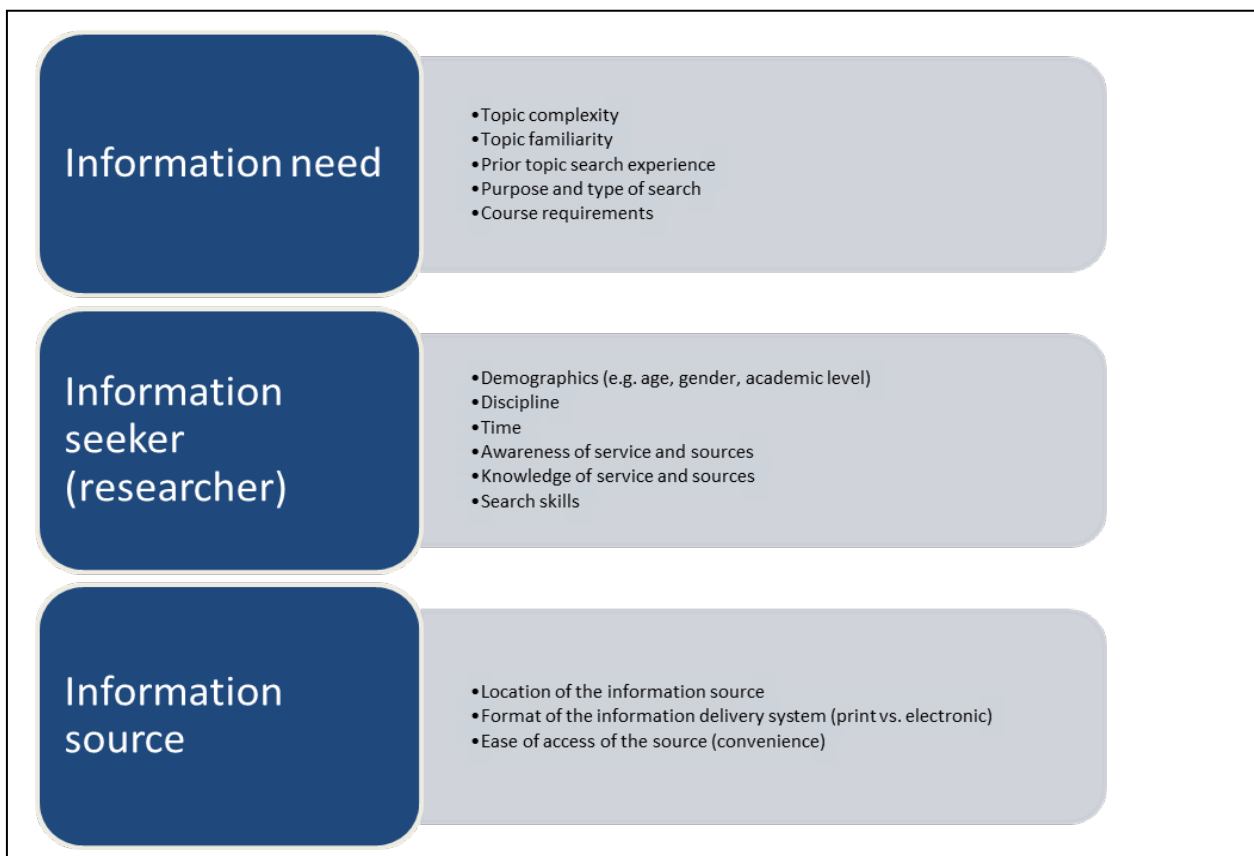
Research by Connaway, Dickey and Radford (2011) focussed on convenience as a critical factor in information seeking and found that convenience has a large impact on the choice of information resources, satisfaction with the source, ease of access and time taken to access and use the information source. This can be linked to different demographic categories (e.g. age group, gender, academic roles, etc.), where for example younger researchers especially prefer the more convenient Google as starting point for information seeking. George *et al.* (2006) found similar results to these in their research on the information seeking behaviour of graduate students in a multidisciplinary environment. They however add knowledge of services and sources, as well as course requirements to the list of factors affecting the information seeking behaviour of postgraduate students. In this study George *et al.* (2006) also found that doctoral students have better knowledge of information sources and demonstrate more advanced search skills. Other factors identified by Weiler (2005) as being prominent considerations when students seek information are personal preconceptions, time and level of difficulty of the assignment.

Another research project investigating the information needs and information seeking behaviour of biomedical researchers working at a research institute (Central Drug Research Institute) was conducted by Raza and Upadhyay (2010). They addressed the following aspects in a questionnaire: researchers' awareness of services provided by the library, the purpose and type of information sought, the extent of IT application in the library and researchers' awareness of these, user opinion regarding the facilities, researchers' strategies for searching and the factors that influence researchers' information needs and information seeking.

Raza and Upadhyay (2010) found that most biomedical researchers who participated in the study visited the library weekly to collect reading material. These researchers searched for information by doing subject searches on the library's online public access catalogue and the library's international information database network, used e-journals, felt that library staff was helpful and most found the library facilities satisfactory. Although the study was very specific in respect of information resources used and services related to the Central Drug Research Institute library and biomedical researchers, the authors came to the conclusion that information seeking behaviour differs between disciplines and libraries. Raza and Upadhyay

(2010:9) also suggest that library information systems “must be capable of handling the complex information needs and demands of researchers.”

Taking the preceding discussion into account, factors playing a role in the information seeking behaviour of researchers are portrayed in Table 3.1. These are very important considerations for academic libraries to take into account when developing services and purchasing products to address the information seeking needs of researchers. Although these were not directly applied in this study, some aspects were considered in the empirical investigation, including the awareness and knowledge of services and sources as well as the location, format and ease of access of information sources.



**Table 3.1: Factors affecting the information seeking behaviour of researchers**

The next section will discuss information use, with special reference to the library and information resources provided by the library in more detail.

### **3.5 INFORMATION USE OF VETERINARY RESEARCHERS AND POSTGRADUATE STUDENTS**

Researchers obtain and use information from a large spectrum of resources (Pantry & Griffiths 2009). Studies investigating the use of different information sources have been published since the early 1940s (Case 2007:10). Although these studies indicated that the

focus was on information seeking and needs, Case (2007:6) mentions that they in fact investigated the actual information sources and how these were used. Only during the second part of the twentieth century were studies more directed towards the information user and his/her needs.

Searches in databases, including Library and Information Science Abstracts (ProQuest), ScienceDirect and EBSCO Host (Library, Information Science & Technology Abstracts), found a number of studies reporting on the information sources researchers prefer to use; how they experience and evaluate the library, its products and services; as well as their attitudes to library services. The aim of many of these studies was to develop new products and services based on the information needs of the user group studied. Haines *et al.* (2010:74) also mention that although many studies are focusing on the library resources used, they are not aimed at collecting data on the library services that are required.

The focus of the next section will be on library resources and products, including information channels researchers prefer to use and access. (The use of library and information services is addressed in more detail in Chapter 4.)

### **3.5.1 Use of libraries and collections**

The use of the library and library resources are the focus of a large number of studies in the field of library and information science (Case 2012).

A few studies address library and information use by veterinary science researchers. Pelzer and Leysen (1988) studied the library use and information-seeking behaviour of veterinary medical students at Iowa State University. The aim of their research was to evaluate veterinary students' perception of curriculum demands for clinical information. They also tried to determine if students sought current information and how they "... intended to pursue continuing education when in practice" (Pelzer & Leysen 1988:328).

Pelzer, Wiese and Leysen (1998) repeated the study in 1997 (with similar methodology), but with the focus more on information seeking in the electronic information environment. The results of this study indicated that most respondents (60%) prefer the internet for information seeking and use and indicate a preference for electronic information resources above printed material.

In another study Chikonzo and Aina (2001:111) found that the veterinary library is the main information provider for veterinary researchers in Zimbabwe and that there is a huge need for library resources and support. In contrast with this, veterinary science researchers in

Nigeria prefer the use of personal records, discussion with colleagues and a variety of different reading material for their research (Nweke 1995:41). These researchers often also obtain information serendipitously.

Ikpaahindi (1985) conducted a study on the information needs and seeking behaviour of Nigerian veterinary scientists in 1985 in which the following aspects were investigated: the type of information needed; the frequency of information needs; the purpose of information seeking; the strategies of information seeking and the role of information sources. Ikpaahindi (1985:152) found that journal articles were the most frequently used sources of information. Veterinary scientists also prefer bibliographies, abstracts and indexes and consulting library staff for new information. Respondents needed information for research purposes, to keep up to date and prepare teaching material and lectures. Although the results of this study can not be compared to current studies, due to the role of the internet, it providevaluable information on early studies conducted on the information behaviour of veterinary researchers in Africa.

Several other studies have been published on the information use behaviour of researchers from a large spectrum of disciplines. Only a few will be discussed to add value to the discussion.

Focussing on the role of the academic library in research, Hart and Kleinveldt (2011) examined the use of the library of the Cape Peninsula University of Technology (CPUT) in South Africa. They investigated the impact of information and communication technology on information seeking and use, as well as the pressure put on researchers to increase research output (refer to chapter 2 for a comprehensive discussion on this issue). Respondents in this study identified access to e-resources, borrowing print resources and inter-library loans as the preferred research support services provided by the library. The researchers also indicated a need to be kept informed of new research in their field. The need for librarians to obtain more subject knowledge was also raised, as well as opportunities for the library to organise and archive research data sets and other research output.

As library collections play an important part in addressing the information needs of researchers, these have been addressed by several authors, including Pancheshnikov (2007), Udofia (1997), Viera and Faraino (1997) and Wilson and Tenopir (2008). A recent study by Kayongo and Helm (2012) looked at the relevance of library collections for postgraduate research. They did a citation analysis of doctoral dissertations at the University of Notre Dame. The aim of this study was to determine to what extent the library collections

at this institution met the needs of graduate students and the findings indicated a need for additional funding for collection development.

As most of these studies are evaluations of local library collections, they will not be discussed in much detail here. Several of these studies however used citation analysis as research methodology. This method will be discussed in more detail in chapter 5, which deals with methodology.

As mentioned earlier in this review, developments in information technology had a huge impact on information seeking and are also investigated in a large spectrum of studies, including those by Brown (2010); Ford, Miller and Moss (2001); Garcia *et al.* (2006); Pelzer *et al.* (1998) and Talja, Vakkary, Fry and Wouters (2007), to mention only a few. The next section will briefly review studies focussing on researchers' use of electronic information resources.

### **3.5.2 Electronic information sources**

A 1999 study by Brown on the information seeking behaviour of scientists at the University of Oklahoma concluded that “the ultimate preferred source for information was shown to be the printed journal article” (Brown 1999:937). However, according to Tenopir *et al.* (2003), this applied only to the early evolving system phase, where electronic journal collections were expanding after their introduction to the academic community during the first part of the 1990s. Today it is impossible to imagine research without access to online electronic resources (Borgman *et al.* 2005; Borrego & Urbano 2007; Mulligan & Mabe 2011; Niu *et al.* 2010; Rowley 2000; Tenopir, Mays & Lei 2011; Urquhart & Rowley 2007).

It is therefore essential to include a discussion on the impact of electronic information services and products when investigating the information use of students and researchers - as the “electronic environment poses significant strategic and management challenges for higher education” (Schonfeld & Guthrie 2007:9). Schonfeld and Guthrie (2007:8) say that “as digital technologies continue to transform the environment for teaching, learning, and research, faculty information needs are evolving steadily”. Both Hepworth (2007) and Rowlands *et al.* (2008) agree that it is even more important to understand the information needs of users in the electronic research environments, which includes not only information products, such as electronic databases, journals and books, but also interpersonal communication, social networks and the internet (Fisher & Julien 2009). As many researchers in the science disciplines prefer electronic information above face-to-face library

services (Case 2008; Haines *et al.* 2010; Nel & Fourie 2010), the following paragraphs will focus on the use of online electronic information resources.

A few studies on the use of information sources among veterinary science researchers also indicate a preference for electronic information. A study by Prakash (2013) found that researchers at the Indian Veterinary Research Institute Izzatnaga preferred the use of the internet for information for their research. This study was conducted between 2008 and 2009 and used survey research to collect data by means of questionnaires sent to veterinary science researchers based at the Indian Veterinary Research Institute Izzatnaga at the Deemed University.

Shokeen and Kumar (2009) found in a study among veterinary science researchers at a university in India that most veterinary science researchers preferred books and journals as sources of information for research. They also indicated a preference for information from digital information resources. On the basis of their study, Shokeen and Kumar (2009:38) highlighted the importance of library training programmes to researchers on the use of online information databases and resources in order to “be able to utilize information resources to the maximum extent possible”.

The use of online information is also visible in other science disciplines. A research study by Nicholas *et al.* (2010) gives insight into the electronic information use of researchers from a large spectrum of disciplines (including physics, chemistry, economics and earth and environmental science); it found that researchers prefer the use of e-journals and seek and use information in very different ways. The authors found that the information seeking of researchers using the ScienceDirect database was fast and direct and that this database was entered via a gateway, such as PubMed. Another interesting finding of this study is that researchers hardly ever use carefully crafted discovery systems, such as advanced search and e-mail alert facilities, and that most researchers in their study used ScienceDirect outside the traditional 9 – 5 working day (thus well into the night and during weekends). The average journal use was higher in research-intensive institutions and their information seeking was faster and more direct than in less research-intensive institutions. According to this study, users of research-intensive institutions tended to make high and effective use of electronic information resources.

A study by Mulligan and Mabe (2011:290) explains the means by which the migration from a print to an electronic environment has affected the motivations, attitudes and behaviours of researchers in scholarly communication. By means of both quantitative and qualitative research methodologies, they found that in spite of the impact of technology on the efficiency

of scholarly communication, the information behaviour of researchers fundamentally stayed the same in the digital environment – similar to what it used to be in the print environment. Brown (2010:287) also confirms these findings, saying that “although the digital infrastructure facilitates new kinds of interaction, it has not altered the essential nature of scholarly communication.”

Library services in the online environment were also investigated by Haines *et al.* (2010), who aimed to develop customised library services for basic science researchers and therefore needed to examine their information seeking behaviour. Haines *et al.* (2010) particularly tried to form a detailed picture of what information was needed and what library services were preferred by researchers. They concluded that “the library must fundamentally change the way it sees itself in relation to basic science researchers ...” (Haines *et al.* 2010:79). The findings of their study indicated that the library is no longer the only source of information for science researchers. Information on the internet and collaboration with co-workers form part of their information network. As researchers do not view traditional library services as integral to their work environment anymore, Haines *et al.* (2010:79) suggested an integration of information resources and services “into their users’ work lives.” A need for an institutional repository was also raised by participants in this study.

Several other studies confirm that researchers in the science disciplines prefer electronic online information above traditional library services (Brown 2010; Case 2008; Hart & Kleinveldt 2011; Neal 2009). These findings have also been reported as relevant to veterinary science (Nel & Fourie 2010).

### **3.5.3 Collaboration**

Technology did not affect only information and library resources, but also the way in which information is shared among researchers. According to Borgman and Furner (2002:4), “... portable computers, electronic mail, word processing software, electronic publishing, digital libraries, the Internet, the World Wide Web, mobile phones, wireless networks, and other information technologies” transformed the research environment. These new trends in communication technology and the semantic web provided opportunities for faster and more effective networking and information exchange (Brown 2010; Case 2008; Erdelez & Means 2005; Pantry & Griffiths 2009). Case (2008:141) also suggests that these developments provide librarians with opportunities to become more actively engaged in research support, scholarly communication and knowledge creation.



Sonnenwald (2007:645) defines scientific collaboration as the “interaction taking place within a social context among two or more scientists that facilitates the sharing of meaning and completion of tasks with respect to a mutually shared, superordinate goal.”

The role of collaboration in research has been studied by several authors and a number of *Annual Review of Information Science and Technology* chapters have been devoted to reviews on this topic (including Borgman & Furner 2002; Brown 2010; Foster 2006; Sonnenwald 2007).

A report by Blake and Pratt (2006) explains how scientists communicate while working collaboratively. Blake and Pratt (2006) investigated the everyday communication and collaborative information behaviour of academic research scientists through mixed-methods methodology (such as observations, interviews and a systematic review) and introduced the Collaborative Information Synthesis model. Their findings also suggested that researchers in the fields of medicine and public health engage in four critical information-based tasks, namely retrieval, extraction, verification and analysis, during the synthesising activities of the research process. According to them, synthesis is a collaborative, rather than an individual process, and information systems play an integrated role.

An excellent example of successful scientific collaboration among researchers from a large spectrum of disciplines is the “One Medicine – One Health” approach to global health education at the University of California, Davis. Conrad *et al.* (2009) demonstrate through this approach that transdisciplinary collaboration between scientists in the health-related disciplines (such as veterinary science, human medicine and public health) in the global research community is needed to address complex health problems.

Hara, Solomon, Kim and Sonnenwald (2003) suggest corresponding work interests, as well as skills and expertise, as criteria for successful scientific collaboration.

An important aspect of information use for a researcher is the presentation of this information in an article, thesis, conference presentation or other means of scholarly communication. The following section will address this.

#### **3.5.4 Information presentation and communication**

According to Brown (2010:287), the innovation and advancement of research depends on the ability to communicate research findings to the wider research community. This can be done by means of formal (e.g. peer-reviewed scholarly journals and conference presentations) and informal channels (e.g. blogs and networks of contacts).

Several studies report investigations on scholarly communication among researchers. Knight and Steinbach (2008) analysed research publications from different disciplines in order to develop a model to explain the journal selection process of researchers. They identified five major considerations researchers experience when selecting a publication for manuscript submission: likelihood of acceptance, credibility, reputation and prestige of the journal, visibility and potential impact of the manuscript, timeline from submission to publication and philosophical and ethical issues.

Frantz *et al.* (2010) investigated the research productivity of physiotherapy academics by means of a data analysis of documents and data on master's and doctoral graduates. This study found that the presence of postgraduate programmes in a faculty, as well as academics with doctorates, has a positive impact on research publications of the faculty. Local in-house journals may also contribute to a higher number of research publications. Frantz *et al.* (2010) suggest mentoring of junior researchers by senior academics in the form of joint publications, dedicated time for research, as well as workshops addressing aspects related to research publication in order to promote higher quality research productivity.

An earlier, but very informative study on how academic researchers select, consult, read and cite documents retrieved from online databases was conducted by Wang and White (1999). They suggest a cognitive model of document use, indicating it as a decision-making process occurring in three stages during a research project: selecting; reading and citing. Criteria considered by researchers when selecting journals include cognitive requisite, actual quality, depth, classic or founder, publicity, reputation, prolific author, journal spectrum, peer review, standard reference, judge, norm, target journal and credentials.

As the preparation and writing of articles for publication is an important aspect of being a researcher, it is also important for librarians to investigate how researchers deal with information during this stage of the research process. Brown (2010:309) summarises it as follows: "Awareness of changes in the scientific communication system is critically important to information professionals in their mission to provide the products and services scientists want and need for the creation and dissemination of scientific knowledge."

### **3.6 CONCLUSION**

This chapter discussed information needs, information seeking behaviour and information use behaviour of researchers in the light of several previous studies, not only in veterinary science, but also from other disciplines, as well as in general.

Some of the main findings on the information behaviour of researchers are that information needs, information seeking behaviour and information use behaviour differ between disciplines and due to developments in the online environment, the library is no longer the only source of information for researchers. Researchers need library collections (especially online) as a support service from the library. Researchers need to be informed on library products and services. Context as well as work roles and tasks play an important role in the information behaviour of veterinary science researchers.

Some aspects of the studies discussed were used as background for decisions regarding methodology and in the development of the measuring instruments, which will be discussed in Chapter 5. The next chapter will focus on the role and responsibilities of academic libraries and information specialists in supporting the information needs of researchers.

## CHAPTER 4:

### LIBRARY SUPPORT TO RESEARCHERS

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#### 4.1 INTRODUCTION

Improving academic library services to researchers and postgraduate students is viewed as such a crucial issue by the South African higher education sector, that an “ambitious project, generously funded over two three-year cycles by the Carnegie Corporation of New York” was devoted entirely to this (Darch & de Jager 2012:145). The aim of this project was to improve the research skills and domain knowledge of information specialists. If the role and responsibilities of information specialists are viewed in such a serious light that a large amount of money is invested in this, what exactly is expected from them and how can it be ensured that this investment is in line with the needs of the research community?

Several researchers, among them Brophy (2008), Fourie (2004) and Webb *et al.* (2007) attempted to address the question raised above. Most found that the role of the information specialist is changing. It is fraught with challenges in order to meet the evolving information needs of faculty and researchers in a technology-driven society. Concern about the future role of academic libraries in faculty and research support is also raised in a large number of publications (Corrall 2010; Johnson 2011; Ross & Sennyey 2008).

The aim of this chapter is to review selected literature on the changing role of the library and information specialists in order to adapt strategically to an increasingly digital and challenging research environment and research information needs. The focus will be on academic libraries, the role of information specialists and the skills involved. The discussion will be introduced with brief references to challenges information specialists are facing in the current research support environment to provide context to the dynamic environment in which academic libraries function.

Although this study focuses on support services to veterinary researchers, studies on researchers in general and in other disciplines are also included, as work focussing on veterinary researchers only is limited.

## 4.2 CURRENT CHALLENGES FOR INFORMATION SPECIALISTS TO SUPPORT RESEARCHERS AT ACADEMIC INSTITUTIONS

Gannon-Leary *et al.* (2008:60) say that information specialists “need to be alert to new trends or approaches that may impact upon information demands and the establishment of new services to meet those demands. Sound communications and information policies need to be in place to affect this.” They also warn that information specialists may increasingly have to respond not only to growing interdisciplinary research agendas, but also to different patterns of scholarly communication.

An essay by Neal (2009:464) focuses on the needs and expectations of users of the academic research library and warns that the relationship between the library and the user (researcher) “needs to be viewed in the context of the core responsibilities of the academic research library.” Changing needs of library users may have an influence on library collections, services, technology, space, staffing and the organisation. He adds that new roles and changing responsibilities are “shifting the boundaries of the academic research library and reshaping user interactions” (Neal 2009:464).

Taking the above arguments into consideration, one may assume that the academic research library today faces several challenges as a result of the increasingly digital information environment (Pinfield 2001). The next section will briefly discuss some of these challenges, including the impact of technology, library space and collection management.

### 4.2.1 Impact of technology

Relationships between researchers and traditional library and university support for research have shifted radically over the last few years (Becker 2009; Genoni, Merrick & Willson 2006; Ilesanmi 2013; Mullins 2012). Developments in technology, the internet, online databases and new online information tools and services, Google and social network tools (which enable easy collaboration with colleagues and other researchers, as well as new ways to locate and access information) may be the reason why researchers rely less on traditional library services for research information.

Several authors investigated the role of the library in the information and technology-rich research environment (Case 2008; Corall 2010; Hart & Kleinveldt 2011; Musoke 2008). Some examples of adapted library services they revealed are new, fast and immediate options of service delivery in the physical library (e.g. self-service circulation) as well as in the virtual library environment (24/7 communication and access) through information communication technology and networks (Webb *et al.* 2008); a shift in user expectations and

needs (e.g. immediate attention to problems) (Musoke 2008; Neal 2009); embedded librarianship in faculty projects and curricula (Corall 2010; Schumaker 2011); enhanced communication within the scholarly community (Brown 2010); increased sharing and collaboration, which enable and enhance access to information resources (Mullins 2012); improved collection development practices (Ross & Sennyey 2008); involvement in knowledge creation, preservation and publishing (Case 2008), as well as involvement in information policy and ethical issues (Neal 2009). Brophy (2008) captures it well when saying that the challenges for academic libraries regarding user support are in the following scenarios: the networked landscape, the virtual learning environment, the research environment, scholarly publication and personal creativity.

Although some may view the enormous impact of technology on library services to researchers as challenges for better and improved service delivery, several concerns are also raised about the recognition of the importance of the library in supporting research waning among researchers (Schonfeld & Housewright 2010:7). In order to survive, academic libraries therefore need to embrace these challenges to their fullest potential and enhance and extend library support services to researchers (Corrall 1995). To achieve this, strong management and involvement in institutional planning is needed (Corrall 1995); Ross and Sennyey (2008) also suggest new service models, workflows and building redesigns. Technological innovations may offer opportunities for research information specialists to gain and apply new knowledge, to support learning, to enhance teaching and to improve research by providing customised services where and when needed by users (ASRL 2001). In response to this, information specialists need to broaden their skills and knowledge in order to be competitive (and even to survive) in this dynamic environment (Gerolimos 2009).

#### **4.2.2 Library as a place for research**

Technological developments enhance access to digital information and collections, resulting in a decrease in visits to the physical library building for information access (Pantry & Griffiths 2009). Nevertheless, Webb *et al.* (2008:134) found that researchers still “value the scholarly atmosphere of a research library”. This has resulted in less library space being taken up by collections, while some libraries have redesigned their floor plans to provide study areas and public spaces. Neal (2009) addresses this issue and suggests that researchers need to think more flexibly and adaptably about library space for research. In order to provide effective support to faculty researchers and students, physical library spaces, as well as virtual spaces, need to be reconceptualised according to users’ needs (Fox & Stuart 2009). Ross and Sennyey (2008) argue that the library can play an important role in not only providing information, but also serving as space for student services, such as

technology support centres, writing centres and even advising centres. They also refer to libraries that introduced services traditionally found in student centres, such as cafés, dining facilities, meeting rooms, retail and information spaces.

Although some may see the concept of libraries as places providing space for learning, teaching and research as well as “one-stop-centres” for student services as a solution for inviting users to the library again, Ross and Sennyey (2008:150) warn that this is not truly a representation of the identity of the profession and eventually the library will “become a legacy asset with depreciating value.”

### **4.2.3 Information resources and collections**

Munde and Marks (2009) argue that “faculty access to digital resources – their availability, ease and speed of retrieval, and ubiquity of delivery – has very likely contributed to increased faculty productivity over time.” Several recent studies indicated that researchers rank access to information resources very highly (Case 2008; Musoke 2008; Schonfeld & Housewright 2010). Mullins (2012) emphasises the important role of the academic library in collection development, saying that “the unique role that university research libraries have traditionally had that separates them from other types of libraries is the expectation that a university research library will be committed to growing and stewarding ever larger, comprehensive collections”.

Current challenges for academic and research libraries regarding collection management include balancing decreasing budgets with increasing volumes of published material, accommodating all demands, incorporating information resources as well as physical space and including, managing and preserving non-traditional collections into library collections (Mullins 2012; Webb *et al.* 2009). Mullins (2012) also mentions the challenge and opportunity to include research data sets in academic library collections.

Information and communication technologies enabling immediate access to information resources in the library’s actual holdings and sharing and collaboration initiatives have made access to most information possible (Corrall 1995). This implies a need for new resource management models and resource sharing initiatives (Mullins 2012). One of the main responsibilities of academic libraries is to ensure that researchers have access to all the information resources that support their information needs and that collection management activities recognise and accommodate diversity and change from the perspective of researchers (Mullins 2012).

Taking the above-mentioned challenges into account, a balance between current services and resources provided to researchers and what they actually need is required. The next section will briefly review studies on the role of the library in research support.

#### **4.3 ROLE OF THE LIBRARY IN RESEARCH SUPPORT TO VETERINARY RESEARCHERS AND POSTGRADUATE STUDENTS**

Research on library and information support to veterinary researchers and postgraduate students is limited. This review will therefore also include studies on academic library support in general and in other disciplines.

Several studies investigating the role of the library in research support have been published recently (including ACRL 2010; Cheek & Bradigan 2010; Hart & Kleinveldt 2011; Kroll & Forsman 2010; Schonfeld & Housewright 2010; Tennant & Cataldo 2002). The aim of these studies was to investigate the impact of recent technology and network developments on global library and research trends. A discussion of these studies will introduce this section, following a discussion of a few studies done by individual researchers.

A report commissioned by OCLC Research in support of the Research Library Group Partnership and presented by Kroll and Forsman (2010) addresses the challenges for libraries in the technology-driven research environment. This report gives an overview of the information needs of researchers, while special attention is paid to the role of the library in the provision of easily accessible information to support the information needs of researchers.

Kroll and Forsman (2010) conducted a comprehensive study involving researchers, research assistants, graduate students, grant and other research administration specialists, as well as university administrators at four USA research universities, namely Cornell, the Ohio State University, Vanderbilt University and the University of Washington. They were selected for their “exemplary reputations for innovative research support services, and for their geographical and organizational diversity.” They used interviews to collect the data for their study. The focus of the study was on the tools and services researchers use, and on documenting how these support elements were being used at the time; how effective they were in meeting researchers’ needs and whether there were existing unmet needs (Kroll & Forsman 2010:6). The study concluded that researchers valued ease of use and efficient information tools and services; researchers relied on access to electronic journal content, but spent little or no thought on how that content was made available to them; there was a need for data management plans, services and tools; despite the technological advances,



researchers still preferred personal introductions and face-to-face interaction for collaboration; researchers were unaware of the expertise information specialists could offer them or the services available, and they had little idea of future library plans. They suggested that academic libraries needed to develop and aggregate discipline-based tools, provide customised services and emphasise user-centred services in order to articulate and create their own future (Kroll & Forsman 2010:18).

The aim of the 2010 Ithaka S+R Library Survey presented by Schonfeld and Housewright (2010:7) was to investigate how academic libraries were “addressing changing user needs and how they are putting new strategies in place at their institutions.” A questionnaire assessed and explored the attitudes and habits of university and college faculty members in their use of information resources, their perceptions of the academic library, and their views on scholarly communications, as well as the strategies and services provided by academic libraries to meet these needs. After a sample of contact data from a commercial mailing list vendor had been obtained, the survey questionnaire was sent via email to the entire population (which included library directors at academic libraries at colleges and universities in the United States) in the fall of 2010. The population of 2 405 library directors returned 267 questionnaires, which resulted in a response rate of 11 percent. The study focussed on issues regarding strategies library administrators were pursuing for their libraries, the management of library collections, the development of new digital collections and the creation of new services to meet changing user needs.

Key findings of the Schonfeld and Housewright (2010) report indicated some important divergences between the priorities of library directors (as expressed in this survey) and attitudes of faculty members (as expressed in an earlier Ithaka S+R Faculty Survey 2009). Regarding issues of strategy and leadership, Schonfeld and Housewright (2010:5) found that library directors “envision a high-level strategic prioritization of their research and teaching support and facilitation functions ... in conjunction with a shift away, in some cases, from collections, acquisitions and preservation functions ...” They see supporting teaching and learning as priorities in faculty support. In contrast to this, the study found that “a notably smaller share of faculty members values the library for its teaching support role ...” In contrast to what library leaders thought their main role was, “faculty members and students increasingly rely on resources outside the library for discovery of information and content ...” Faculty viewed the library’s role as buyer of information resources (and preferably electronic resources) as priority.

In a comprehensive research review and report by the ACRL, research reports and best practices currently in place were reviewed to demonstrate the value of academic libraries.

The following question was addressed by the ACRL (2010:25): “How does the library advance the mission of the institution?” The focus of this report is on “library value within the context of overarching institutions” (ACRL 2010:25). It includes a significant literature analysis (including monographs, scholarly and trade articles, websites, statistical sources, data sources, white papers, and grey literature) on the library’s value in academic institutions. In addition to this, the researchers conducted a large number of interviews (conversations) with academic information specialists as well as information specialists in other library environments, including library product vendors. The following evaluation criteria were included: “ability to contribute to the documentation of academic library value, depiction of models for best practices in evidence-based librarianship, articulation of library impact of goals of the larger institution, emphasis on student/patron learning or development, and an outcome-based perspective” (ACRL 2010:26). The main objective of the ACRL review was to provide academic libraries and institutional leaders with better insight on the value and contribution of libraries to institutional and research performance. The report suggests that academic libraries need to provide evidence of their value to their institutions. This value needs to be demonstrated. Some of the recommendations include that higher education educators, as well as their libraries, need to create assessment management systems to help them to document progress towards strategic goals and to manage learning outcomes. Libraries need to demonstrate their value by means of studies indicating their impact (linkage) on students and faculty (e.g. postgraduate students, academic staff and researchers), achievement and success, as well as the overall institutional reputation and prestige.

Cheek and Bradigan (2010) investigated how health science libraries in the USA and Canada provide support to biomedical researchers at their institutions by means of a survey consisting of a combination of open-ended, structured and scaled responses. They sent the survey to 134 academic health science libraries via USA mail and conducted a web-based survey as well, which was sent out via e-mail (including two e-mail reminders). They reported a response rate of 65 percent to the web-based survey. Respondents in their study identified the following library support services provided by health science libraries (in decreasing order): individual consultations with researchers (100%), licenced electronic resources (journals) (100%), expert information specialist searches (97.6%), print collections (97.6%), licenced electronic resources (books) (96.3%), formal instruction or workshops (90.2%), web services (64.6%), information specialist serving as member of research team (41.5%), bioinformatics information specialist (18.3%), database design (15.9%), data curation (12.2%) and data mining (12.2%) (Cheek & Bradigan 2010:168).

This study found that most libraries provide mainly traditional library services to biomedical researchers, in addition to a variety of other services. The authors expressed a need for information specialists' skills development through continuing education coursework, along with mentoring programmes, and the recruitment of information specialists with a science background (Cheek & Bradigan 2010:170).

Focussing on a South African university of technology, Hart and Kleinveldt (2011) investigated the role of an academic library in research by means of an e-mail questionnaire survey involving 102 (from an entire population of 602) full-time academic staff representative of all six departments at the CPUT in Cape Town. Postgraduate students were excluded from this study. They found that the impact of information and communication technology on information seeking and use, as well as the pressure put on researchers to increase research output (refer to Chapter 2 for a comprehensive discussion on this issue), are important factors influencing research and research output in South Africa.

The questionnaire consisted of four sections: personal information of respondents, the use of CPUT library's support services, researchers' views on the library research service (Likert scale statements) and open comments on these support services.

Respondents in the Hart and Kleinveldt (2011) study claimed to have used the following library services for research in the preceding year (in decreasing order): library e-resources, borrowing library print resources, interlibrary loans, faculty information specialist reference or information service, training workshops on databases, library quiet study area and others (not specified).

Hart and Kleinveldt (2011:47) also asked researchers to provide a "wish list" of library research support services, which can be summarised as follows: ongoing updates on new information resources, maintaining a research repository, database training, reading lists and advice on literature reviews, advice on bibliographic referencing, advice on research topics and advice on proposal writing. The need for information specialists to obtain more subject knowledge was also raised, as well as opportunities for the library to organise and archive research data sets and other research output. They concluded that the library plays a significant part in research support (mainly for providing access to information resources), but needs to improve its expertise in "organising and archiving" research output (Hart & Kleinveldt 2011:49).

Tennant and Cataldo (2002) investigated and assessed specialised information specialist services in a veterinary medicine setting. They compared clinical sciences with basic sciences in order to establish an understanding of the needs, awareness and satisfaction of

veterinary medicine researchers and students at the College of Veterinary Medicine, University of Florida. This study consisted of an initial pilot study conducted in 1999 in which the two information specialists (liaisons) responsible for liaison with users of the College of Veterinary Medicine each spent two hours a week in the faculty reading room. The goals of this pilot project were to increase liaisons' familiarity with the collection and services, to assess the needs of the users, to improve the visibility of liaison information specialists, to improve the relationship between the library and faculty and to determine areas of need to improve services. During this project, they assessed the resources available through the public computer terminals and evaluated the print and electronic collections, as well as the physical layout of the reading room. Users were asked to complete a questionnaire assessing their experience of liaison and library services. A similar survey was then conducted again at the end of April 2000. This study presented the following findings: the veterinary faculty was able to find information without an information specialist; they preferred e-mail and phone calls as communication method with the information specialist; a large number of respondents indicated they approached the information specialist for searching services, instruction and collection development and a large number of faculty members were not aware of the support services that the library provided.

As library collections play an important part in addressing the information needs of researchers, the topic has been addressed by several authors, including Pancheshnikov (2007), Udofia (1997), Viera and Faraino (1997) and Wilson and Tenopir (2008). A recent study by Kayongo and Helm (2012) looked at the relevance of library collections for postgraduate research. The authors did a citation analysis of doctoral dissertations at the University of Notre Dame. The aim of this study was to determine to what extent the library collections at this institution met the needs of graduate students and the findings indicated a need for additional funding for collection development. As most of these studies were evaluations of local library collections, they will not be discussed in much detail here. Several of these studies however use citation analysis as research methodology. This method will be discussed in more detail in the next chapter, which deals with methodology.

A few studies also report the use of the LibQUAL+™ protocol to evaluate academic library services to users (Cook, Thompson, Heath & Thompson 2001; McCaffrey 2013; Nitecki & Hernon 2000). The focus of most of these studies is on aspects related to the instrument (LibQUAL+™) and the analysis and interpretation of the survey results. The study reported by McCaffrey (2013) is one of few reporting a combination of the LibQUAL+™ protocol with other methodology. Because the focus of these studies is mainly on the evaluation of individual libraries and they do not report much about the role of the library as such, this will

not be discussed in much detail here. It is however important to take note of the existence of these studies, as this may contribute to the methodology choices for this study. Chapter 5, dealing with methodology, will discuss the LibQUAL+™ protocol more comprehensively.

Taking the above discussion into account, it is clear that the academic library of today is facing a large spectrum of challenges regarding support services to researchers in the digital environment. The next section will specifically address new roles and responsibilities of academic and research information specialists and the competencies and skills linked to these in order to provide efficient and effective support services to researchers.

#### **4.4 INFORMATION SPECIALISTS**

Information specialists can play an important role and fulfil various functions in dynamic research environments (Goetsch 2008; Ilesanmi 2013; Johnson 2011; Mullins 2012; Neal 2009).

Although the focus of this study is on researchers in veterinary science, no reports could be found that focus exclusively on the role of information specialists supporting the information needs of this group. The following discussion will thus be a more general one on the role of the information specialist supporting the information needs of researchers, faculty and students at academic or research institutions.

##### **4.4.1 Role and responsibilities of information specialists**

Several authors, among them Allan (2010), Pinfield (2001) and Ross and Sennyey (2008), argue that academic libraries continue to have a significant role to play in information support and services to faculty, researchers and students. Apart from traditional library services, information specialists are now responsible for delivering extended and even more sophisticated services to address the increasing demands and needs of their users.

According to Pinfield (2001:33), the traditional duties of information specialists were of a non-subject nature most of the time. He mentions some general responsibilities of the traditional role of academic information specialists, such as user liaison, enquiry work, selection and management of information resources and collections, cataloguing and classification, user education (mainly library induction), production of guides and publicity material and other functional and managerial responsibilities, such as membership of project committees. Most of these responsibilities (although transformed into different ways of delivering owing to technological developments) are still part of the job description of the information specialist. Additional roles and responsibilities however are added.

Neal (2009:464) argues that the core responsibilities are still very important. He mentions the following as core responsibilities: identifying (selection), getting (acquisition), organising (synthesis), finding (navigation), distributing (dissemination), serving (interpretation), teaching (understanding), using (application) and archiving (preservation). Building on these, he adds new, more sophisticated and focussed roles, such as involvement in expanded intermediary and aggregation activities, assistance with more specialised information evaluation services, creation of new knowledge about users and development of user products. Apart from these specialised information supportive roles, academic research libraries also need to take on active roles as publishers, educators and information policy advocates.

It is important not to view these responsibilities only from the library's viewpoint - as there may be a possibility that the roles identified by information specialists for themselves may not (always) be what researchers expect from them. In the Ithaka S+R faculty survey discussed in section 4.3, Schonfeld and Housewright (2010) asked researchers to rank their perceptions on different traditional roles of the library according to importance. They identified these as follows: The role of buyer (acquisition and management of information resources) is for most researchers by far the most important responsibility of the library. The next important role is to archive or create repositories (preserve and keep track of resources) of information and research products. The importance of this role is confirmed by Case (2008), Musoke (2008), Mullins (2012) and several other authors. In the third place is the role as gateway (starting point for research) to information, followed by teaching support (facilitates teaching and information literacy training) and research support (active support to help increase research productivity). This seems to be a challenge for libraries as "... faculty members across disciplines do not yet value the teaching and research support roles nearly as highly as they do the 'infrastructural' roles" (Schonfeld & Housewright 2010:14).

Another study, confirming the difference in perceptions, was conducted by the Research Information Network and the Consortium of Research Libraries in 2007 and reported by Brown and Swan (2007). The core roles for information specialists as identified by researchers in the study (according to importance) are as follows (starting with the most important): custodian of print-based and digitised archives and special collections, manager of institutional repositories of digital information, administrator dealing with the purchasing and delivery of information services, subject-based information expert, teacher of information literacy and related skills, manager of the vast datasets generated by e-research and grid-based projects, and technology specialist facilitating electronic access to information resources.

Brown and Swan (2007) also found that academic information specialists have an important role to play in promoting and expediting access to digital information resources (including previously printed material that needs to be made available electronically), as well as facilitating the sharing of resources.

An important role of an information specialist is thus to provide access to information. This is done through selection, acquisition, cataloguing, preservation or digitisation. Case (2008:142) however suggests that by combining and integrating these traditional information management skills and expertise of information specialists with opportunities and initiatives enabled by technological and digital developments, information specialists have an opportunity to “engage directly with faculty in their research, teaching, and professional activities”. Information specialists can now also become involved in knowledge creation through metadata and digitised services, the development of repositories and the publication of scholarly work.

In the work by Webb *et al.* (2008), library services to researchers are discussed in detail. They mention that information specialists have to act as “facilitators rather than supporters of research” (Webb *et al.* 2008:123). They found that various roles of academic information specialists were valued by researchers. The role of “gatekeeper”, who filters, organises and re-packages information for researchers and keeps them up to date, is seen as very important to facilitate research. Another important role is that of “translator”, which facilitates the use of information and information systems. Since these members of the library staff are experts in finding and managing information, resources and data, the third role identified by Webb *et al.* (2008) is the one of “information specialist”, followed by “subject expert”. The difference between these two roles is that the latter is seen as someone with an academic research background. Other descriptive roles of academic information specialists mentioned by Webb *et al.* (2008:144) include provider of a “safe harbour” (libraries as a haven to study and do research), “the fount of all knowledge” (provider of focussed information and interface between the researcher and library systems or services) and “counsel, colleague and critical friend”.

Taking the above discussion into consideration, it is clear that the information specialist has a significant role to play in research support. Exactly what roles are regarded as important may differ between the perceptions raised by researchers and the views of the LIS profession. This study will therefore address this problem from both viewpoints: the information specialist and the researcher. Chapter 5 will focus on the methodology to address this problem.

#### 4.4.2 Competencies and skills of the information specialist supporting research

Case (2008:152) argues that although “it is true that libraries already have experience and skills in areas of interest to faculty, it is also true that we do not necessarily have the depth or breadth of expertise or the right person with expertise”. In order to find out what skills and competencies are recommended to provide effective library support to researchers, a selection from the subject literature was consulted.

According to Middleton (2003), traditional skills, such as information management and information organising skills, are still viewed as the most important attributes for information specialists, followed by communication skills. Pinfield (2001:37) however argues that in addition to traditional professional skills, a few newly adapted skills are recommended for information specialists. He suggests the following additional professional skills: “subject expertise, people skills, communication skills, technical (IT) skills, presentation and teaching skills, financial management skills, analytical and evaluative skills, team-working and team-building skills, flexibility, ability to learn quickly and vision”.

Focussing on library support in Africa, Musoke (2008:533) mentions written and verbal communication skills as very important and adds training skills, technology skills, planning and organising skills, initiative and enterprise skills, teamwork and interpersonal skills, as well as learning and self-management skills, as important attributes for the information specialist in the current research environment. Several other publications, including those of Hart and Kleinveldt (2011), Ilesanmi (2013) and Webb *et al.* (2008), agree on the above-mentioned attributes when discussing skills and competencies of research information specialists.

An important concern that needs to be addressed in this discussion is the fact that “although the library and information profession is a graduate one there are relatively few practitioners who have obtained a research degree” (Allan 2010:165). This issue is also raised by Darch and de Jager (2012) regarding research information specialists in South Africa. It served as one of the main motivations for a series of Library Academy events funded by the Carnegie Corporation to improve the library service to researchers at South African universities. Darch and de Jager (2012:148) argue that “the absence of methodological rigor in LIS research” is a worldwide problem. In South Africa, this may have an impact on national research output and was therefore addressed by the Carnegie project. In order to equip participating information specialists (selected from the six main research universities in the country) with research skills and domain knowledge, they were invited to attend a two-week residential course. They were exposed to research content and methodologies in a wide range of



subject domains and a variety of epistemologies. They were also introduced to the South African research environment through workshops and presentations by carefully selected speakers and presenters. As part of this project they were required to conduct a research project and submit a publishable paper. Darch and de Jager (2012:148) report that after the academics, most information specialists indicated that they had a better understanding of the research journey and were in “a better position to support students and faculty members than they were before.”

Whether research experience and skills are necessary contributions to effective research support remains a debate requiring further investigation - as other studies found information specialists need to focus on collection-related skills (Case 2008) and skills related to facilitate access to information, including research data (Mullins 2012). A study on veterinary researchers even found that there is only a limited need for information specialist support in research (Tennant & Cataldo 2002). However in order to determine what competencies are needed from the information specialists supporting the research needs of veterinary researchers in South Africa, this issue will be addressed in both measuring instruments (for researchers as well as information specialists) of this study.

#### **4.5 CONCLUSION**

This chapter discussed the role of information specialists supporting the needs and expectations of faculty researchers in dynamic research environments by reviewing several recent studies. The changing role of the academic information specialist with competencies and skills linked to it was also discussed. The discussion pointed out that the role of the information specialist is changing and fraught with challenges in order to meet the evolving information needs and expectations of faculty and researchers in a technology-driven society. The changing information needs of researchers need to be incorporated in library and collection planning initiatives. Information management and information organising skills are still viewed as the most important attributes of information specialists.

In the light of this, one question stands out: are the roles and viewpoints of information specialists (regarding research support) meeting the needs and expectations of researchers? Moreover, do all the efforts of the library really address the information needs, information seeking needs and information use needs of researchers? The empirical component of this study will address these questions.

The next chapter will explain the methodology of this study.

## CHAPTER 5:

### RESEARCH DESIGN AND METHODS

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#### 5.1 INTRODUCTION

The aim of this chapter is to discuss the research design and methods followed to collect evidence to address the research question and sub-questions. It also includes a discussion of the research techniques and instruments for data collection, population and sampling and strategies for data analysis. In addition, ways to address validity and reliability, as well as ethical considerations, will be included.

#### 5.2 RESEARCH DESIGN AND METHODS

A research design provides a clear statement of the research methodology and the rationale behind it (De Vos 1998:99; Pickard 2012:15). This includes decisions about the problem, the methodology, data collection, data analysis and reporting of the results (Hofstee 2006). Leedy and Ormrod (2014:76) refer to the research design as “a general strategy for solving a research problem” and explain the distinct purpose of the research design as ensuring that the initial problem is unambiguously addressed and comprehensively answered. The research design shapes and guides decisions on all aspects of the research study.

The aim of this study is to provide better understanding of the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria, as well as to investigate how these needs are currently being met by the Jotello F Soga Library. In order to address these issues, decisions on the overall research activities have to be taken before the research process is initiated. The first step in this process is to decide on an appropriate “theoretical perspective of the research”, which is called the research methodology (Pickard 2012:xviii).

The research methodology “directs the whole research endeavour” (Leedy & Ormrod 2014:4). It guides decisions on the acquisition of data, as well as methods and processes to analyse the data to make accurate findings in order to resolve the initial research problem. Research methodology involves two broad fundamental categories, namely quantitative research and qualitative research (Leedy & Ormrod 2014:76; Pickard 2012:13). The combination of a quantitative and qualitative research methodology is called mixed methods research (Pickard 2012:14). Mixed methods are used increasingly in studies where the research problem and sub-problems may need a more comprehensive approach to address

different facets (Creswell 2013; Leedy & Ormrod 2014:268). Mixed methods will be used in the collection of data as well as the analysis of data for this study.

The following section will discuss the reasons behind the choice of research methodology for this study. It will briefly discuss the purpose and nature of quantitative research, qualitative research as well as mixed methods research and how these will be used in this study to eventually address the research question and sub-questions as a comprehensive whole.

### **5.2.1 Quantitative and qualitative research approaches**

Quantitative research is a structured research method, which involves fairly structured data collection procedures, as well as the quantification and measurement of concepts (Connaway & Powell 2010:3). Collected data are usually quantified in numbers and analysed and communicated as aggregated data and statistical representations. The purpose of a quantitative research methodology is to explain, predict, control or confirm human behaviour or to validate or test a hypothesis (Leedy & Ormrod 2014; Poggenpoel, Myburg & Van der Linde 2001). Examples of quantitative studies are experimental studies, quasi-experimental studies and statistical-analytical studies (Leedy & Ormrod 2014).

The purpose of qualitative research is “to understand social life and the meaning that people attach to everyday life” (Poggenpoel *et al.* 2001:409). Qualitative research is a more creative and emotional approach than quantitative research, owing to its concern with social aspects of human beings such as interpersonal relationships, values, meanings, beliefs, thoughts and feelings (Leedy & Ormrod 2014). De Vos (1998:240) defines it as “a multiperspective approach ... to social interaction, aimed at describing, making sense of, interpreting or reconstructing this interaction in terms of the meanings that the subjects attach to it.” Qualitative data are not expressed in numbers, but include other forms of information, such as words, music, pictures, etc. Descriptive studies, survey studies, historical studies and case studies are some of the research methods associated with qualitative research (Leedy & Ormrod 2014:145).

According to Ingwersen and Järvelin (2005:250), one of the main differences between qualitative and quantitative research is the approach followed during the data analysis stage. Qualitative research does not measure cause and effect, nor does it test theories or hypotheses, as in the case of quantitative research. Qualitative research is more descriptive in nature than quantitative research, as the data collected by qualitative research methods can be richer, deeper and more dynamic, with a much more holistic focus. The main differences between quantitative and qualitative research are summarised in Table 5.1

(Connaway & Powell 2010; Durrheim 2006; Leedy & Ormrod 2014; Poggenpoel *et al.* 2001; Struwig & Stead 2007).

Quantitative research	Qualitative research
Collects data in the form of numbers	Collects data in the form of written and spoken language and observations
Data portrayed as objective, precise and reliable	Data portrayed as rich, deep, valid and subjective
Uses statistical types of data analysis	Analyses data by identifying and categorising themes
Guided by theories and prior research findings	Not all qualitative research is theory-driven
Begins with a series of predetermined categories, embodied in standardised quantitative measures to make broad and general comparisons	Allows the researcher to study selected issues in depth, in detail and with openness
Purpose is to explain, predict or control phenomena	Purpose is to describe and understand phenomena from the perspective of the participant
Negligible contact between researcher and participant – therefore more impersonal and objective	Researcher part of the reality – therefore not completely objective and value-free
More structured	More flexible
Takes a more nomothetic approach (investigating large groups and making general conclusions regarding the whole group)	Takes a more idiographic approach (investigating individuals in person to achieve a unique understanding of them)
Focuses heavily on reliability	Focuses heavily on validity
Suggested when the research question is more confirmatory or predictive	Suggested when the research question is more exploratory and interpretive
Also called the <i>traditional, experimental or positivist</i> approach	Also called the <i>interpretative, constructivist or postpositivist</i> approach

**Table 5.1: Comparison between quantitative and qualitative research methodologies**

Connaway and Powell (2010:187) say that “the research problem must determine the research approach and the methods employed”. Although quantitative research may seem to be more structured, objective, reliable and precise than qualitative research, it is also less flexible and does not allow the researcher to study issues such as human behaviour in depth and in much detail (which is necessary for this study). Since the researcher interacts with the participant(s) in qualitative research, the inquiry is value-bound, context-bound and the description is rich (Wang 1999).

In order to address the different issues and multiple possibilities of human information behaviour in this study, a more flexible research approach, which allows a platform for in-depth investigation of certain aspects of the participants, was needed. In addition to this, the research question for this study is exploratory and interpretive in nature. For such studies Leedy and Ormrod (2014:101) suggest a qualitative approach. Some of the anticipated data collected for this study may however have been numerical in nature and, in order to make

better sense from it, needed to be summarised and interpreted by means of statistics and graphs (descriptive statistics). For the latter, Leedy and Ormrod (2014:101) suggest a quantitative research approach.

Poggenpoel *et al.* (2001) propose the use of a combination of both qualitative and quantitative research in some cases. The work edited by De Vos (1998:361) calls this approach to research the “mixed methodology design model” and suggests that although it requires sophisticated knowledge of both perspectives, it adds complexity to a design, because of the utilisation of the advantages of both qualitative and quantitative research designs. Leedy and Ormrod (2014:100) suggest the use of mixed methods especially in studies of human behaviour, as it has the ability to provide “a more complete picture of a particular phenomenon ...” This is also confirmed by Connaway and Powell (2010) and Pinto (2010), who support the use of a mixed methods approach in the social behaviour sciences as well as in the changing environment of library and information science research.

The next section will briefly discuss mixed methodology as an appropriate research approach for this study.

### **5.2.2 Mixed methods research**

According to Wang (1999) and Case (2012), early studies in the field of human information behaviour were mainly orientated towards quantitative research. Recent studies in this field however tend to be more orientated towards qualitative research. Wang (1999:80) suggests the use of more than one research approach in order to include the complex issues addressed in human behaviour studies, for triangulation or to address exploratory issues. Tenopir (2003:16) also supports the movement towards a combination of quantitative and qualitative methodology, saying that this may enable researchers to form more “reliable insights into information behaviour”. Fidel (2008:265) motivates the use of a mixed methods approach as follows: “the quality of a study can be improved when the biases, limitations, and weaknesses of a method following one approach are counterbalanced, or compensated for, by mixing with a method belonging to the other approach.”

Gorman and Clayton (2005:12-13) refer to a mixed methods approach as a study where multiple methodologies are used and suggest that both “qualitative (perhaps both observation and interviews) and quantitative perhaps descriptive statistics (related to specific activities and work performances)” are used in combination to address the same research question. Bryman (2006:111) values the use of a combination of quantitative and qualitative research and warns that the likelihood “of unanticipated outcomes is multiplied”. Leech and

Onwuegbuzie (2009) also agree that mixed methods research may involve descriptive statistics.

Several other authors, including Creswell (2013), Leedy and Ormrod (2014), Pickard (2012) and Yin (2013), also suggest the use of a mixed methods approach to address more complicated research questions, or where different aspects of a case are under investigation.

A mixed methods approach was reported in several studies on the information needs of researchers reviewed for this study, including studies by Al-Suqri (2011), Barry (1997), Connaway *et al.* (2011), Meho and Haas (2001), Mulligan and Mabe (2011), Nweke (1996) and Wilson and Tenopir (2008).

Because of the exploratory nature of this study, a mixed methods approach was followed to address the different facets of the research problem. It followed a quantitative approach to collect information on the background of researchers and some aspects regarding their information seeking behaviour, information use behaviour and the way in which they view the role of the information specialists in their research. Quantitative data on current services to researchers were collected from the information specialists. These data are more general and measureable and involve aspects regarding frequencies, trends, opinions and numbers. These data can be organised into categories, summarised and interpreted by means of graphical representation and descriptive statistics and may allow the researcher to draw patterns, interrelationships and meaning from the data. In this case a descriptive quantitative approach is suggested.

In addition to the quantitative approach, a qualitative approach was followed to form a more in-depth understanding of the information behaviour of participants in this study. This part of the study focused on aspects related to perceptions regarding the successes, shortcomings and future of the library. The nature of these qualitative data is more social, unstructured and interpretive and involves more interaction with the participants.

Once the appropriate research approach was established, the next step was to decide on the research method or combination of research methods that could be followed. There are a large number of different research methods. Leedy and Ormrod (2014:102) mention the following: action research, case studies, content analysis, correlational research, developmental research, ethnography, experimental research, ex post facto research, grounded theory research, historical research, observation study, phenomenological research, quasi-experimental research and survey research. More specific to research conducted by information specialists, Connaway and Powell (2010) add operations research,

modelling, systems analysis, Delphi studies, bibliometrics, comparative information specialistship (a research method serving as framework for a comparative analysis) and technology-based research methods. Other methods used in information behaviour studies on researchers and reported in the reviewed literature are network analysis, historical analysis and model building, as well as theory testing (Case 2007; Case 2012), citation analysis (Moed 2005) and transaction log analysis (Fourie & Bothma 2007; Tenopir 2003).

After careful examination of the literature on research methods (including Case 2012; Connaway & Powell 2010; De Vos 1998; Fisher & Julien 2009; Leedy & Ormrod 2014; Pickard 2012), as well as findings of previous studies on information needs of researchers (e.g. Ellis 1993; Fidel, Mark Pejtersen, Cleal & Bruce 2004; Fidzani 1998; Kumar 2009; Tenner & Ye (Lan) Yang 2000; Wakeham & Garfield 2005), it was decided to use case study research as the main research method.

The following section will discuss case study research in more detail as it applies to this study.

### **5.3 CASE STUDY RESEARCH**

It was decided to employ a method that would best adhere to the purpose of this study, namely to provide better understanding of the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria, as well as to investigate how these needs are currently being met by the Jotello F Soga Library.

Yin (2009:23) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.” According to Pickard (2012:102) the main purpose of a case study is “to provide a holistic account of the case and in-depth knowledge of the specific [case] through rich descriptions situated in context.”

Early work by Fidel (1984) mentions the use of case studies in library and information science research, such as investigations of the patterns of information behaviour and online searching styles. Kuhlthau (1999) also successfully employed a case study to investigate perceptions of uncertainty, complexity, construction, and sources in the information search process of an early career information worker.

In order to determine if the case study method was indeed the most suitable method for this study, the advantages, benefits and properties of case studies needed to be encapsulated and linked to this study. A summary of this is set out in Table 5.2.

Advantages and properties of case studies	Applicability to this study
Data are drawn from experiences and practices of people, and therefore a strong reflection of reality (Blaxter, Hughes & Tight. 2011)	Data will be collected from the researchers on their experiences and practices regarding information for their research, as well as from the information specialists on their experiences and practices in supporting researchers
Case studies are suggested when the research question(s) is (are) more explanatory (Yin 2003)	The aim of this study is to form a more comprehensive understanding of the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria, as well as to investigate how these needs are currently being met by the Jotello F Soga Library
Case studies are suggested when the research question(s) is (are) more exploratory in nature (Connaway & Powell 2010)	As found in the preceding literature reviews, not much is known about the information behaviour of researchers in the context of veterinary science. This study aims to explore this.
A case study has the potential for serendipity (Wallace & van Fleet 2012)	In order to learn more about the information needs of researchers, the researcher (of this study) is open to the potential of learning the unexpected
A case study method allows the researcher to include a large number of factors and relationships (Fidel 1984)	One of the goals of this study is to investigate not only the information needs, information seeking behaviour and information use of researchers in detail, but to also investigate how these are addressed by the library, and what the relationship between information needs and information services is
A case study method allows the researcher to use multiple sources of evidence (Pickard 2012)	As learned from the literature review, data on the information needs of researchers can be collected from a number of sources. A case study approach will allow this study to use all suggested sources
Case studies are suggested when comprehensive and in-depth understanding of the observed phenomenon is needed (Connaway & Powell 2010; Pickard 2012)	The aim of this study is to form indepth understanding of the information needs, information seeking behaviour and information use behaviour of researchers
With a case study method, the researcher can employ either a qualitative or a quantitative research approach or both (Pickard 2012)	In section 5.2.2 a mixed methods approach was suggested as the best approach to apply to this study
Single entities are emphasised and analysed intensively in case studies (Case 2012; Connaway & Powell 2010; Leedy & Ormrod 2014)	This study will focus intensively and in detail on the information needs of a small group of researchers at this faculty, as well as the services provided by the small group of information specialists serving them
Case studies focus on the phenomenon in context (environment) (Case 2012)	Researchers at the Faculty of Veterinary Science, University of Pretoria will be investigated in the context of their research environment
Case studies use purposive sampling to “identify information-rich sources” (Pickard 2012:104)	Although a census sample will be used for questionnaires, specific researchers at the faculty will be approached directly and invited to participate in the focus groups

**Table 5.2: Advantages and characteristics of case studies applied to this study**



The next section will give a brief overview of the different data collection methods suggested for this study.

## **5.4 METHODS OF DATA COLLECTION**

Case study research typically employs a variety of data collection methods (Yin 2006). The most commonly used methods include observations, individual interviews, focus group interviews and the analysis of documents (Leedy & Ormrod 2014). Pickard (2012:106) mentions that in some cases questionnaires are also employed to collect data. Yin (2003:91) confirms the use of structured questions, when saying that surveys (questionnaires) “could be designed as part of a case study and produce quantitative data as part of the case study evidence.”

The case study used in this research employed a number of research methods to collect data from researchers and information specialists. The study started to collect quantitative data by means of an online questionnaire sent to all researchers at the Faculty of Veterinary Science, University of Pretoria. To provide more insight and detail into certain aspects addressed in the questionnaire, the online questionnaire was followed up by focus group interviews with small groups of faculty researchers.

To collect more data on current services and products delivered by the Jotello F Soga Library, as well as the role of the information specialist in supporting the information needs of researchers at this faculty, another set of questionnaires was sent to all information specialists at the Jotello F Soga Library, followed by a semi-structured focus group interview.

In addition to encompassing a survey (questionnaires) and focus group interviews, Yin (2006) also suggests the analysis of documents as relevant and useful in case study research. This study made use of this method by employing a citation analysis to collect evidence on the research output of the researchers of the Faculty of Veterinary Science, University of Pretoria. It also investigated results published on a LibQUAL+® survey implemented at the University of Pretoria in 2013.

The design of the questionnaires will be discussed later in this chapter. The following section will address the strengths and weaknesses of questionnaires and focus-group interviews as these relate to this study.

### **5.4.1 Questionnaires**

A large number of studies (including Bawden & Valleley 1996; Drake & Woods 1978; Pelzer & Leysen 1988, 1991; Raw 1987; Wales 2000) report on the use of questionnaires in

research on the information behaviour of veterinarians and veterinary researchers. An increase in e-mail and online questionnaires is noticeable in more recent studies, including studies by Fleishman-Hillard (2008), Nel and Fourie (2010) and Pelzer and Wiese (2005).

Some of the benefits of e-mail and online questionnaires are that they are mainly self-administered and therefore cost-effective, are easy and fast to use, can provide access to a large number and wide variety of people (Meho 2006) and the researcher can include participants beyond physical reach, such as distance researchers, in the case of this study (Leedy & Ormrod 2014). Zhang (1999) and Hoonakker and Carayon (2009) add that online questionnaires provide more flexibility and more possibilities to the questionnaire design and that the data can be stored on an online server, which is cloud-based. Analysis of the data can also be done on the platform, which allows the further export of results in an Excel spreadsheet.

A downside is that questionnaires are known for low and inadequate response rates and do not allow direct probing, which means that questions can be misinterpreted or participants may lose focus (Leedy & Ormrod 2014). In addition to non-response, Hoonakker and Carayon (2009:351) add “nondeliverability, lack of anonymity, and computer security issues” to the lists of disadvantages associated with online surveys.

It was decided to employ an online questionnaire to collect data from the researchers. Although a high response rate is not a requirement in case study research, the researcher wanted to gather as much information as possible from the group under investigation. Therefore, to address the possibility of a low response rate for the questionnaire, it was decided to send an invitation to complete the questionnaire online by e-mail to every researcher registered at this faculty (not only a representative sample as suggested in the literature on survey research), accompanied by a personally addressed letter in which the title and purpose of this study were clearly stipulated and outlined. The researcher planned to send out several reminders in case of a low response rate.

The design of the questionnaire for researchers, as well as the questionnaire to collect data from the information specialists, will be discussed in more detail in the following sections, which will also briefly discuss some limitations of these measuring instruments.

#### *5.4.1.1 Questionnaire for researchers*

The purpose of the questionnaire for researchers was to determine their information needs, information seeking behaviour and information use behaviour. It also aimed to investigate their need for library support, as well as their opinions and perceptions on current library

services provided by the Jotello F Soga Library. Table 5.3 summarises the different parts of the questionnaire for researchers.

1	2	3	4
Demographic information	Information seeking	Information use	Role of information specialist
Faculty involvement	Time spent on information seeking	Use of information sources	Personal acquaintance with information specialist
Research involvement	Involvement of other people in information seeking	Use of the library	Importance of the information specialist
	Methods used to find information for research	Methods to keep up to date with new developments	Roles of the information specialist
	Level of confidence that information needs are being satisfied	Information presentation and communication	Skills of the information specialist
	<b>Based on studies by:</b> Al-Suqri (2011); Connaway <i>et al.</i> (2011); George <i>et al.</i> (2006); Prabha <i>et al.</i> (2007)	Criteria used when selecting appropriate publication outlets for research	Shortcomings of the library
			Successes of the library
			Suggestions for new products or services
			Role information specialists will play in the future in supporting the information needs of researchers
			<b>Based on studies by:</b> Brown & Swan (2007); Cheek & Bradigan (2010); Hart & Kleinveldt (2011); Kroll & Forsman (2010); Munde & Marks (2009); Pantry & Griffiths (2009); Pinfield (2001); Ross & Sennyey (2008); Schonfeld & Housewright (2010); Tennant & Cataldo (2002); Webb <i>et al.</i> (2008)

**Table 5.3: Design structure of the questionnaire for researchers**

The aim with the questionnaire was to collect both quantitative and qualitative data. To obtain quantitative data, fixed response or structured questions were used. These included factual questions (to obtain data such as demographic information, research involvement and position in faculty); questions on opinions and attitudes (for example how they viewed the importance and role of the information specialist) and self-perception questions (such as the time spent on information seeking and the methods used for information seeking and use). Questions in the following format were used: scale indications and rating scales;

summated scales; Likert scale questions and checklists. Open-ended or unstructured questions were used to address qualitative data (such as opinions on the successes, shortcomings and future of the library). The aim of the first section of the questionnaire was to collect data on the background of researchers and to determine their faculty and research involvement.

The focus of the second section of the questionnaire was on data, referring to the information seeking behaviour of the respondents. It collected data on the time researchers spent on information seeking, the involvement of other people in information seeking, methods researchers preferred for information seeking (Al-Suqri 2011), the criteria they used to select information sources and their confidence that their information needs were being met (Connaway *et al.* 2011; George *et al.* 2006; Prabha *et al.* 2007).

In the third section of the questionnaire data on the information use of researchers were collected. Here the use of the library and its collections was measured. Questions in this section were based on studies on the information use of researchers, including Hart and Kleinveldt (2011), Kayongo and Helm (2012), Pantry and Griffiths (2009), Udofia (1997), Viera and Faraino (1997) and Wilson and Tenopir (2008). It also looked at collaboration and information presentation and communication practices (Borgman & Furner 2002; Brown 2010; Foster 2006; Sonnewald 2007).

The last section of the questionnaire collected data on the opinions and perceptions of researchers regarding the role of the information specialist. Aspects investigated included researchers' awareness of the library's role in research information support, their rating of the importance of the information specialist in research support and their rating of how well the information specialists were skilled to support the information needs of researchers. These questions were based on the discussion of the role of the information specialist in chapter 4 of this study.

Open-ended questions in which participants were asked to give their opinions on the shortcomings of the library in supporting their information needs, the successfulness of the library in supporting their information needs, and what new or different services they would like to receive from the library were added at the end of the questionnaire.

#### *5.4.1.2 Questionnaire for information specialists*

The purpose of the questionnaire for information specialists was to determine the current state of research and information support services provided to researchers and postgraduate students by the Jotello F Soga Library, University of Pretoria, as well as to collect data on

their opinions and perceptions of the (future) role of the information specialist in supporting the information needs of researchers and postgraduate students.

Table 5.4 summarises the content of the questionnaire to information specialists. The questionnaire started with a few background and demographic questions, investigating participants' own involvement in research. In the second part of the questionnaire the aim was to gather information on current services provided to faculty researchers. The intention of the final part of the questionnaire was to collect data on the opinions and perceptions of the information specialists regarding their current as well as future role(s) in information support to researchers (based on the literature discussed in chapter 4). In this part they were asked to indicate how they viewed their own role in research support, the three most important roles of an information specialist (according to their own perception), the skills they viewed as important to ensure effective information support to researchers and what they thought were the information needs of researchers and postgraduate students. Questions in this section were the same as the questions that were asked in the questionnaire to the researchers on their opinions and perceptions of the role of information specialists. The intention with this was to compare the opinions and perceptions of the researchers with the opinions and perceptions of the information specialists, as Schonfeld and Housewright (2010) did in their study on the role of the library in supporting research.

Open-ended questions were added to the questionnaire, asking participants to state the current services and products they provided to support the information needs of researchers; the information needs (if any) they were aware of that they could not address, as well as the professional development initiatives (training/courses) they had attended (if any) in the last 24 months in preparation to provide better support to researchers.

Copies of the research instruments, including questionnaires for researchers and information specialists, are attached in Appendices A and B.

Involvement in research	Current information support services to researchers	Role of information specialist
Involvement in research projects	Departments or research centres served	Personal acquaintance with researchers
Publication output of information specialists	Current information support services provided to researchers	Importance of the information specialist
	Time spent on research support services to faculty	Roles of the information specialist
	Perceptions of the information needs of researchers and postgraduate students	Skills of the information specialist
	Information needs that information specialists cannot address	Role information specialists will play in the future in supporting the information needs of researchers
	Skills and professional development initiatives	Suggestions for collecting data from researchers
		Based on studies by: Brown & Swan (2007); Cheek & Bradigan (2010); Hart & Kleinveldt (2011); Kroll & Forsman (2010); Munde & Marks (2009); Pantry & Griffiths (2009); Pinfield (2001); Ross & Sennyey (2008); Schonfeld & Housewright (2010); Tennant & Cataldo (2002); Webb <i>et al.</i> (2008)

**Table 5.4: Design structure of the questionnaire for information specialists**

#### 5.4.2 Focus group interviews

Semi-structured interviews and focus group interviews are other popular data gathering methods for information behaviour studies on researchers, as found in research by Haines *et al.* (2010), Korjonen-Close (2005) and Schonfeld and Guthrie (2007).

Focus group interviews involve interviews with several participants simultaneously. Case (2012) suggests group sizes between eight and twelve participants to ensure good representation. An advantage of focus group interviews is that they may yield a great deal of useful information, in view of their relatively high face validity and less structured environment – allowing the researcher to create a dynamic, open discussion, which may produce better participation (Leedy & Ormrod 2014). It is also a very useful technique to collect data on feelings, perceptions, attitudes and motivation of people (Connaway & Powell 2010). Other advantages of this data gathering method are that it is cost-effective, offers

quick results, is less controlled and therefore flexible towards topics, group sizes and questioning techniques (Case 2012).

There are, however, also weaknesses to focus group interviews, and Case (2007:218) mentions that although data are easy to gather, it can be difficult to analyse and interpret. Other weaknesses mentioned by Leedy and Ormrod (2014) and Struwig and Stead (2007) are that the method relies entirely on group interaction; it is not naturalistic, since it is created and influenced by the researcher; participants may steer the discussion in directions not relevant to the research; some participants may dominate the discussion and it can be difficult to recruit participants.

In order to ensure an effective focus group interview, Leedy and Ormrod (2014:156) encourage researchers to prepare well in advance, to ensure that participants are representative of the group, to decide on a suitable venue for the interview, to make use of a moderator (not necessarily the researcher) to introduce the discussion, to try to ensure that one person will not dominate the discussion, to ensure that participants stay focussed and to make use of technology to assist in recording the interviews.

The concerns regarding the weaknesses of focus group interviews were addressed in this study as follows: A list of questions was compiled beforehand and researchers representing all faculty departments were invited to participate in one of a few scheduled focus group interviews. A light lunch was provided to all the participants after each interview. The library seminar room was used as venue for the focus group interviews, as this provided a friendly, quiet venue for discussions. The researcher acted as moderator for the discussions and made use of a colleague to take notes.

The same procedure was followed with the focus group interview with the three information specialists. The focus group interview with the three information specialists was recorded with an electronic recording device and later transcribed.

As the purpose of the focus group interviews was mainly to add more insight on data collected through the questionnaires, the questions discussed in these interviews were mainly intended to elaborate on certain issues from the questionnaires.

The following section will discuss citation analysis as method of data analysis, since it was used as an additional method to provide data for this study.

### 5.4.3 Citation analysis

Apart from using questionnaires and focus group interviews as data collection methods, the information use of researchers and academia can also be studied by a citation analysis. Herther (2009:363) mentions that “a key component of formal, academic communication, through the publication process, is the use of references and citations to prior works, to both frame new contributions and to give fair credit for the role of other researchers in the evolution of theory and research.” These references and citations can be used as indicators of collection use.

According to Webb *et al.* (2007:34), citation analysis and bibliometrics are effective tools for “examining scholarly communication processes and patterns”, which enable information specialists to gain insight into the needs of researchers, assist in collection development and support research endeavour and output. Studies on the information behaviour of researchers used citation analysis as methodology, including the work of Frantz *et al.* (2010); Hofman, Kanyengo, Rapp & Kotzin (2009); Kayongo and Helm (2012); Meho and Haas (2001); Pancheshnikov (2007); Udofia (1997); Viera and Faraino (1997) and Wilson and Tenopir (2008).

Bibliometric databases, such as Journal Citation Reports (JSR) of the ISI, Scopus, Google Scholar, CiteSeer and SciFinder Scholar are mainly developed to analyse citations and to serve as sources of citation information (Herther 2009:365).

This study used JSR and InCites of the ISI to assist in collecting information on the journals in which researchers at the Faculty of Veterinary Science, University of Pretoria published during 2012 and 2013.

### 5.4.4 Gap analysis: LibQUAL

LibQUAL+® is a standardised international online survey instrument used by many academic libraries worldwide to get feedback on their services and products and to measure overall client satisfaction. Eldredge (2004:86) explains that the main goal of LibQUAL is to serve as an indication of the gaps between the expectations of an organisations’ customers and the services provided to them by the organisation. The LibQUAL survey consists of 22 questions and allows for general comments. The University of Pretoria Library Services conducted LibQUAL surveys during 2005, 2009 and August 2013. Although this was not discussed in detail, the August 2013 feedback from postgraduate students and academic staff was included in the analysis as additional information to add value regarding perceptions, opinions and satisfaction with services provided by the library.



## 5.5 POPULATION AND SAMPLE

A population is all the individuals who have certain characteristics, as defined by the researcher of a research study, while sampling refers to the process of drawing a part, group or subset of a population, to use as a representative of the population in the study (Struwig & Stead 2008). Blaxter (2010:169) mentions that sampling is part of most research procedures, although to a lesser extent in some methods, including methods associated with case study research.

Yin (2006) says that in case study research, the researcher is allowed to determine the appropriate unit(s) of analysis for investigation. According to Pickard (2012:104), case study research always uses purposive sampling to collect and identify rich sources of information within a case.

As a number of data collection methods were suggested for this study, it is necessary to explain the population, samples and sampling techniques (if any) according to the different methods. Table 5.5 gives an overview of this.

<b>Data collection method:</b>	<b>Questionnaires</b>	<b>Questionnaires</b>	<b>Focus group interviews</b>	<b>Focus group interviews</b>	<b>Citation analysis</b>	<b>LibQUAL results</b>
<b>Population</b>	Researchers at the Faculty of Veterinary Science, UP	Information specialists at the Jotello F Soga Library, UP	Researchers at the Faculty of Veterinary Science, UP	Information specialists at the Jotello F Soga Library, UP	Research output of the Faculty of Veterinary Science, UP	Feedback from postgraduate students on LibQUAL 2013
<b>Sample</b>	All researchers	All Information specialists	Campus-based researchers and/or postgraduate students	All Information specialists	List of 2012 and 2013 faculty publications obtained from research office	All available results from the survey report
<b>Sampling technique</b>	Not applicable	Not applicable	Purposive sampling	Purposive sampling	Not applicable	Not applicable

**Table 5.5: Overview of data collection methods linked to research population**

In this study, the population of researchers consists of all researchers linked to the Faculty of Veterinary Science, University of Pretoria (including those residing on campus as well as distance researchers). An updated e-mail list of all faculty researchers (including postgraduate students) was obtained from faculty administration.

As the Jotello F Soga Library is the only academic veterinary science library in South Africa, the three information specialists at the Jotello F Soga Library devoted to supporting the information needs of researchers at the faculty were requested to complete the questionnaire.

The next section will address aspects regarding the reliability, validity and triangulation of the study.

## **5.6 RELIABILITY, VALIDITY AND TRIANGULATION IN RESEARCH**

Reliability and validity are important requirements and concerns for any research project (Connaway & Powell 2010:43). In order for a research project to meet its initial aim and to provide credible answers to the research questions and sub-questions, it is very important to ensure that the measuring instruments are consistent (reliability) and that they measure or examine what they claim to measure (validity). Reliability and validity therefore imply both the design and the measurement of research (Struwig & Stead 2007:98).

Connaway and Powell (2010:62) mention that case studies are viewed as “relatively low in internal and external validity.” Wallace and van Fleet (2012:219) also add that because of its tendency to be very personal and focussed on individuals, its reliability may be perceived as rather low.

This study will attempt to address validity and reliability in a few ways.

### **5.6.1 Reliability**

Reliability refers to the accuracy, precision, consistency and reproducibility of a measuring instrument (De Vos 1998:85; Pickard 2012:22). Struwig and Stead (2007:130) add that it is important to ensure that the test score is reliable before its validity can be measured. Reliability therefore implies that when other researchers repeat the research under the same conditions, they must be able to make the same findings and thus refers to this as the quality of consistency involved in a research experiment over a period of time.

There are a number of ways to ensure more reliable results. Struwig and Stead (2007:131) suggest the following: test-retest reliability, parallel forms reliability, split-half reliability and internal consistency reliability. Some of these methods were employed to ensure reliability of the research instruments.

Drost (2011:139) says that a test can be made more reliable by “writing items clearly, making test instructions easily understood, and training the raters effectively by making the rules for scoring as explicit as possible.” Yin (2003:34) suggests the use of case study

protocol, as well as the development of a case study database, to address reliability in case study research.

In this study a clearly stated, personally addressed introduction letter was included with the questionnaire, ensuring that participants clearly understand the test instructions. Before starting the focus group interviews, all relevant information (e.g. the purpose, background and procedure) of the study was explained to the participants. The questions were asked as clearly as possible, using language the participants (researchers) are familiar with, or, where required, explaining confusing terms (e.g. the terms librarian and information specialist).

Struwig and Stead (2007:131) say that test-retest reliability can be obtained if a test yields the same scores when administered twice to the same individuals over a period of time. The use of more than one research instrument in this study to collect and confirm data (focus group interviews following the questionnaires) partially addressed this.

### **5.6.2 Validity**

Validity refers to the soundness or effectiveness of the measuring instrument, thus the level to which it meets the initial construction purpose, “doing what it is intended to do” (De Vos 1998:85). To ensure validity, Struwig and Stead (2007:139) suggest methods such as the face validity of a test, criterion-related validity, content validity, concurrent validity, predictive validity, correlational approach and group differences approach.

Yin (2003:34) argues that construct validity in case studies can be addressed by the use of multiple sources of evidence and using “key informants” to confirm the case study report. Pattern-matching, explanation building and the use of logic models are suggested to address internal validity. For addressing external validity, Yin (2003) suggests the use of theory for single-case studies and replication logic, in the case of multiple-case studies.

Face validity, content validity, external validity and interpretive validity were employed in this study to ensure validity.

Face validity is described by Drost (2011:139) as “a subjective judgment on the operationalisation of a construct.” It refers to whether the test measures what it is designed to measure. In this study, face validity was applied by using a literature analysis as foundation for the methodology and aligning all investigations with the intentions, purpose and aim of the research.

Davies (2007:30) refers to content validity, although subjective in nature, as data being based on a proper comprehensive description of the content domain. The content validity of

both questionnaires used in this study was addressed by building it on a proper literature analysis (discussed in chapters 2, 3 and 4 of this study). This also addressed external validity, as suggested by Yin (2009).

Both the reliability and validity of the focus group interviews were addressed as well. Interpretive validity was addressed by asking participants to comment on the interpretations of the researcher after completing the interviews. Questions addressed in the questionnaire were reassessed in the follow-up focus group interviews.

### **5.6.3 Triangulation**

Triangulation is suggested by several authors (including Case 2007; Pickard 2012; Wallace & van Fleet 2012; Yin 2003) to address the low and uncertain potential of reliability and validity in case study research. When more than one method is used to explore the same subject, it is called triangulation (Davies 2007:34). In this study triangulation was addressed by the use of a mixed methods approach (qualitative and quantitative methodologies); the employment of different data sources (researchers, information specialists, faculty research output, as well as data collected for LibQUAL) as well as using various data collecting techniques (questionnaires, focus group interviews, a citation analysis and reviewing results from the LIBQUAL survey). For analysis of the data descriptive statistics (quantitative data), as well as thematic analysis (qualitative data), were employed. Multiple research methods, as well as multiple sources of data, are ways suggested by Case (2014), Creswell (2013) and Drost (2011) to ensure more valid and reliable research.

The following section will focus on strategies for data analysis and interpretation.

## **5.7 STRATEGIES FOR DATA ANALYSIS AND INTERPRETATION**

According to De Vos (1998:203), the purpose of data analysis is to make the collected data more intelligible and interpretable in order to allow the researcher to reach conclusions in addressing the research problem(s). He refers to data analysis as the “categorising, ordering and summarising of data.” After analysing the data, these are interpreted and organised according to the meaning of the data and implications for the research.

The data analysis and interpretation processes and techniques used in information behaviour studies, especially those employing case study research, have not been described comprehensively and this lack of standards for data analysis is a major challenge for researchers (Wang 1999:67). Leedy and Ormond (2014:315) warn that the researcher must always keep the main purpose of the data in mind, namely “to discover the meaning of the data and its relevance to the research problem.”

This study collected both quantitative and qualitative data by means of different data collection methods (questionnaires and focus groups). Because of the nature of the data, it used mainly descriptive statistics.

When mixed methods research is conducted, Leedy and Ormond (2014:274) suggest that a researcher may give one form of data higher importance. In the case of this study, the purpose of the focus group interviews (qualitative data) was to shed light and add more in-depth information to the quantitative responses to the questionnaires.

Struwig and Stead (2007:156) advise researchers to consider the following when deciding on an appropriate data analysis technique: the number of variables to analyse simultaneously, as well as the required level of measurement of the data. They distinguish between descriptive statistics and inferential statistics as methods of data analysis and interpretation. Descriptive statistics are used to organise, summarise and visualise the data, while inferential statistics are used to assist in decisions on the generalisation of findings (Leedy & Ormond 2014:10).

According to Connaway and Powell (2010:232), descriptive statistics are predominantly found in studies in library and information science, because of the following valuable features: it can indicate frequency distributions, it allows different data display options (e.g. tables, pictures, graphs), it is capable of measuring a central tendency (e.g. the mean, median and mode), it can indicate dispersion or variability (e.g. the score range, the mean deviation, standard deviation, variance), it is able to measure relationships between different variables and it can describe the difference between groups.

Several statistical methods and packages exist that can be used to analyse complex tasks and variables. Leedy and Ormrod (2014:314) mention among others the following statistical software packages available for quantitative data analysis: SPSS, SAS, SYSTAT, Minitab and Statistica, as well as online statistics calculators, such as GraphPad Software's QuickCals ([www.graphpad.com/quickcalcs](http://www.graphpad.com/quickcalcs)) and [www.easycalculation.com](http://www.easycalculation.com) ([www.easycalculation.com/statistics/statistics/php](http://www.easycalculation.com/statistics/statistics/php)). Spread sheets (such as Excel) are also commonly used for data coding, counting and less complex statistical calculations of relatively small and simple data sets (Berk & Carey 2010; Hofstee 2006; McGrath 2014). Spread sheets are easy to use "to express data as charts, diagrams and graphs" (Burnett 2009:190).

For qualitative data analysis, Struwig and Stead (2007:169) suggest software, such as ATLAS/ti, ETHNOGRAPH, HyperRESEARCH and Hypersoft.

As some of these computer programmes require experience and access to expensive technology, Blaxter *et al.* (2011) say that it is not compulsory to use a computer programme to manage and analyse data. A sufficiently small research project can easily be managed manually. Because of their ease of use and the familiarity of the researcher with the use of cloud-based services, Google Drive and Microsoft Excel were used to assist with the data analysis process.

According to Quick and Choo (2014) cloud storage services are increasingly used as a cost-effective alternative “to access, store, collaborate and disseminate data.” Several other authors, including Drago *et al.* (2012), Gallaway and Starkey (2013) and Kleynhans (2012), agree that cloud services, such as GoogleDrive, Dropbox and Microsoft SkyDive, provide more possibilities, which can be used by researchers. Google Drive also has a function to create, distribute and manage forms. This function may assist researchers in the administration and management of online surveys. As data can be analysed and summarised on the system, it can be a useful tool to analyse less complex, smaller data sets (as found in this study).

Google Drive was used in this study to host the online questionnaire for researchers. Google Drive can automatically count and summarise the variables for each question. In addition to Google Drive, summaries of the survey responses were uploaded and captured in an Excel spread sheet and captured under the different headings (as presented in the questionnaires) in columns. The values were then listed, counted and summarised and the data sorted by organising it into pivot tables. To make this information easier to interpret, it is visually presented by means of graphical presentations and figures (also in Excel).

The questionnaires for the three information specialists were completed in paper format. The variables of each question were manually counted and then captured in an Excel document. Similar procedures as described above for the researchers were then followed.

Excel was also used for the citation analysis to count variables and trends and to analyse data on the list of 2012 and 2013 research outputs of the Faculty of Veterinary Science, University of Pretoria.

Thematic analysis was used to interpret the qualitative data collected from the open questions in the questionnaires, as well as from the focus group interviews. Thematic analysis is a qualitative analytic method used to assist researchers in identifying, analysing and reporting patterns (themes) within data, while minimally organising and describing data sets in (rich) detail (Braun & Clarke 2006:79). Durrheim (2006:52) suggests beginning

qualitative data analysis by identifying themes in the data and ensuring that these are linked to the research question.

Thematic analysis was employed as follows: Qualitative data collected through the focus group interviews, as well as from open-ended questions in the questionnaires, were analysed by identifying meaningful patterns. First the data were reviewed. The next step was to identify patterns by arranging them, using a colour scheme, into themes by grouping data with similar codes together. Codes assist in providing meaning to the data obtained (Leedy & Ormrod 2014:274; Struwig & Stead 2007:169). Themes were based on the outline of the questions in the questionnaire, which were based on the research question and sub-questions as these were outlined in sections 5.4.1.1 and 5.4.1.2 of this chapter. As the aim of the data retrieved through the focus group interviews was to provide information in addition to the quantitative data (collected mainly through the questionnaires), similar themes were used. The different data sets were compared with one another throughout the data analysis and data interpretation processes.

Chapter 6 will report on the data collected, present the findings of the research project and discuss the research outcomes. As researchers and information specialists were used as respondents in this study, ethical considerations had to be taken seriously. The next section will briefly outline the ethical considerations related to this study.

## **5.8 ETHICAL CONSIDERATIONS**

All reasonable attempts were made to ensure that no party would be harmed during or after the data collection process of this study. Before any data were collected for the study, permission to carry out the research was obtained from the Research Ethics Committee in the Faculty of Engineering, Built Environment and Information Technology (EBIT), University of Pretoria. Consent forms and introductory cover letters (in which the intentions and aim of the research were clearly explained) were developed for respondents completing the questionnaires, as well as for those participating in the focus group interviews (Appendix E and F). Participants were requested to give signed permission for voluntary participation and to guarantee confidentiality, as well as to allow recording of the proceedings of the focus group interviews.

## **5.9 CONCLUSION**

This chapter explained the research design and methodologies to collect data for the study. It gave an overview of the different data collection methods for this study and paid attention to the design of the measuring instruments. Other aspects addressed included population

and sampling, strategies for data analysis and interpretation, reliability and validity, as well as ethical considerations.

In the following chapter the collected data will be presented, described and analysed.



## CHAPTER 6:

### DATA ANALYSIS AND FINDINGS

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#### 6.1 INTRODUCTION

The aim of this study is to get more insight into the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria. The second part is to assess the current information services provided by the Jotello F Soga Library in order to find out if these services are meeting the information needs of researchers. An important aspect is also to determine the importance of the information specialists in addressing the information needs of faculty researchers and postgraduate students.

The literature analysis, discussed in chapter 3, addressed the first sub-question mentioned in chapter 1, namely:

- What has been reported on the information needs, information seeking behaviour and information use behaviour (nationally and internationally) of the following: veterinary researchers, veterinary faculty staff, postgraduate students in veterinary science and veterinary practitioners?

Chapter 4 gave a review on the information support by academic and research libraries in general, as well as to veterinary faculty researchers and postgraduate students (sub-question 2).

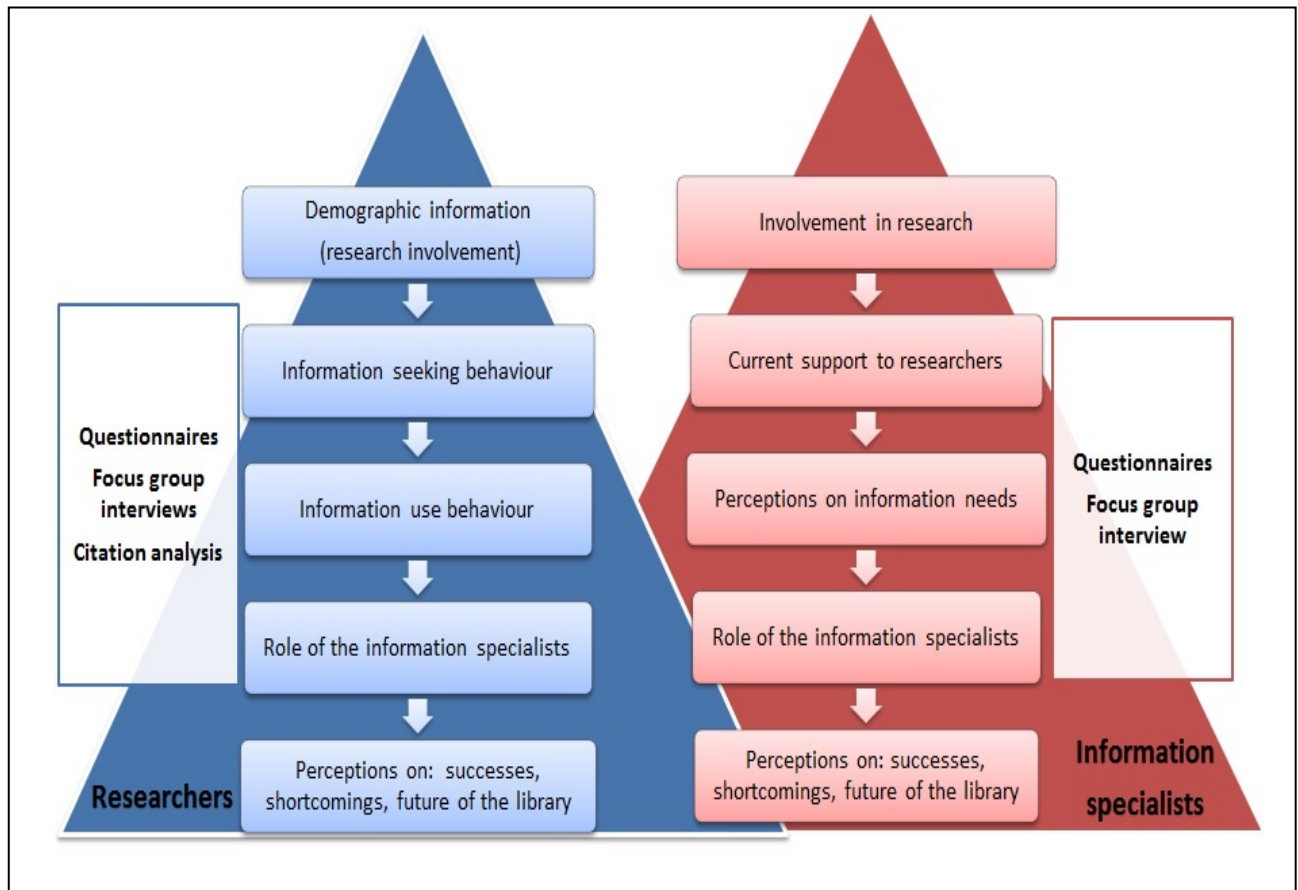
This chapter will present the data that were collected to address the following sub-questions:

- How are the information needs of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria, at present being met and satisfied?
- What research and information support services and products are currently offered by the Jotello F Soga Library?

Arising from the findings presented in this chapter, the next chapter (chapter 7) will address the last sub-question, namely:

- How can the Jotello F Soga Library address the information and research needs of the researchers at the Faculty of Veterinary Science, University of Pretoria and fill gaps in the service?

The previous chapter outlined the research methodology and discussed the data collection procedures. The focus of this chapter will be on presenting the data that were collected. Figure 6.1 summarises the data collection methods used to address the multiple parts of the research question and sub-questions.



**Figure 6.1: Data collection methods used to address research sub-questions and key issues**

Data will be presented according to the different aspects investigated and sub-questions addressed and not according to the data collection methods used. Table 6.1 is an overview of how the data analysis has been discussed in this chapter, in the context of the research questions addressed, the measuring instruments used and the way in which the data are presented.

Sub-question 1	Sub-question 2	Sub-question 3 & 4	Sub-question 5
<p>What have been reported on the information needs, information seeking behaviour and information use of veterinary researchers and postgraduate students in general?</p>	<p>What has been reported on information support by academic and research libraries, research libraries in general as well as to veterinary faculty researchers and postgraduate students?</p>	<p>How are the information needs of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria, presently being met and satisfied? What research and information support services and products are currently offered by the Jotello F Soga Library?</p>	<p>How can the Jotello F Soga Library of the University of Pretoria address the information needs of the researchers and support their information seeking behaviour and information use behaviour at this faculty and fill gaps in the service?</p>
Chapter 3	Chapter 4	Chapter 6	Chapter 7

DATA COLLECTED FROM RESEARCHERS	DATA COLLECTED FROM INFORMATION SPECIALISTS	DATA COLLECTED FROM BOTH RESEARCHERS AND INFORMATION SPECIALISTS
<p><b>Section 6.2</b></p> <p>Information seeking (IS)</p> <p>Time on IS (QR 2.1)</p> <p>Involvement of other people in IS (QR 2.2)</p> <p>Methods used (QR 2.3)</p> <p>Confidence in IS (QR 2.4)</p> <p>Information usage (IU)</p> <p>Use of library &amp; information sources (QR 3.1)</p> <p>Library visits &amp; training (QR 3.1.1)</p> <p>Methods to keep up-to-date (QR 3.1.3)</p> <p>Information presentation and communication (QR 3.2)</p> <p>Criteria to select publication outlet (QR 3.2.1)</p> <p>CA: Research output</p>	<p><b>Section 6.3</b></p> <p>Current services to researchers</p> <p>Faculty departments (QIS 1.1.3)</p> <p>Time spend on services (QIS 2.2)</p> <p>List of services (QIS 2.6; FGI-IS 2.8)</p> <p>Skills development (QIS 2.8)</p>	<p><b>Section 6.4</b></p> <p>Researchers</p> <p>Acquaintance with information specialist (QR 4.1)</p> <p>Importance of IS</p> <p>QR 4.2</p> <p>Roles of IS</p> <p>QR 4.3</p> <p>Skills of IS</p> <p>QR 4.4 &amp; 4.5</p> <p>FGI-IS 1b, d &amp; e</p> <p>Shortcomings of the library</p> <p>QR 4.6</p> <p>Successes of the library</p> <p>QR 4.7</p> <p>FGI-R 1</p> <p>Suggestions for new products / services</p> <p>QR 4.8</p> <p>FGI-R 4</p> <p>FGI-IS 3</p> <p>Future role of IS</p> <p>FGI-R 3</p> <p>FGI-IS 2</p>

QR: QUESTIONNAIRE FOR RESEARCHERS	QIS: QUESTIONNAIRE FOR INFORMATION SPECIALISTS	FGI-R FOCUS GROUP INTERVIEWS WITH RESEARCHERS	FGI-IS FOCUS GROUP INTERVIEWS WITH INFORMATION SPECIALISTS	CA: CITATION ANALYSIS	IS: INFORMATION SPECIALIST

LEGEND:

Table 6.1: Overview of data analysis in context of research questions addressed, measuring instruments and presentation of data

Table 6.1 illustrates how section 6.2 will present data collected from researchers and will look at the demographic background of respondents, their information seeking behaviour and their information use. It will therefore investigate ways in which the information needs of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria are being met and satisfied (sub-question 3) at present. It also indicates which data collection methods were used to investigate the sub-questions and key issues. The citation analysis, used to provide additional information on the research output of the faculty, will be discussed as part of this section, as it adds value to evaluate the selection criteria respondents mentioned for their research publication output.

Section 6.3 will present data collected from the three information specialists of the Jotello F Soga Library. It will attempt to present more insight on the research and information support services and products currently offered by the Jotello F Soga Library (sub-question 4).

In order to determine how the Jotello F Soga Library can ensure that the information needs of the researchers at the Faculty of Veterinary Science, University of Pretoria are addressed and gaps in the service filled, the perceived roles of the information specialist should be investigated. Similar questions on the role of the information specialist were put to the researchers and the information specialists. These data are presented and compared in section 6.5. This section investigates different perceptions (researchers as well as information specialists) regarding the future of the library in supporting faculty research.

The next discussion will start with an analysis of data collected from researchers.

## **6.2 DATA COLLECTED FROM VETERINARY SCIENCE RESEARCHERS**

Various methods, including an online questionnaire, focus group interviews and a citation analysis, were used to collect data from researchers. The survey was sent out by means of a personally addressed e-mail to 397 academic staff members and postgraduate students registered at the University of Pretoria in the Faculty of Veterinary Science. 36 of the 397 questionnaires sent out were not delivered. Non-deliverability due to wrong or no longer existing e-mail addresses can be a problem when conducting internet surveys (Hoonakker & Carayon 2009). The final response rate to several rounds of the questionnaire sent out was 33 percent (119/361 respondents) and 21 researchers (including academic staff and postgraduate students) participated in five different focus group interviews. These groups were small because of problems with availability of participants.

(a) Questionnaire

A copy of the e-mail in which respondents were requested to complete the questionnaire and submit the data, is attached in Appendix C. A summary of the response to the questionnaire is presented in Table 6.2.

<b>Questionnaire</b>	
<b>Potential respondents:</b>	397
<b>Electronic mails returned (undelivered)</b>	36
<b>Delivered questionnaires</b>	361
<b>Number of respondents (final)</b>	119
<b>Response rate</b>	33%

**Table 6.2: Summary of response received to the questionnaire to researchers**

<b>Date of e-mail</b>	<b>To whom</b>	<b>Number of recipients</b>	<b>Number of responses</b>	<b>%</b>
<b>24/10/2013</b>	All academic staff and postgraduate students	361	14	4%
<b>04/11/2013</b>	All academic staff and postgraduate students	361	32	9%
<b>29/01/2014</b>	All academic staff and postgraduate students	361	37	10%
<b>12/02/2014</b>	Onderstepoort Postgrad Student Association (op.pgsa@gmail.com)	64	36	56%
		Total:	119	33%

**Table 6.3: Response to the different survey invitations**

Table 6.3 indicates the frequency with which the invitation to fill in the questionnaire was mailed to the respondents, as well as the number of responses received after every send-out date. The first e-mails were sent out on 24 October 2013, followed by a reminder on 4 November 2013. In this follow-up round, a Word document of the questionnaire was also attached, allowing respondents to print it out and return it through the campus-wide internal mail service or, alternatively, e-mail it back to the researcher (although this was not recommended, for anonymity reasons). Eleven questionnaires were received back in the mail. These were manually filled in on the internet questionnaire form. In total 46 questionnaires had been successfully completed and returned by 5 December 2013. This resulted in a very low response rate of 13 percent.

As the initial response rate for the survey was very low, it was decided to send out the invitation to complete the questionnaire again at the beginning of the academic year. This

round returned 37 completed questionnaires - bringing the response rate at this stage to 23 percent.

With the response rate still very low, printed questionnaires were handed to the chairman of the Onderstepoort Postgraduate Student Association to be distributed among postgraduate students attending a meeting on campus on 12 February 2014. These questionnaires were only given to students who indicated that they had not yet completed the online questionnaire. Of the 64 questionnaires handed out, 36 were returned, resulting in a response rate of 56 percent for this survey round, and bringing the final response rate for the overall survey on 33 percent.

A low response rate is not unusual. Some of the studies reviewed for this research also reported low response rates. A study by Al-Suqri (2011) among social science scholars returned 21 responses to 70 e-mailed questionnaires (a 30% response rate); Korjonen-Close (2005) reported a response rate of only 7.9 percent to an internet questionnaire investigating the information needs of clinical researchers and Hart and Kleinveldt (2011) accepted a response rate of 17 percent in their study on South African researchers' perspectives on the role of the academic library in research. Most studies however suggest the use of more than one data collection method to accommodate low response rates (Al-Suqri 2011; Connaway *et al.* 2011; Wilson *et al.* 2002).

The low response rate to the internet survey could be attributed to several reasons. Some of these may include the time of year when the survey was conducted (the end and beginning of the academic year are mostly very busy times for faculty, researchers and postgraduate students); slow internet speed or limited internet access (especially for off-campus respondents) or some might not have been interested in participating or completing the questionnaire (because of the impersonal way in which respondents had been requested to participate in the survey, it was easy to withdraw or disengage from the survey). As the LibQual survey of the University of Pretoria Library Service had been conducted only two months previously (August 2013), some respondents could have confused this survey with the LibQual survey and discarded it, thinking that they had already participated.

#### (b) Focus group interviews

Focus group interviews were used to supplement the questionnaire. Purposive sampling was used and focus group participants were invited personally to participate in the study. Similar procedures to recruit focus group participants were reported in studies by Al-Suqri (2011), Haines *et al.* (2010) and Prabha *et al.* (2007). As a large number of researchers and postgraduate students are not on campus every day, invited participants consisted only of

faculty staff and postgraduate students with teaching and/or other responsibilities, ensuring that they would physically be on campus.

Five focus group interviews were conducted between December 2013 and April 2014, involving a total number of 21 participants. As indicated in Table 6.4, these groups were made up of both faculty staff and post-graduate students – except for focus group interview 3, which consisted only of masters' degree students. Prabha *et al.* (2007) found focus group interviews to be more dynamic, with participants more willing to respond and to give their honest opinions when students and faculty participated in separate groups (students might feel uncomfortable to express their opinions freely in the presence of faculty). Because of the limited availability of participants to attend a focus group interview, it was however not possible to have separate interviews for faculty staff and students.

Although the anonymity issue of the questionnaire makes it impossible to track the names of participants responding to the survey questionnaire, all focus group participants indicated verbally at the beginning of the interview that they had completed the questionnaire. There was no separate schedule for the focus group interviews. Questions from the questionnaire were used as starting point in the focus group interviews and participants were asked to elaborate on and discuss issues addressed in the questionnaire.

Focus group interview:	Date	Number of participants	Composition of group
1	5 December 2013	5	1 x Doctoral student 2 x Senior lecturers 2 x Master's students
2	20 February 2014	3	1 x Senior lecturer 1 x Doctoral student 1 x Master's student
3	27 March 2014	3	3 x Master's students
4	10 April 2014	4	1 x Junior lecturer 2 x Master's students 1 x Doctoral student
5	17 April 2014	6	1x Professor (Head of Department) 5 x Master's students
<b>TOTAL:</b>		21	Professor: 1 Senior lecturers: 3 Junior lecturer: 1 Doctoral students: 3 Master's students: 13

**Table 6.4: Summary of the composition and dates of the focus group interviews**

### (c) Citation analysis

For the citation analysis, all research articles published in 2012 and 2013 in the Faculty of Veterinary Science were used. These were analysed manually on MS Excel 2007 and reports were created on JCR on the ISI Web of Knowledge (<http://thomsonreuters.com/en/products-services/scholarly-scientific-research/research-management-and-evaluation/journal-citation-reports.html>) and InCites (<http://incites.isiknowledge.com/Home.action>); both are Thomson Reuters' products. The results of the two years were compared.

Data collected from the veterinary science researchers were presented under the following headings: demographic information of researchers (including faculty involvement and research involvement), information seeking and information use.

#### 6.2.1 Demographic information of participants (faculty academic staff and postgraduate students)

The main purpose of this section was to serve as background to create a demographic overview of participating respondents. Respondents needed to indicate their faculty involvement, involvement in research and whether they acted as supervisors for postgraduate students. The data were collected by means of the questionnaire and are presented in Table 6.5.

<b>Faculty involvement (n = 119)</b>		<b>Research involvement:</b>	
Professor	7	No research involvement	5
Associate professor	4	Yes, for masters' degree purposes	67
Senior lecturer	17	Yes, for doctoral degree purposes	37
Lecturer	5	Yes, for post-doctoral degree purposes	6
Junior lector	7	As contract researcher	3
Assistant lector	0	Other research projects	11
Research staff	1	<b>Supervisor of postgraduate students:</b>	
Postdoctoral	3	Not a supervisor	93
Doctoral student	24	Yes, for students doing masters' mini-dissertation	12
Master's student	50	Yes, for students doing research masters' dissertation	17
Other (specify)	1	Yes, for doctoral students	9
Total	119	Supervisor of other research projects	2

**Table 6.5: Faculty and research involvement of respondents**



There were 119 respondents, of which 7/119 (6%) indicated that they were professors; 4/119 (3%) were associate professors; 17/119 (14%) were senior lecturers; 5/119 (6%) were lecturers; 7/119 (6%) were junior lecturers; 1/119 (1%) was a research staff member; 3/119 (3%) were postdoctoral researchers; 24/119 (20%) were doctoral students and 50/119 (42%) were master's students. Only one respondent marked "other", but did not specify this option.

Table 6.5 indicates respondents' research involvement. As a number of respondents are involved in more than one research project for different purposes, the total indicated for research involvement is 129 (more than the number of respondents). Of the 119 respondents, five (6%) indicated that they were not involved in research projects at the time; 67/119 (56%) were doing research for masters' degree purposes; 37/119 (31%) for doctoral degree purposes; 6/119 (5%) for postdoctoral purposes and 3/119 (3%) were involved in contract research. The option "other" was indicated by 11/119 (9%) respondents. Most respondents specified their involvement in "other" research as "academic research."

A large number (93/119; 78%) of researchers were not at the time supervising postgraduate students, while respondents indicated that twelve students doing master's mini-dissertations, seventeen students doing research master's dissertations, nine students doing doctoral research and two other research projects were at the time being supervised.

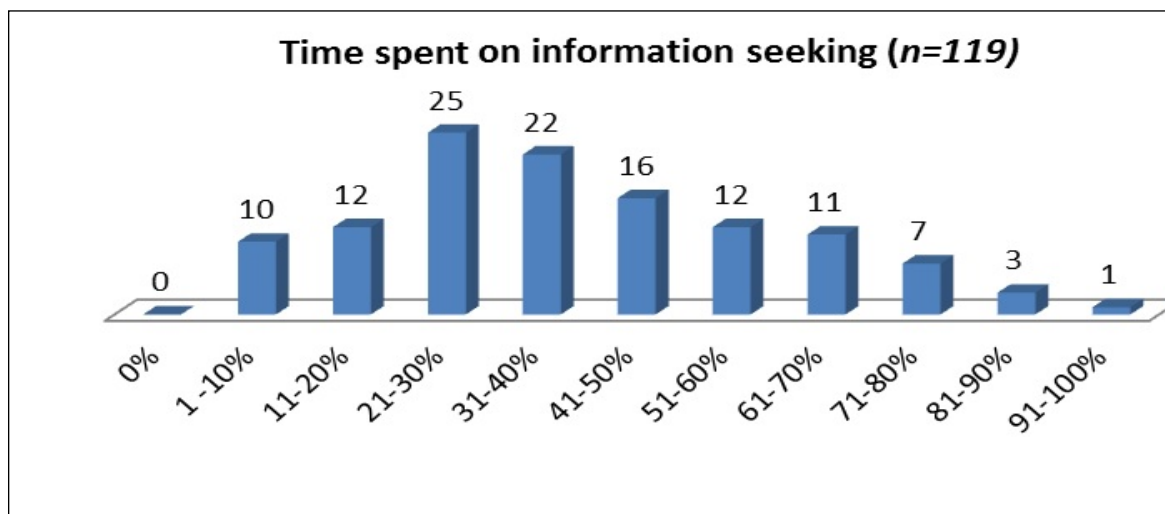
## **6.2.2 Information seeking**

This section reports data collected on the information seeking behaviour of researchers. It investigates the time spent on information seeking, the involvement of other people when researchers sought information for their research, methods used when seeking information and the level of confidence that participants had in their own information seeking abilities (i.e. if they considered their information seeking successful).

### *6.2.2.1 Time spent on information seeking*

Chart 6.1 presents the data analysed on the estimated time respondents spent on information seeking. Of the 119 respondents, 85/119 (71%) indicated that they spent less than 50 percent of their time on information seeking. Most respondents (25/119; 21%) in this group indicated time spent on information seeking as between 21 and 30 percent, 22/119 (18%) between 31 and 40 percent, 12/119 (10%) between 11 and 20 percent and 10/119 (8%) between 1 and 10 percent of their time on information seeking. Thirty-four out of 119 (29%) researchers in this study indicated that they spent more than 50 percent of their time on information seeking, while 1/119 (1%) even indicated that the time spent on information seeking was between 91 and 100 percent. The rest of the participants indicated their

average time spent on information seeking as follows: 12/119 (10%) between 51 and 60 percent; 11/119 (9%) between 61 and 70 percent; 7/119 (6%) between 71 and 80 percent and 3/119 (3%) between 81 and 90 percent.



**Chart 6.1: Time researchers spent on information seeking**

*6.2.2.2 Involvement of other people in information seeking for research*

Table 6.6 displays the data on the involvement of other people in information seeking for researchers (i.e. when researchers use other people to search on their behalf). Participants were asked to indicate all applicable options. A total of 119 respondents answered this question.

% of time	Researcher self	Information specialist	Research assistant	Post-graduate students	Under-graduate students	Secretary / Other administrative staff	Other
0%	0	22	59	51	66	64	33
1-10%	7	59	6	10	1	8	5
11-20%	9	13	1	5	1	0	3
21-30%	14	1	3	4	0	2	1
31-40%	12	1	0	1	0	0	0
41-50%	16	0	0	3	0	0	1
51-60%	15	2	0	0	0	0	1
61-70%	9	1	1	1	0	0	0
71-80%	10	0	0	0	0	0	1
81-90%	7	0	0	0	0	0	0
91-100%	17	0	0	0	0	0	2
<b>Number of responses:</b>	<b>116</b>	<b>99</b>	<b>70</b>	<b>75</b>	<b>68</b>	<b>74</b>	<b>47</b>

**Table 6.6: Involvement of other people in information seeking for research**

Data displayed in Table 6.6 were further broken down to look at the individual categories of people involved in information seeking for researchers.

(a) Researcher responsible for his/her own information seeking

Most respondents indicated that they were responsible for their own information seeking. Of the total of 119 respondents, 116 (97%) marked the option “Yourself” as being responsible for information seeking for research. Of the 116 responses, 17 (14%) indicated that they were responsible for 91 to 100 percent of their own information seeking. These 17 respondents indicated their positions in the faculty as follows: six master’s students, five doctoral students, two postdoctoral researchers, one professor, one senior lecturer and two lecturers. The percentage involvement of respondents in information seeking for their research was indicated as follows: 7/119 (6%) between 1 and 10 percent, 9/119 (8%) between 11 and 20 percent, 14/119 (12%) between 21 and 30 percent, 12/119 (10%) between 31 and 40 percent, 16/119 (13%) between 41 and 50 percent, 15/119 (13%) between 51 and 60 percent, 9/119 (8%) between 61 and 70 percent, 10/119 (8%) between 71 and 80 percent and 7/119 (6%) between 81 and 90 percent.

(b) Information specialists

Information specialists’ involvement in researchers’ information seeking was marked by 99/119 (83%) respondents. Of these however 22/119 (18%) indicated their involvement as 0 percent. Faculty involvement of these 22 respondents was indicated as follows: 12/22 (55%) are master’s students, 3/22 (14%) are doctoral students, 1/22 (5%) is a postdoctoral researcher, 2/22 (9%) are professors, 3/22 (14%) are senior lecturers and 1/22 (5%) is a lecturer.

The largest number of respondents to this question (59/119; 50%) indicated the information specialists’ involvement as between 1 and 10 percent.

Another 13/119 (11%) respondents indicated the information specialists’ involvement as between 11 and 20 percent, 1/119 (1%) as between 21 and 30 percent, 1/119 (1%) as between 31 and 40 percent, 2/119 (2%) as between 51 and 60 percent and 1/119 (1%) as between 61 and 70 percent. There were no further indications for this option.

(c) Research assistants

Of the 70/119 (59%) respondents who marked the option “research assistants” as being involved in their information seeking, in the questionnaire, 59/70 (50%) indicated it as 0 percent. A few other respondents (11/119; 9%) indicated that they did make use of research

assistants to assist them in information seeking for their research. These were indicated as follows: 6/119 (5%) as between 1 and 10 percent, 1/119 (1%) as between 11 and 20 percent, 3/119 (3%) as between 21 and 30 percent and 1/119 (1%) as between 61 and 70 percent.

(d) Postgraduate students

Some researchers also indicated the involvement of postgraduate students in their information seeking. The involvement of postgraduate students in the information seeking of faculty researchers was marked by 75/119 (63%) respondents, while 51/75 (68%) indicated that they did not use postgraduate students for their research information seeking (0% involvement).

Postgraduate students' involvement in faculty researchers' information seeking was indicated as follows in the questionnaire: 10/119 (8%) indicated 1 to 10 percent involvement, 5/119 (4%) indicated 11 to 20 percent involvement, 4/119 (3%) 21 to 30 percent involvement, 1/119 (1%) 31 to 40 percent involvement, 3/119 (3%) 41 to 50 percent involvement and 1/119 (1%) respondent indicated 61 to 70 percent involvement.

(e) Undergraduate students

The involvement of undergraduate students in the information seeking of researchers was marked by 68/119 (57%), of whom 66 respondents indicated 0 percent involvement of undergraduate students. Only 2/119 (2%) respondents indicated undergraduate students' involvement in information seeking for their research; a master's student indicated he or she used undergraduate students for 1 to 10 percent of his or her information seeking and a senior lecturer indicated 11 to 20 percent of his or her information seeking was done by undergraduate students.

(f) Secretary and administrative staff

In the overall responses to the questionnaire, 74/119 (62%) respondents marked this option and 64/119 (86%) of these reflected the role of the secretary and other administrative staff in their information seeking as 0 percent. A total number of 8/119 (7%) of respondents indicated the involvement of the secretary or other administrative staff as between 1 and 10 percent and 2/119 (2%) as between 21 and 30 percent.

(g) Other

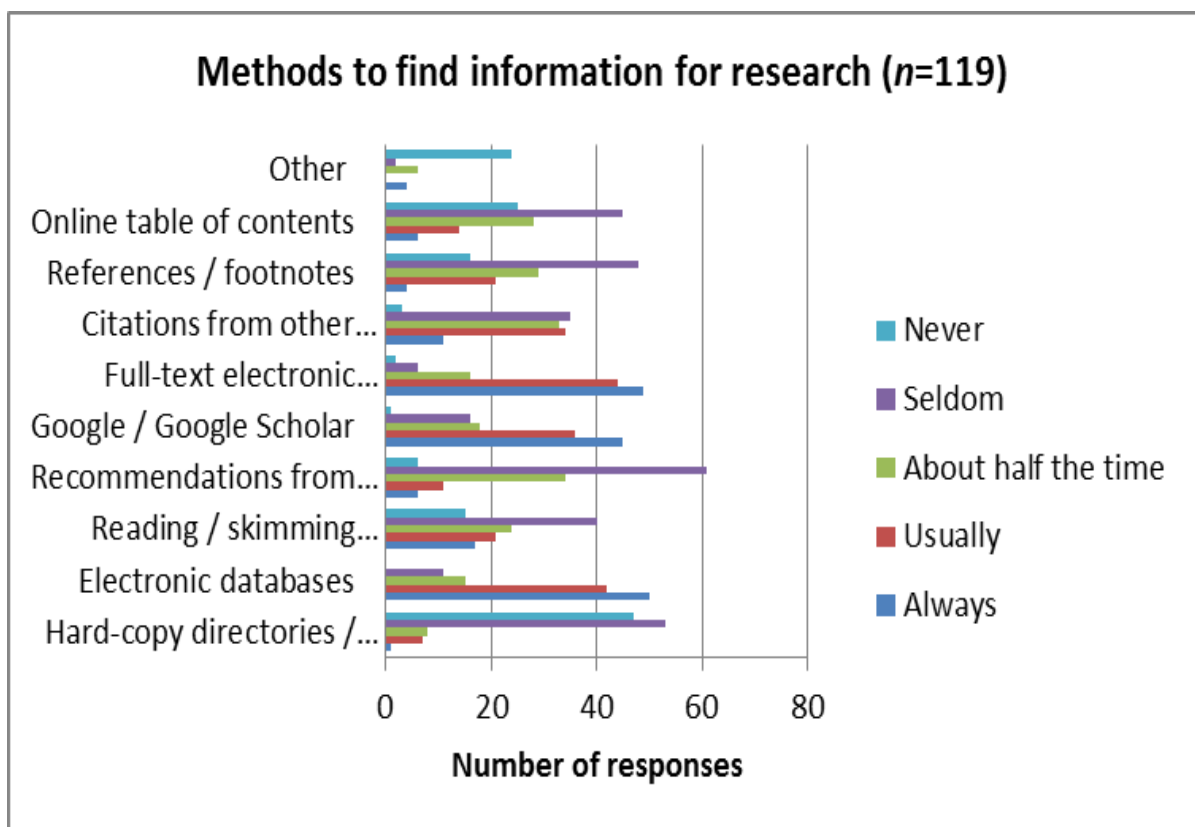
Other people used for information seeking were specified as library staff, colleagues involved in research projects, laboratory helpers and supervisors.

There were 47/119 (39%) responses to this option, of which 33/47 (70%) allocated a value of 0 percent to the involvement of other people in their information seeking.

Involvement of other people was further indicated as follows: 5/119 (4%) as between 1 and 10 percent, 3/119 (3%) as between 11 and 20 percent, 1/119 (1%) as between 21 and 30 percent, 1/119 (1%) as between 41 and 50 percent, 1/119 (1%) as between 71 and 80 percent and 2/119 (2%) as between 91 and 100 percent.

### 6.2.2.3 Methods used to find information for research

Chart 6.2 illustrates the data collected on the methods researchers use to find (discover) information for their research. Researchers had to indicate how often (always, usually, about half the time, seldom or never) they used different methods to start looking for information.

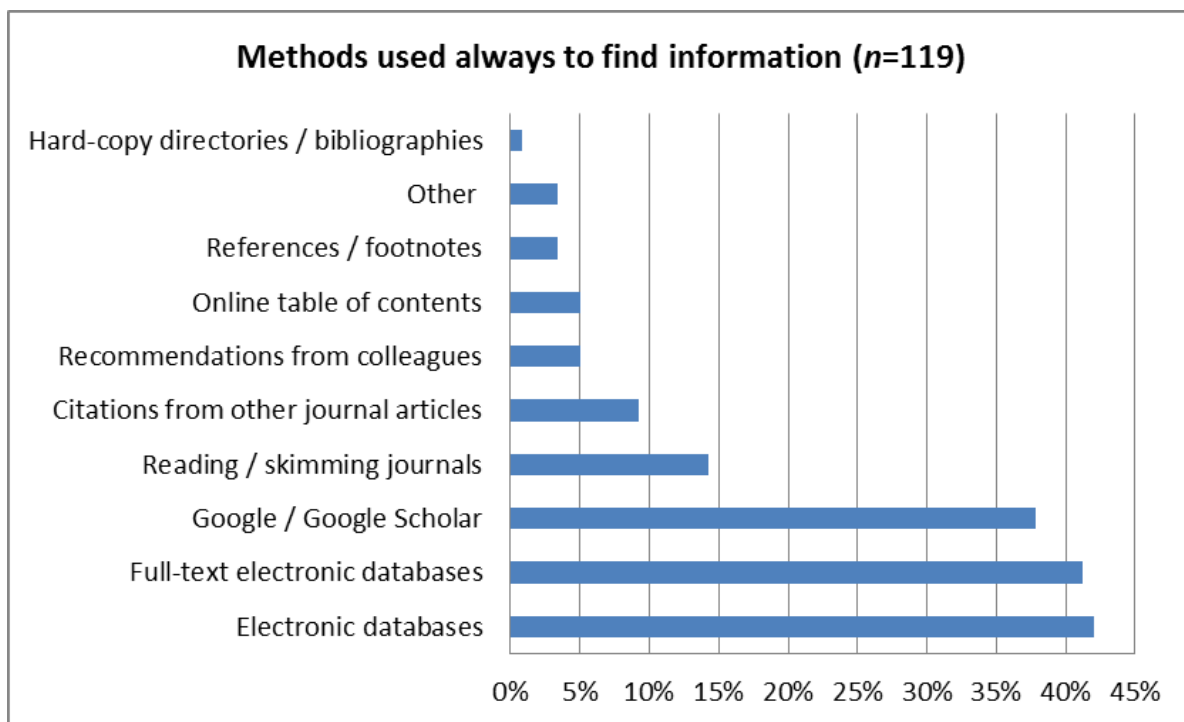


**Chart 6.2: Methods to find information for research**

The data presented in Chart 6.2 were further divided to present the response to each frequency option for the different methods used to find information. These are illustrated in Chart 6.3 (always), Chart 6.4 (usually), Chart 6.5 (about half the time), Chart 6.6 (seldom) and Chart 6.7 (never).

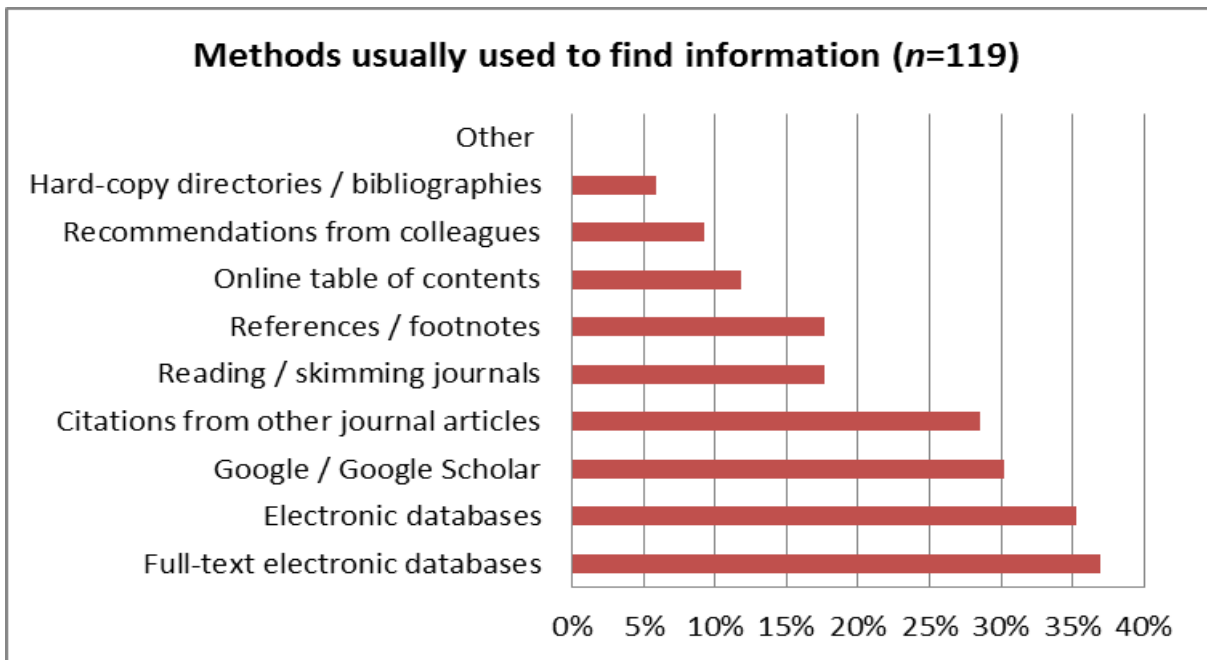
The methods always used by respondents to find information were indicated as searching in electronic databases (e.g. CAB Direct) for citations (50/119; 42%); searching full-text

electronic databases such as ScienceDirect for information (49/119; 41%) and using Google or Google Scholar (45/119; 38%). These methods were followed by reading or skimming the important journals in the field (17/119; 14%); following citations from other journal articles (11/119; 9%); getting references and recommendations from colleagues (6/119; 5%); browsing for articles in an online table of contents of a journal (6/119; 5%); using a reference or footnote in one article to link to another, such as CrossRef (4/119; 3%); other methods (4/119; 3%) and searching in published hard-copy directories or bibliographies (1/119; 1%). The following were mentioned as “other”: PubMed, NCBI and Google.

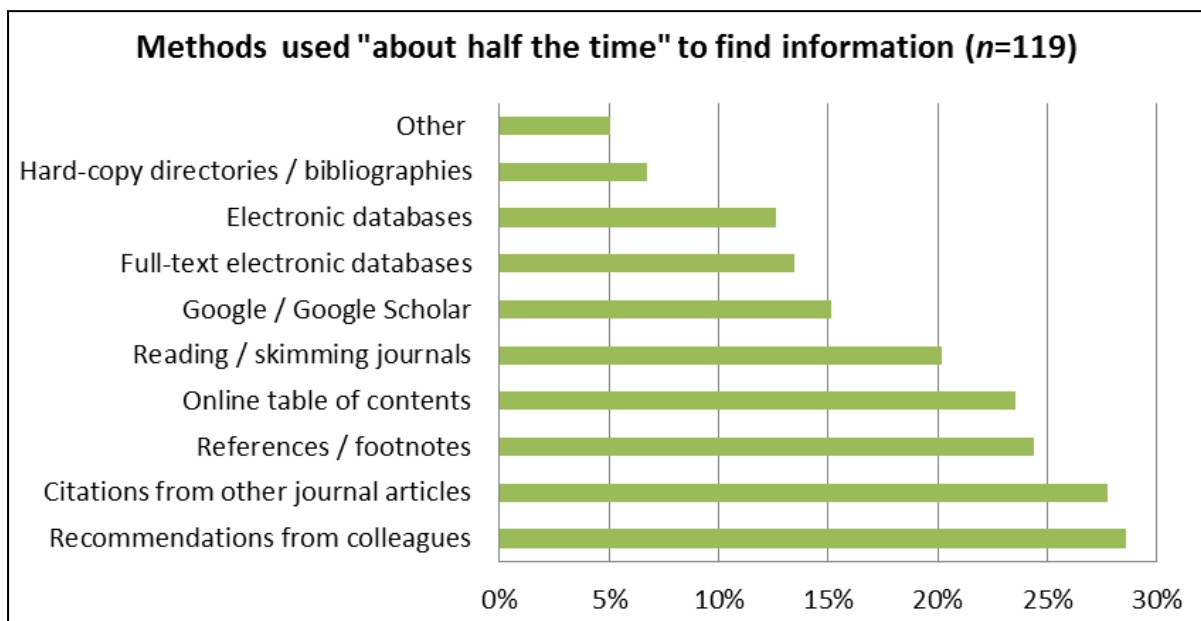


**Chart 6.3: Methods always used to find information for research**

Researchers' response to methods “usually” used is illustrated in Chart 6.4. Full-text electronic databases (44/119; 37%), electronic databases (42/119; 35%), Google or Google Scholar (36/119; 30%) and citations from other journal articles (34/119; 29%) were methods indicated as used most often by researchers. These were followed by reading or skimming journals (21/119; 18%), references or footnotes (21/119; 18%), online table of contents (14/119; 12%) and recommendations from colleagues (11/119; 9%). The method used less often was hard-copy directories or bibliographies (7/119; 6%). None of the respondents indicated “other” methods.



**Chart 6.4: Methods usually used to find information for research**

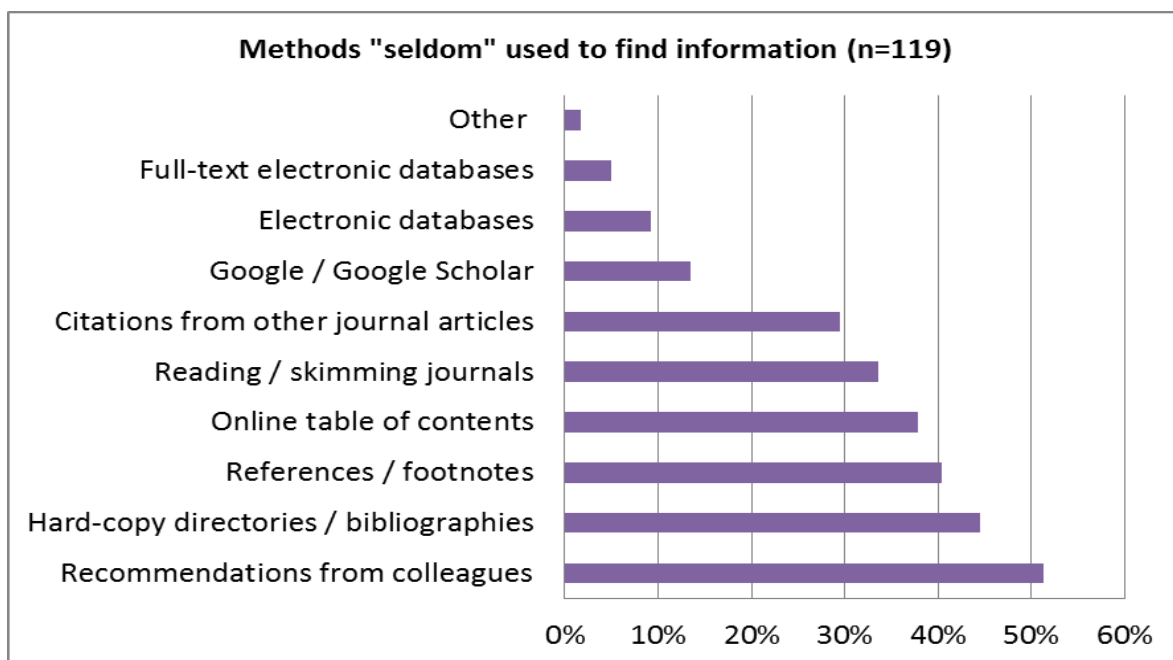


**Chart 6.5: Methods used "about half the time" to find information for research**

Chart 6.5 illustrates the number of responses received to the option "about half the time" for the frequency with which the different methods were used by researchers to find information. The results, presented from the methods with the largest number of responses to the methods with fewest responses, are as follows: recommendations from colleagues (34/119; 29%), citations from other journal articles (33/119; 28%), references or footnotes (29/119; 24%), online table of contents (28/119; 24%), reading or skimming journals (24/119; 20%), Google or Google Scholar (18/119; 15%), full-text electronic databases (16/119; 13%),

electronic databases (15/119; 13%), hard-copy directories or bibliographies (8/119; 7%) and other methods (6/119; 5%).

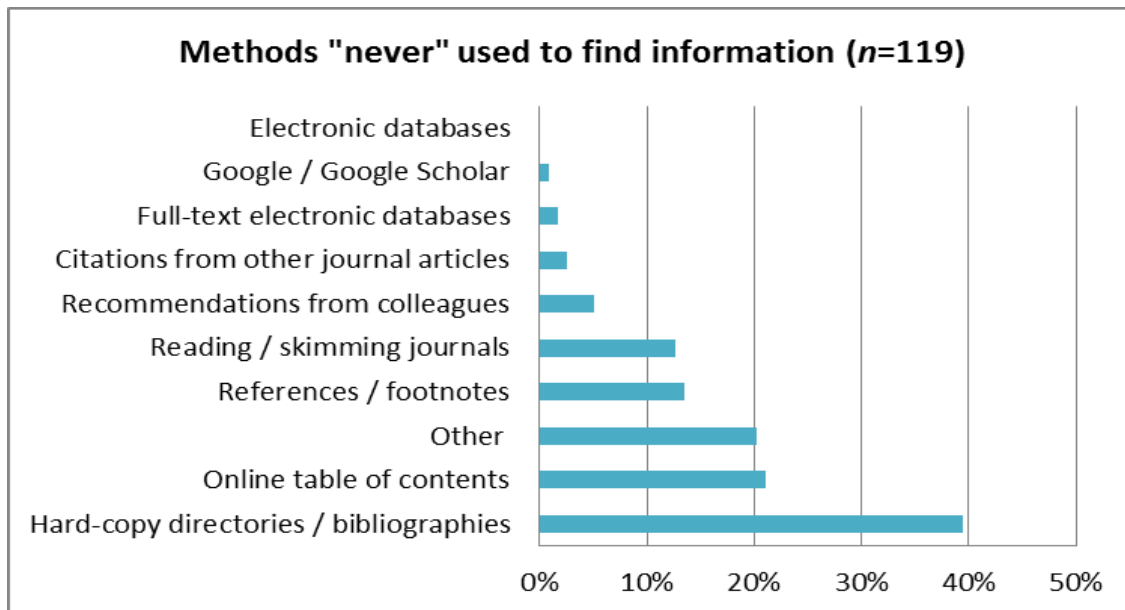
The methods respondents seldom used to find information are reflected in Chart 6.6. These include recommendations from colleagues (61/119; 51%), hard-copy directories or bibliographies (53/119; 45%), references or footnotes (48/119; 40%), online table of contents (45/119; 38%), reading or skimming journals (40/119; 34%), citations from other journal articles (35/119; 29%), Google or Google Scholar (16/119; 13%), electronic databases (11/119; 9%), full-text electronic databases (6/119; 5%) and other methods (2/119; 2%). They did not specify other methods.



**Chart 6.6: Methods “seldom” used to find information for research**

Hard-copy directories or bibliographies (47/119; 39%), online tables of content (25/119; 21%) and other methods to find information (24/119; 20%) were the methods researchers most frequently indicated they never used to find information. These were followed by a few respondents who indicated they never used references or footnotes (16/119; 13%), reading or skimming journals (15/119; 13%), recommendations from colleagues (6/119; 5%) and citations from other journal articles (3/119; 3%). Only 2/119 (2%) respondents indicated they never used full-text electronic databases, while one respondent (1%) never used Google or Google Scholar. No respondent indicated that he or she never used electronic databases. These responses are illustrated in Chart 6.7.





**Chart 6.7: Methods “never” used to find information for research**

To understand which methods are most favoured and which methods are least favoured to find information, a summary of the three methods indicated by most respondents as always being used and the three methods indicated by most respondents as never being used, was compiled and presented in Table 6.7. This will be discussed in more detail in chapter 7.

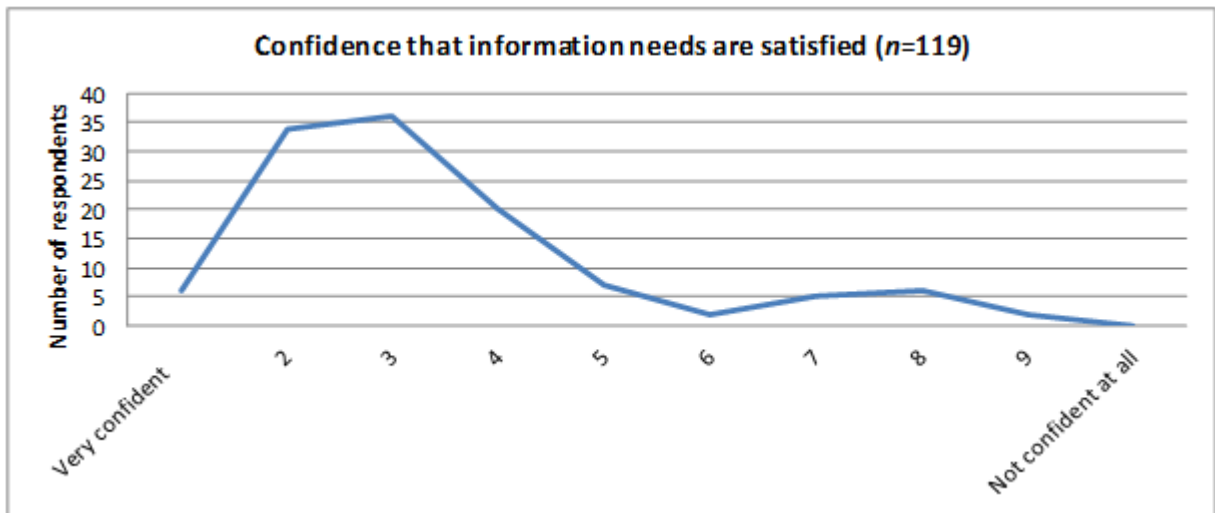
Methods used most often by researchers	Methods used least often by researchers
<ul style="list-style-type: none"> <li>• Electronic reference databases</li> <li>• Full-text electronic databases</li> <li>• Google or Google Scholar</li> </ul>	<ul style="list-style-type: none"> <li>• Hard-copy directories or bibliographies</li> <li>• Online table of contents</li> <li>• References or footnotes</li> </ul>

**Table 6.7: Summary of methods used by researchers to find information for research**

#### 6.2.2.4 Level of confidence that information needs are being satisfied

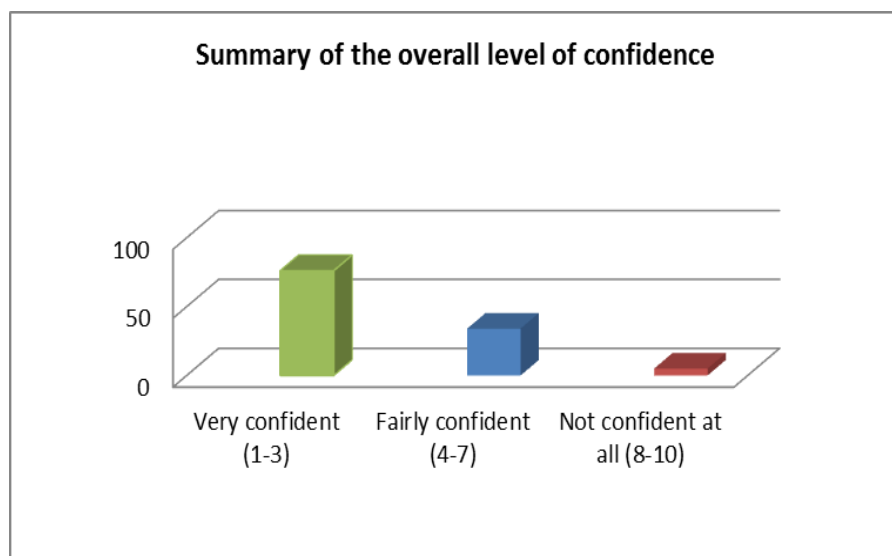
Respondents were asked to indicate on a scale from one to ten (where one was “very confident” and ten was “not confident at all”) their level of confidence that their information needs were being satisfied. Chart 6.8 illustrates the responses to this question. The level of confidence was indicated as follows: 6/119 (5%) were confident (indicated a “1” on the scale) that their information needs were being satisfied. No respondent indicated a “10” on the scale, but 2/119 (2%) indicated a “9” and 6/119 (5%) an “8” on the scale – meaning they did

not feel confident at all that their information needs were being satisfied. Most respondents reported strong confidence that their information needs were being met with 34/119 (29%) allocating a “2” on the ten-point scale and 36/119 (30%) giving their level of satisfaction a “3”. This was followed by 20/119 (17%) respondents who reported a level of “4”, 7/119 (6%) who reported a level of “5”, 2/119 (2%) who reported a level of “6” and 5/119 (4%) who reported a level of “7”.



**Chart 6.8: Level of confidence that information needs are being satisfied**

Overall, most respondents (76/119; 64%), reported that they felt very confident that their information needs were being satisfied. This was followed by 34/119 (29%), who felt fairly confident and only 5/119 (13%) who did not feel confident that their information needs were being satisfied. The summary of these results is illustrated in Chart 6.9.



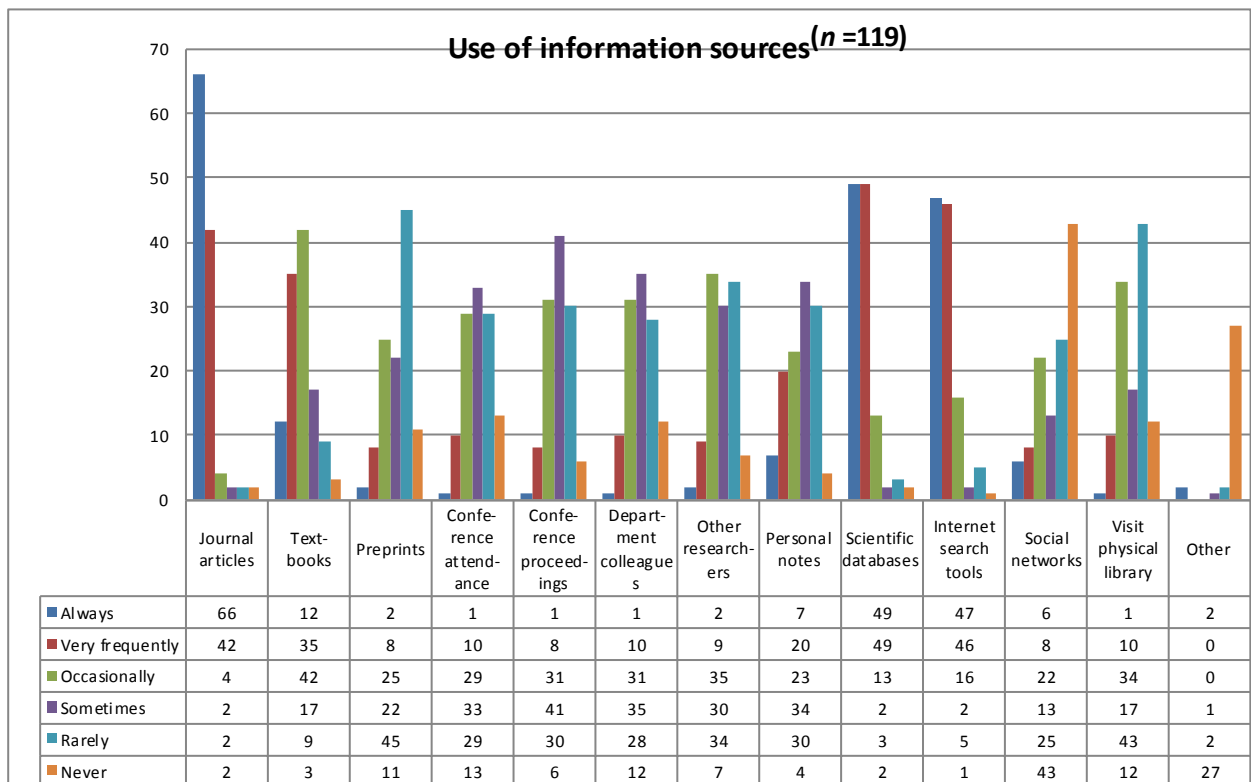
**Chart 6.9: Summary of researchers’ overall level of confidence that information needs are being met**

## 6.2.3 Information use

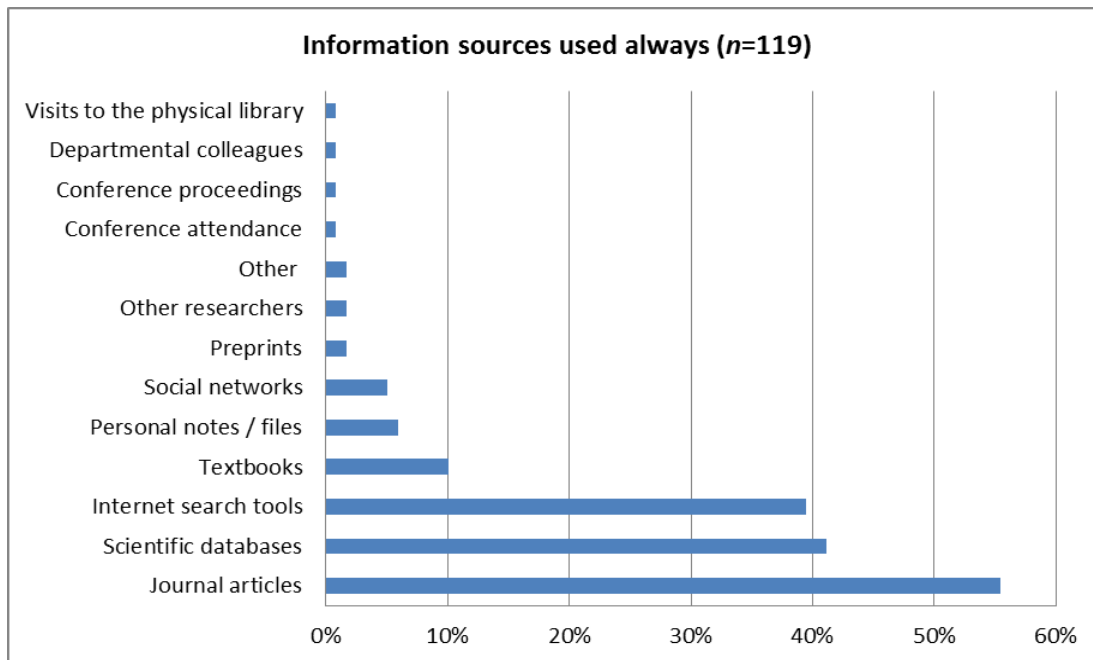
### 6.2.3.1 Use of information sources

The following section of the survey collected data on the use of information resources by researchers. They were asked to indicate the frequency (always, very frequently, occasionally, sometimes, rarely and never) with which the following information sources were used: journal articles, textbooks, preprints, conference attendance, conference proceedings, departmental colleagues, other researchers, personal notes, scientific databases, internet search tools, social networks, visiting the physical library and other (not specified). Data received on this section are illustrated in Chart 6.10.

To present more detail, the data were further divided into separate charts for each frequency. Chart 6.11 presents the data on information sources indicated as always being used, Chart 6.12 the sources indicated as being used very frequently, Chart 6.13 the sources indicated as being used occasionally, Chart 6.14 the sources indicated as being used sometimes, Chart 6.15 the sources indicated as being used rarely and Chart 6.16 illustrates the data on sources respondents indicated they never used.

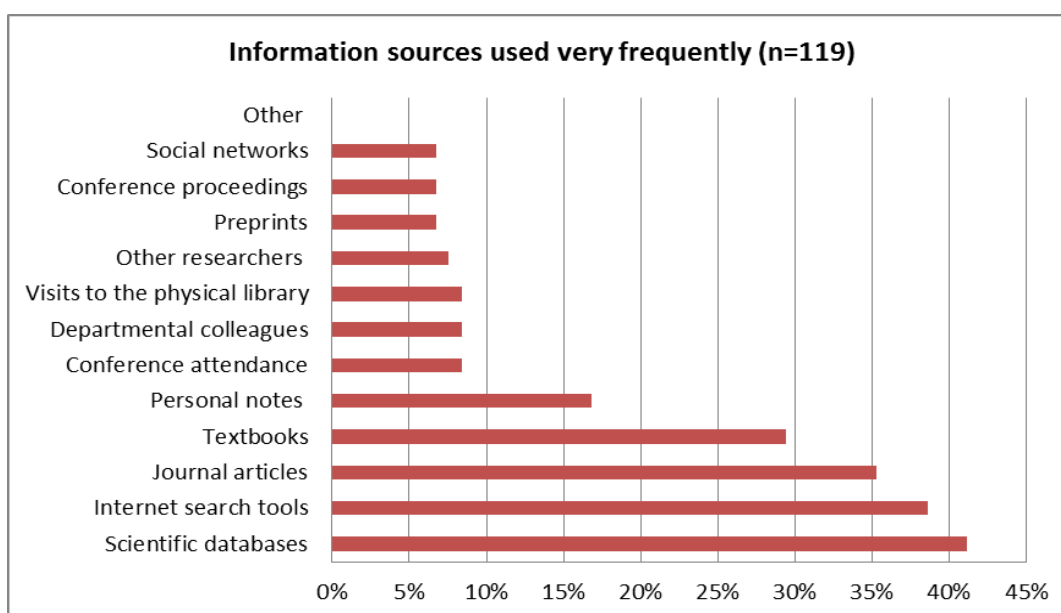


**Chart 6.10: Use of information sources**



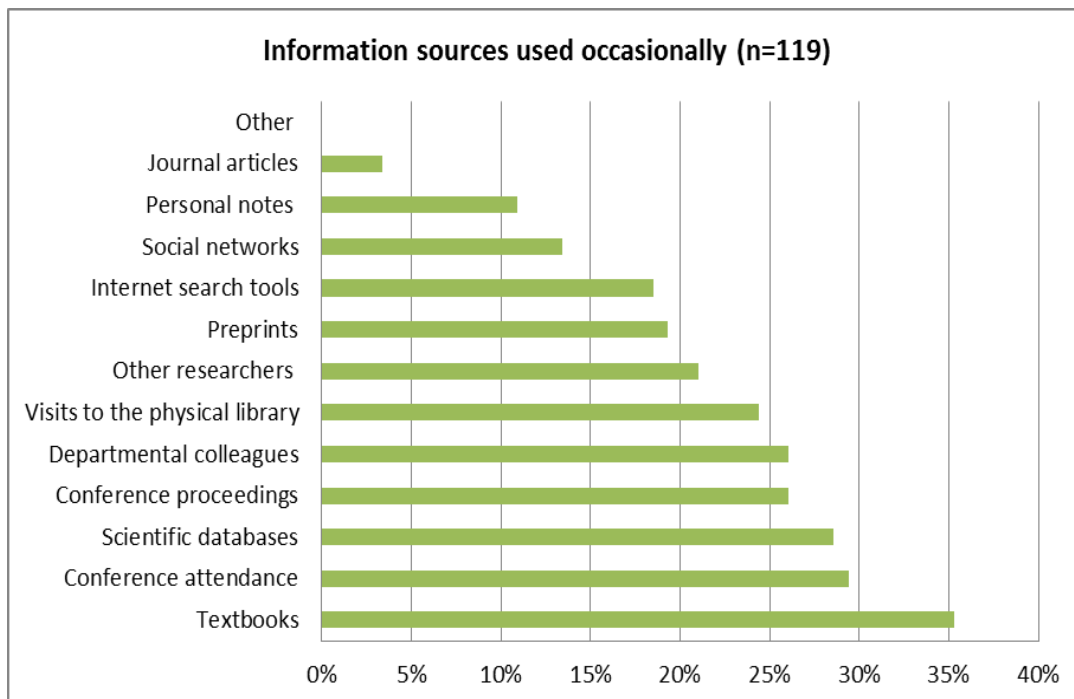
**Chart 6.11: Information sources “always” used by researchers**

Chart 6.11 summarises the data on information sources always used by respondents. The sources used most often include journal articles (66/119; 55%), scientific databases (49/119; 41%) and internet search tools (47/119; 39%). These are followed by textbooks (12/119; 10%), personal notes (7/119; 6%), social networks (6/119; 5%), preprints (2/119; 2%), other researchers (2/119; 2%) and other (not specified) information sources (2/119; 2%). Information sources indicated as being used least often are conference attendance (1/119; 1%), conference proceedings (1/119; 1%), departmental colleagues (1/119; 1%) and visits to the physical library (1/119; 1%).



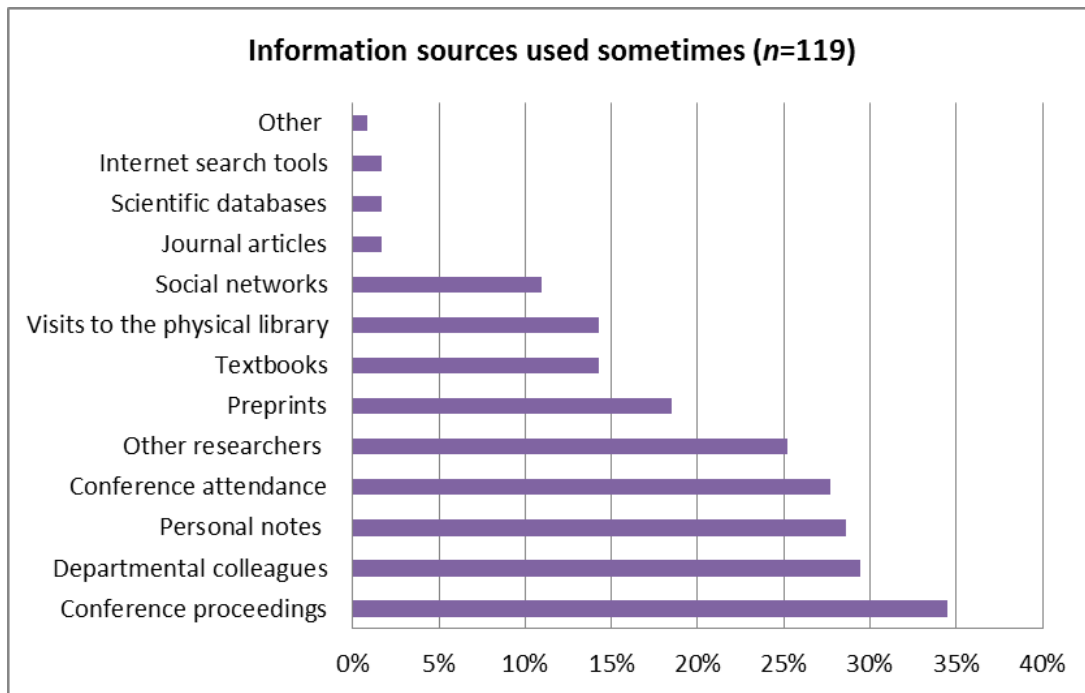
**Chart 6.12: Information sources used very frequently by researchers**

Chart 6.12 illustrates the data on respondents' selection of the option "very frequently" for the use of information sources. Respondents indicated they used scientific databases (49/119; 41%), internet search tools (46/119; 39%) and journal articles (42/119; 35%) very frequently, followed by textbooks (35/119; 29%) and personal notes (20/119; 17%). Conference attendance, departmental colleagues, visits to the physical library and other researchers were each indicated by 9/119 (8%) as being used very frequently. The following information sources were each selected by 8/119 (7%) respondents: preprints; conference proceedings and social networks. None of the respondents indicated that there were other information sources that they used very frequently.



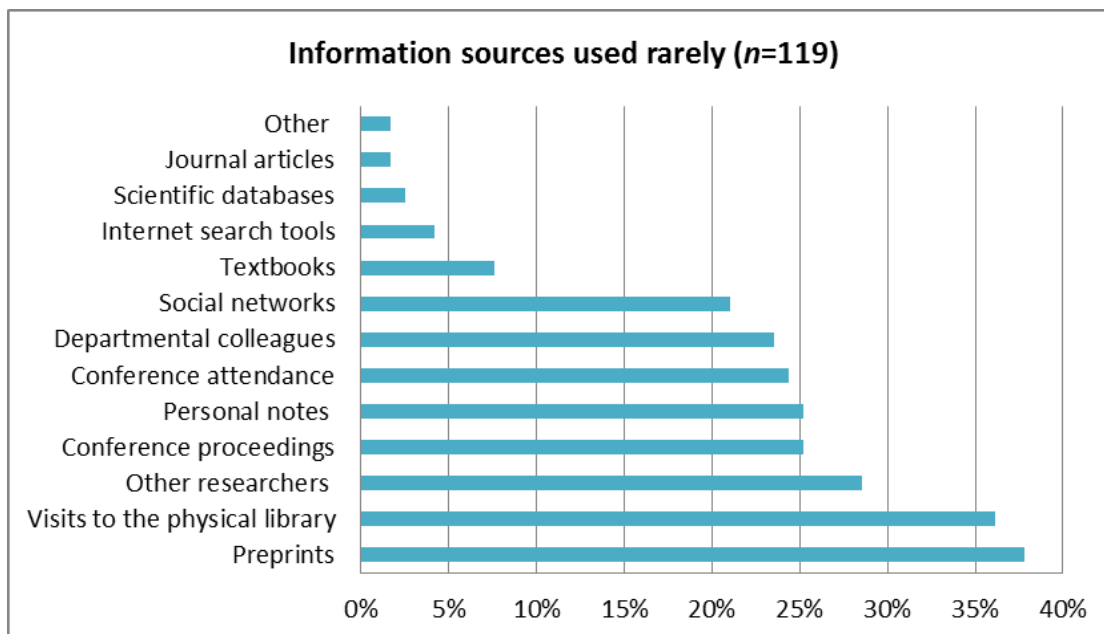
**Chart 6.13: Information sources used "occasionally" by researchers**

As can be seen in Chart 6.13, the information sources indicated as being used occasionally are as follows: textbooks (42/119; 35%), other researchers (35/119; 29%), visits to the physical library (34/119; 29%), conference proceedings (31/119; 26%), departmental colleagues (31/119; 26%), conference attendance (29/119; 24%), preprints (25/119; 21%), personal notes (23/119; 19%), social networks (22/119; 18%), internet search tools (16/119; 13%), scientific databases (13/119; 11%), journal articles (4/119; 3%) and other (0/119; 0%). "Other" was not specified.



**Chart 6.14: Information sources used “sometimes” by researchers**

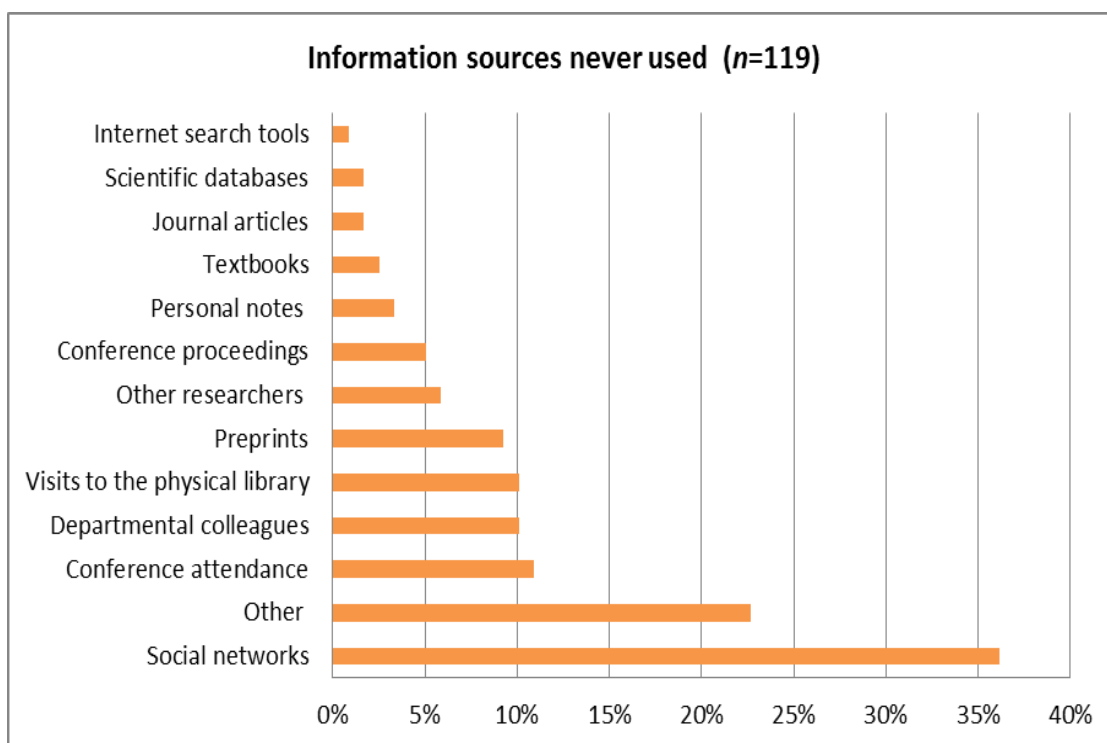
Chart 6.14 presents the data on information sources used sometimes. The following were indicated: conference proceedings (41/119; 34%), departmental colleagues (35/119; 29%), personal notes (34/119; 29%), conference attendance (33/119; 28%), other researchers (30/119; 25%), preprints (22/119; 18%), textbooks (17/119; 14%), visits to the physical library (17/119; 14%), social networks (13/119; 11%), journal articles (2/119; 2%), scientific databases (2/119; 2%), internet search tools (2/119; 2%) and other (not specified) information sources (1/119; 1%).



**Chart 6.15: Information sources “rarely” used by researchers**

Data collected on the information sources researchers indicated they rarely used are illustrated in Chart 6.15 and are as follows: preprints (45/119; 38%), visits to the physical library (43/119; 36%), other researchers (34/119; 29%), conference proceedings (30/119; 25%), personal notes (30/119; 25%), conference attendance (29/119; 24%), departmental colleagues (28/119; 24%), social networks (25/119; 21%), textbooks (9/119; 8%), internet search tools (5/119; 4%), scientific databases (3/119; 3%), journal articles (2/119; 2%), and others (2/119; 2%) (were not specified).

Respondents indicated the following as sources they never used to find information for research: social networks (43/119; 36%), other (27/119; 23%), conference attendance (13/119; 11%), departmental colleagues (12/119; 10%), visits to the physical library (12/119; 10%), preprints (11/119; 9%), other researchers (7/119; 6%), conference proceedings (6/119; 5%), personal notes (4/119; 3%), textbooks (3/119; 3%), journal articles (2/119; 2%), scientific databases (2/119; 2%) and internet search tools (1/119; 1%). These results are illustrated in Chart 6.16. “Other” was not specified.



**Chart 6.16: Information sources “never” used by researchers**

Table 6.8 provides a summary of the preferred information sources. This will be discussed in chapter 7.

Information sources always used by researchers	Information sources least used by researchers
<ul style="list-style-type: none"> <li>• Journal articles</li> <li>• Scientific databases</li> <li>• Internet search tools (e.g. Google)</li> </ul>	<ul style="list-style-type: none"> <li>• Social networks</li> <li>• Conference attendance</li> <li>• Departmental colleagues</li> </ul>

**Table 6.8: Summary of information sources used by researchers to find information for research**

### 6.2.3.2 Use of the library

The use of the library and other information resources was also investigated by the LibQUAL 2013 survey. The LibQUAL 2013 survey differentiated between academic staff and postgraduate students. Although the information represents the perspectives of academic staff and postgraduate students of all faculties of the University of Pretoria, it can add value to the data collected by this study on the use of the library by researchers at the Faculty of Veterinary Science and a few additional remarks from the LibQUAL survey will be added to findings presented in this section.

Respondents' use of the library is indicated in Chart 6.17. Results indicate that 17/119 (14%) of the respondents had never visited the Jotello F Soga Library in person, while 29/119 (24%) had never discussed their information needs with an information specialists. Regarding training, 48/119 (40%) respondents had never received one-to-one training from an information specialist and 68/119 (57%) of the respondents had never attended a scheduled library training session.

A large number (62/119; 52%) of the respondents indicated that they had visited the Jotello F Soga Library in person between one and five times during the previous year. Visits to the physical library were further indicated as follows: 24/119 (20%) respondents visited the library between six and 10 times, 4/119 (3%) visited the library between 11 and 20 times, 7/119 (6%) visited it between 21 and 30 times and 5/119 (4%) visited the physical library more than 30 times during the previous 12 months.

Information needs were discussed by 70/119 (59%) researchers with their information specialist between one and five times during the previous year, while 14/119 (12%) discussed their information needs between six and 10 times with their information specialist in the previous year. Only 2/119 (2%) discussed their information needs between 11 and 20

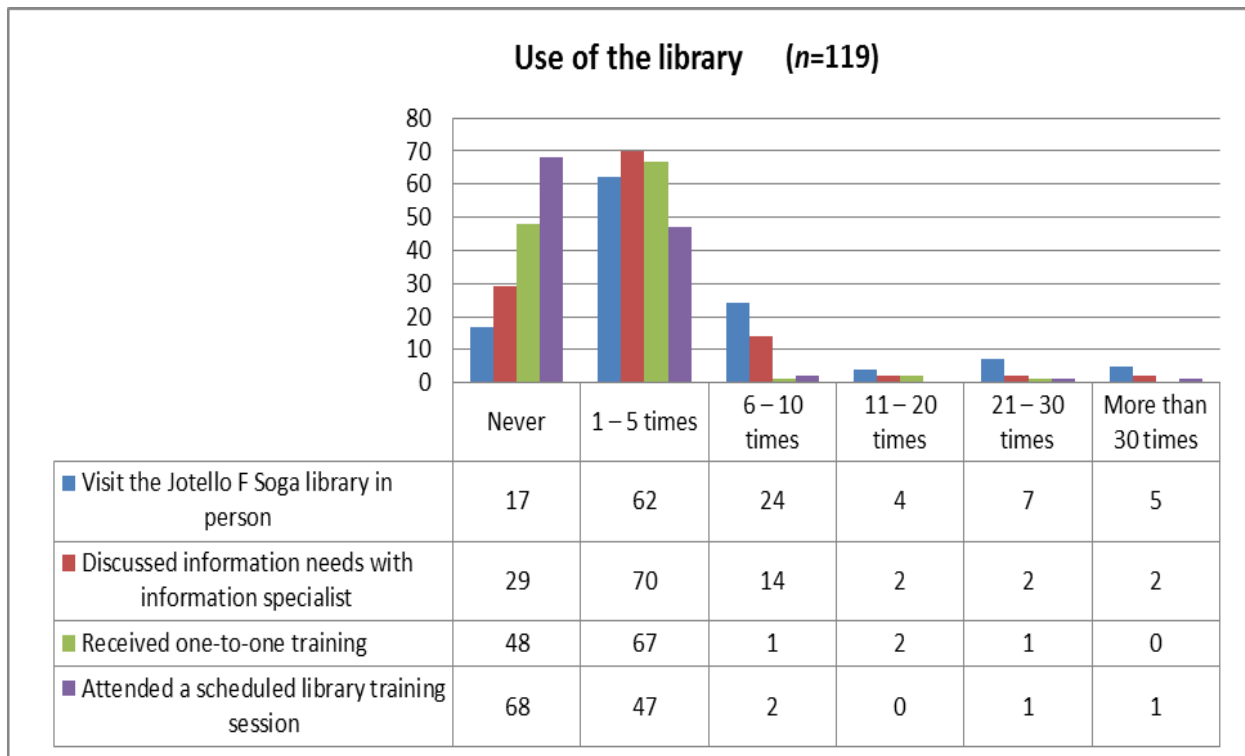


times, between 21 and 30 times and more than 30 times respectively over the previous 12 months with their information specialist.

Respondents indicated their involvement in one-to-one training over the previous year as follows: 67/119 (56%) received training between one and five times, 1/119 (1%) between six and 10 times, 2/119 (2%) between 11 and 20 times and 1/119 (1%) between 21 and 30 times. This was confirmed with the information specialist as to be training in “*RefWorks*”. No respondents received one-to-one training more than 30 times in the previous 12 months.

Scheduled library training sessions were attended as follows: 47/119 (39%) attended such sessions between one and five times in the previous 12 months, 2/119 (2%) attended them between six and 10 times, while 1/119 (1%) attended them between 21 and 30 times. There was indeed one senior lecturer (1/119; 1%) who had attended every scheduled library training session in the previous year, adding up to more than 30 times.

Findings from the LibQUAL survey found that 23 percent of postgraduate students at the University of Pretoria used resources in the library daily; 35 percent used resources in the library weekly; 23 percent used resources in the library monthly; 17 percent used resources in the library quarterly and only 3 percent indicated they never used resources in the library. When comparing the results of the postgraduate students of the university as a whole to the results of this study (only applicable to veterinary science students), the library is used less by veterinary science students. This differs from findings of studies by Chikonzo and Aina (2001), Ikpaahindi (1985) and Nweke (1995), who found that veterinary science researchers visited the library often. These studies are not recent and the impact of online information sources was not included. More recent studies on veterinary science researchers by Prakash (2013) and Shokeen and Kumar (2009) however indicate a preference for online information use.



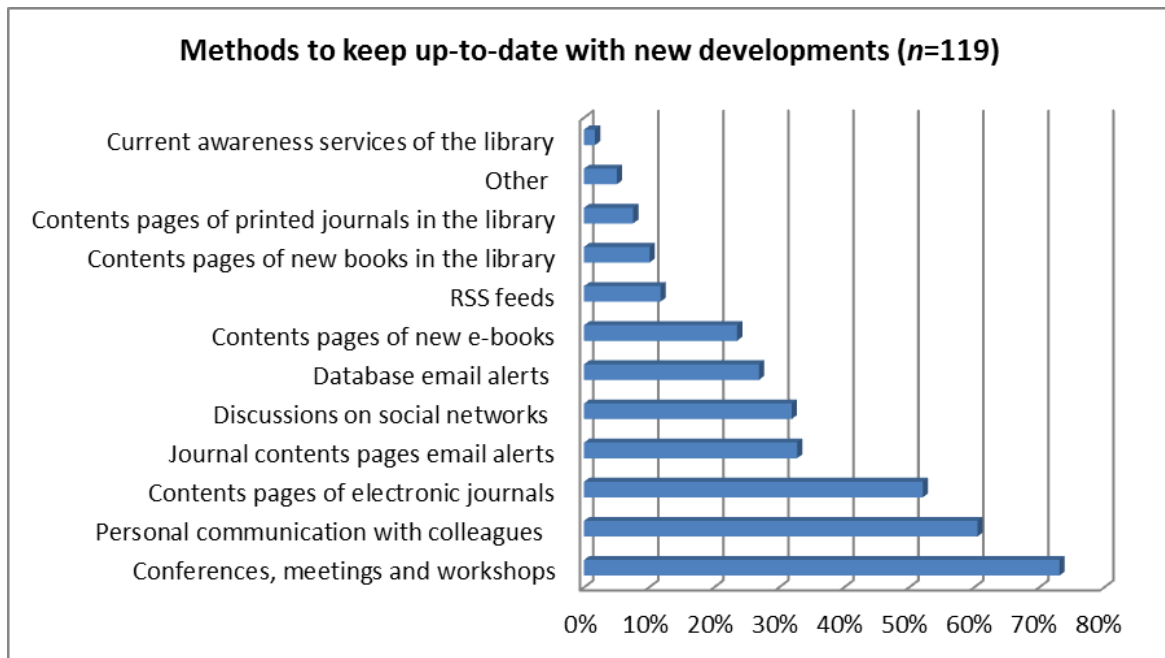
**Chart 6.17: Average use of the physical library during the past 12 months**

### 6.2.3.3 Methods to keep up to date with new developments

Chart 6.18 shows the graphic representation of the data collected on respondents' methods to keep up to date with new developments in their disciplines. As can be seen from this graph, most respondents (87/119; 73%) indicated attendance of conferences, meetings and workshops as the most important way to be updated on new developments. This was followed by personal communication from colleagues (72/119; 61%), browsing through contents pages of electronic journals (61/119; 52%), journal contents pages alerts, such as EBSCO's TOC Premier (database with table of contents information), where contents pages are mailed to subscribers (39/119; 33%) and discussions on social networks (38/119; 32%). Other options indicated by respondents were the contents pages of new e-books (28/119; 24%); RSS feeds (14/119; 12%), contents pages of new books in the library (12/119; 10%), and contents pages of printed journals in the library (9/119; 8%).

There were also 6/119 (5%) respondents who marked the option "other" in this question. Only one elaborated as follows: "*Librarian sends journal indexes of journals relevant to me.*"

The option indicated by fewest respondents is subscriptions to current awareness services provided by the Jotello F Soga Library. Only 2/119 (2%) respondents marked this option as a way to keep up to date with new developments in the field.



**Chart 6.18: Methods to keep up to date with new developments in the field**

#### 6.2.3.4 Criteria used when selecting appropriate publication outlets for research

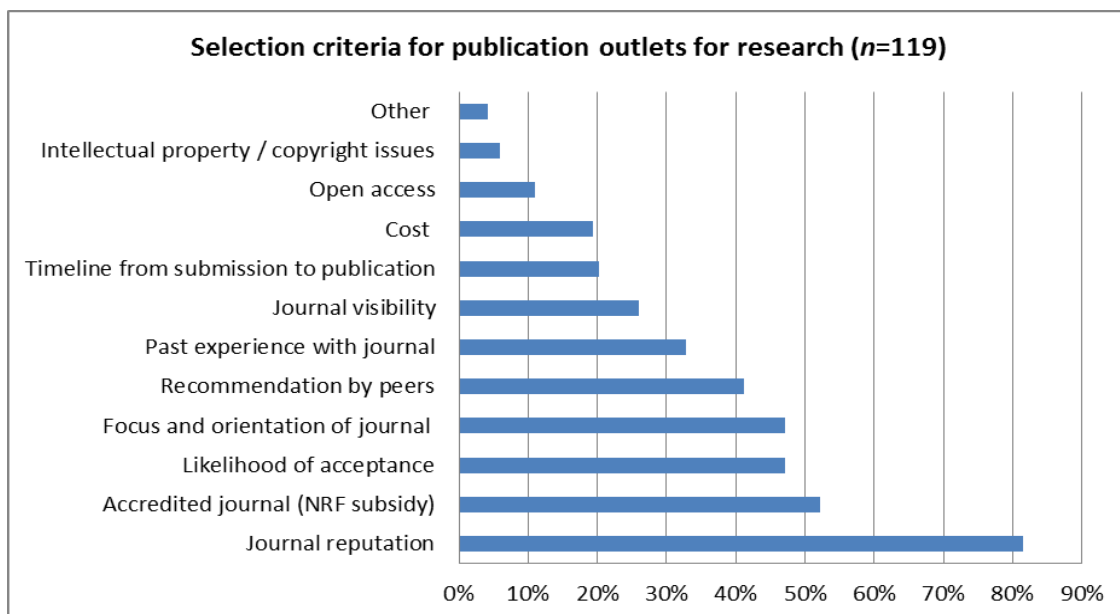
The South African research environment was discussed in detail in Chapter 2. It explained how the South African government implemented a number of initiatives (such as increased research funding, performance monitoring and compensation for research output and publications) to encourage research and knowledge production. In conjunction with these goals and to develop the research profile and international stature of the University of Pretoria, researchers at the University of Pretoria are also encouraged to increase their research output and publish in accredited journals with high impact factors.

The focus of the next part of the study is on researchers' information presentation and communication. Data were collected on how and where researchers prefer to present and communicate their research. In addition to a question on the criteria used when selecting an appropriate publication outlet for research in the questionnaire to researchers, a simplified citation analysis was done. The question of whether the initiatives of the South African government have an effect on the number of articles published and the journals selected for their research output (or not) is addressed when discussing the results of the citation analysis. Data on the first question will be discussed in the following section, while the results of the citation analysis are treated in section 6.2.3.5.

To find out what the principles are on which veterinary science researchers base their decisions when selecting a journal in which to publish, respondents were asked to indicate the most important criteria used when selecting an appropriate publication outlet for their

research. They were provided with a list of options and asked to mark all relevant selection criteria. Data on this are presented in Chart 6.19.

Most respondents (97/119; 82%) indicated the journal's reputation (including the impact factor, credibility and prestige of the journal) as the main criterion, followed by the option that the journal is accredited (62/119; 52%). The focus and orientation of the journal and the likelihood of the manuscript being accepted both received 56/119 (47%) of the responses, followed by recommendation by peers (49/119; 41%), past experience with the specific journal (39/119; 33%), journal visibility (31/119; 26%), timeline from submission to publication (24/119; 20%), cost (23/119; 19%), open access (12/119; 11%) and intellectual property or copyright issues (7/119; 6%). Only 5/119 (4%) respondents marked the option "other", which all described as "recommendation by supervisor".



**Chart 6.19: Criteria for selecting appropriate publication outlets for research**

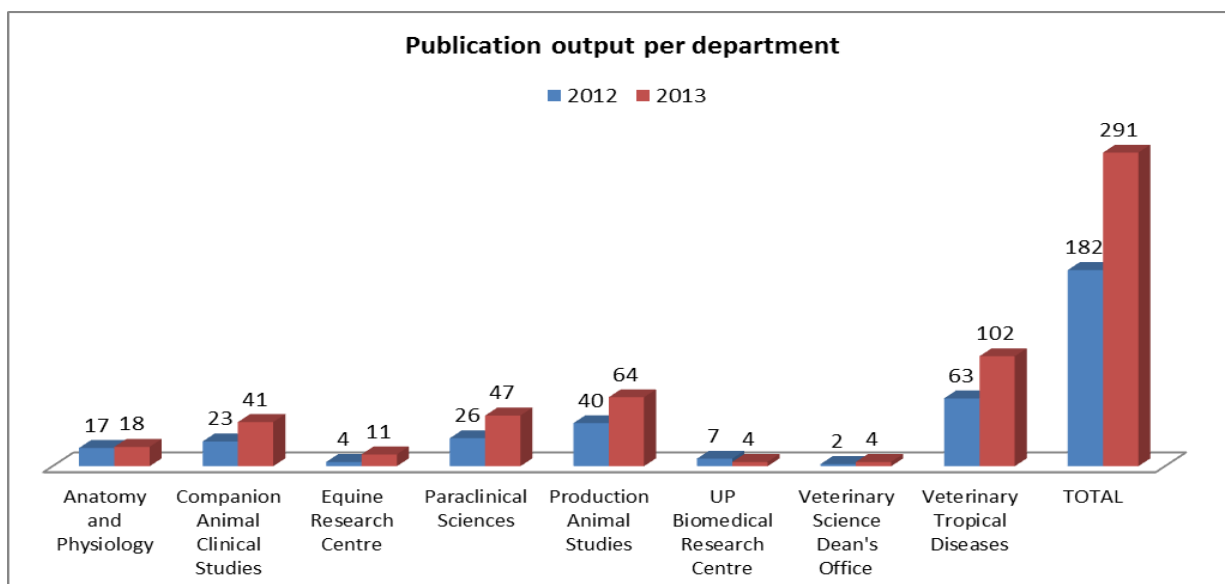
#### 6.2.3.5 Citation analysis of research output

The previous section presented data on the criteria researchers use to select journals to publish their research. The aim of the citation analysis (that will be discussed in the following section) was to evaluate the actual journals in which researchers published according to the criteria mentioned in section 6.2.3.4.

Findings from the citation analysis provided more insight into the influence of the context of the research environment (as discussed in Chapter 2) on the publication behaviour of researchers. It investigated whether there had been an increase in publication quantity as well as publication quality over the period of the study. It also investigated whether any attempts were made to improve international visibility (publication in international journals).

Lists of the research output of the Faculty of Veterinary Science, University of Pretoria for 2012 and 2013 were obtained from the university's Department of Research and Innovation. These lists were already in Excel format (and therefore easy to analyse). The lists of articles were then organised (according to faculty departments), analysed and sorted.

Information obtained through this process was first used to calculate the number of publications in each department and to determine whether there had been an increase in publication output from 2012 to 2013. All publications were on the Thomson Reuters (ISI) Web of Science indexed journal list or the DoHET lists of accredited journals (to be considered for incentives). These results are presented in Chart 6.22. This chart illustrates that all departments, except for the UP Biomed Research Centre (which decreased from seven to four publications, - 43%) produced more research publications in 2013. The output of Anatomy and Physiology increased from 17 to 18 (6% increase), Companion Animal Clinical Studies from 23 to 41 (78% increase), the Equine Research Centre from four to 11 (175% increase), Paraclinical Sciences from 26 to 47 (81% increase), Production Animal studies from 40 to 64 (60% increase), the dean's office from two to four (100% increase) and Veterinary Tropical Diseases from 63 to 102 (62% increase). The Faculty of Veterinary Science's overall research output increased from 182 publications in 2012 to 291 in 2013 (60% increase). This study indicates that the Faculty of Veterinary Science, University of Pretoria increased the quantity of research output.



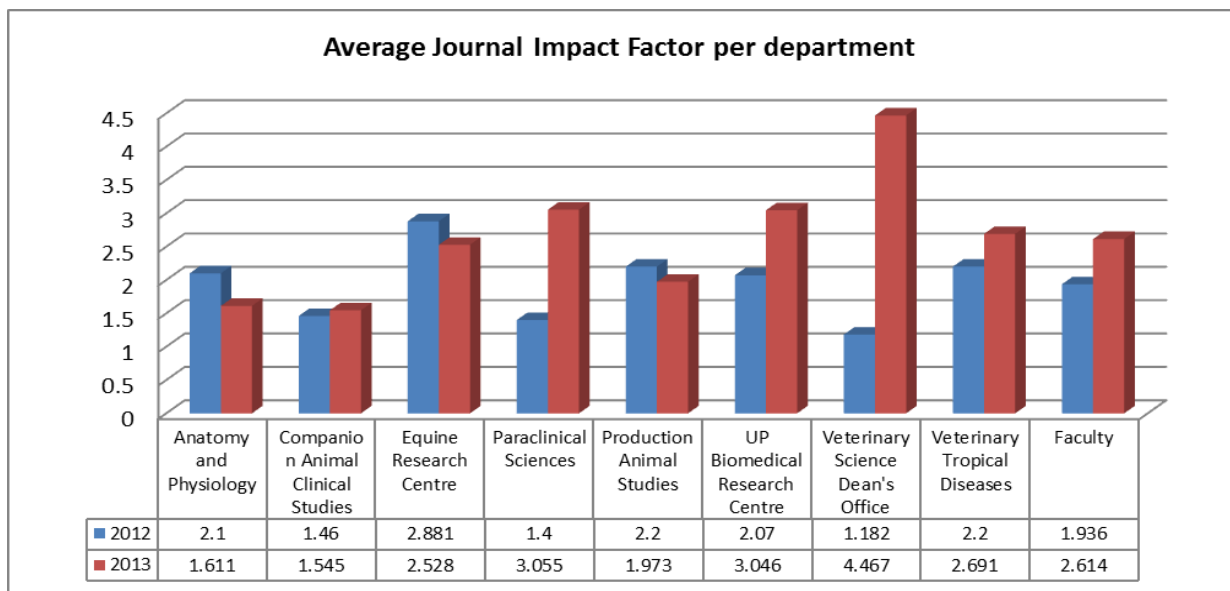
**Chart 6.20: Publication output per department (comparison between 2012 and 2013)**

To investigate the quality of publication outlet, it is necessary to analyse the impact factors of the selected journals. Journal impact factors were obtained from JCR on ISI Web of Knowledge (<http://thomsonreuters.com/journal-citation-reports/>) for each journal. These were

also calculated for each department of the Faculty of Veterinary Science and the averages are displayed in Chart 6.21.

Except for the following departments: Anatomy and Physiology, whose average journal impact factor declined from 2.1 in 2012 to 1.611 in 2013 (-23%), the Equine Research Centre (with an average of 2.881 in 2012 and 2.528 in 2013; -12%) and Production Animal Studies, with an average impact factor of 2.2 in 2012 and only 1.973 in 2013 (-10%), all other departments showed an improvement in the average journal impact factor in 2013.

The Department of Companion Animal Clinical Studies improved its average impact factor by 6% (from 1.46 in 2012 to 1.545 in 2013). Paraclinical Sciences had an average impact factor of 1.4 for their publications in 2012, but improved by 118% with an average of 3.055 in 2013. The average journal impact factor for the UP Biomedical Research Centre was 2.07 in 2012 and 3.046 in 2013 (47% improvement). The Veterinary Science dean's office improved its average journal impact factor by 278%, with its 2012 average of 1.182 improving to 4.467 in 2013. The Department of Veterinary Tropical Diseases improved from an average of 2.2 in 2012 to 2.691 in 2013 (22%). The average impact factor of publication outlets of the Faculty of Veterinary Science improved from 1.936 in 2012 to 2.614 in 2013 (35%). This study indicates that the Faculty of Veterinary Science, University of Pretoria increased the quality of research output.



**Chart 6.21: Average journal impact factor per department (comparison between 2012 and 2013)**

The journals in which researchers published during 2012 and 2013 were investigated further. This provided more insight into publication in high-quality (impact factors) as well as internationally visible journals. Table 6.9 shows that the journals in which the largest number

of researchers published during 2012 were *Veterinary Parasitology* and the *Journal of the South African Veterinary Association*, followed by the *Onderstepoort Journal of Veterinary Research*. The top ten journals in which these researchers published during 2013 are displayed in Table 6.10. As indicated in this table, the three with most publications are the *Journal of the South African Veterinary Association*, *Transboundary and Emerging Diseases* and *Plos One*.

Journal title	Number of articles	Journal impact factor
<b>Veterinary Parasitology</b>	16	2.381
<b>Journal of the South African Veterinary Association</b>	16	0.273
<b>Onderstepoort Journal of Veterinary Research</b>	13	0.545
<b>PLoS One</b>	8	3.73
<b>Parasites and Vectors</b>	6	3.246
<b>Theriogenology</b>	5	2.082
<b>BMC Veterinary Research</b>	5	1.86
<b>Medical and Veterinary Entomology</b>	4	2.208
<b>Equine Veterinary Journal</b>	4	2.286

**Table 6.9: Top ten journals in which researchers published during 2012**

Journal title	Number of articles	Journal impact factor
<b>Journal of the South African Veterinary Association</b>	24	0.273
<b>Transboundary and Emerging Diseases</b>	12	2.096
<b>Plos One</b>	10	3.73
<b>BMC Veterinary Research</b>	8	1.861
<b>Onderstepoort Journal of Veterinary Research</b>	8	0.545
<b>Equine Veterinary Journal</b>	7	2.286
<b>Experimental and Applied Acarology</b>	6	1.847
<b>Journal of Zoo and Wildlife Medicine</b>	6	0.427
<b>Veterinary Journal</b>	6	2.424
<b>Veterinary Parasitology</b>	6	2.381

**Table 6.10: Top ten journals in which researchers published during 2013**

The University of Pretoria supports free open access to global research output and free access to its own research output is therefore also a priority. The University of Pretoria was the first academic institution in South Africa to adopt a mandatory policy for the submission

of research articles to the institutional repository (UPSpace) in 2009 (<http://www.library.up.ac.za/openup/policies.htm>).

Although no specific evidence exists, some authors, including Gross, Chan and Fetherston (2013), suggest that open access journals have various advantages for researchers, including higher quantity and quality publications, greater international impact and more submissions.

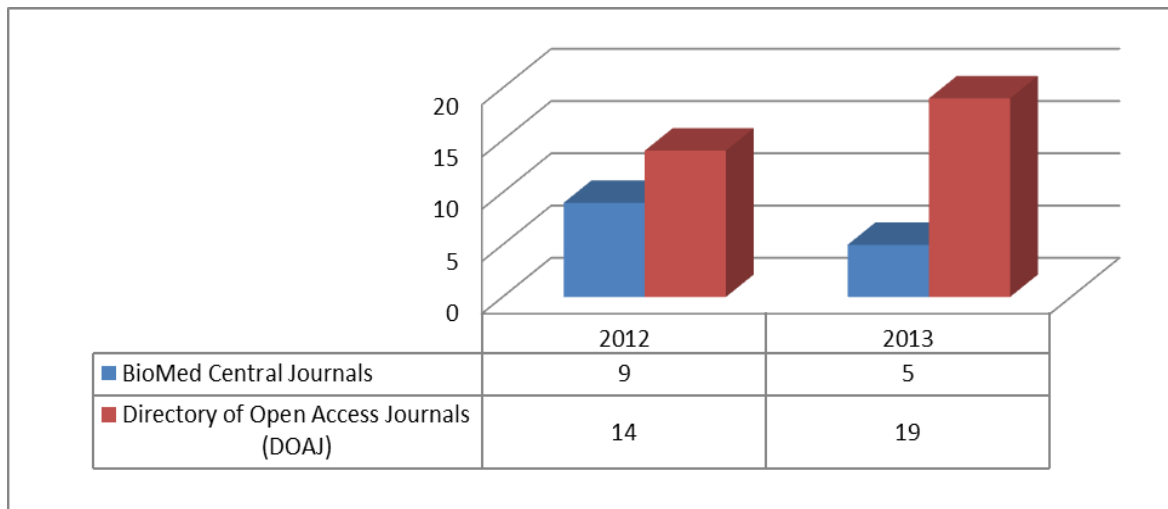
Researchers are encouraged to consider publishing in open access journals. The University of Pretoria has set up a prepaid membership with BioMed Central, which allows researchers to publish in BioMed Central, Chemistry Central and SpringerOpen journals, published on the ISI Web of Science or the International Bibliography of the Social Sciences lists without any charge. Payment of article processing charges is thus covered by the University of Pretoria's prepaid membership (<http://www.biomedcentral.com/>).

The University of Pretoria Library Services drives the open access initiatives and information specialists play a crucial role in the promotion and advocacy of open access publishing. To investigate whether researchers consider the open access initiatives of the university when choosing publication outlets for their research, the open access journals in which the Faculty of Veterinary Science' researchers published during 2012 and 2013 were counted. The 2012 and 2013 lists of journal titles were checked against the list of BMC Open Access titles (<http://www.biomedcentral.com/journals>) and the Directory of Open Access Journals (DOAJ) (<http://doaj.org/>). DOAJ is an online directory that indexes and provides access to quality open access, peer-reviewed journals. Open access was also one of the options in the question on the selection criteria for publication outlets in the questionnaire for researchers, presented in section 6.2.3.4.

Chart 6.22 points out that publication in BioMed Central journals decreased from nine in 2012 to five in 2013. There was however an increase between 2012 and 2013 in publications in journals appearing on the DOAJ lists (from 14 to 19).

Researchers were asked in the questionnaire to indicate the criteria used when selecting an appropriate publication outlet for research (chart 6.21). One of the criteria was "open access". Of the 119 respondents, only 12 (11%) indicated this as a factor influencing their choice of journal in which to publish.





**Chart 6.22: Publications in accredited open access journals (2012 / 2013)**

The following section will turn the focus on data collected from the information specialists.

### 6.3 DATA COLLECTED FROM THE INFORMATION SPECIALISTS

The main purpose of the data collected from the information specialists, which are discussed in the following section, was to answer the following question: “What research and information support services and products are currently offered by the Jotello F Soga Library?”

Questionnaires and a focus group interview were the data collection methods used to gather information from the information specialists. As there is only one Faculty of Veterinary Science in South Africa, and there are only three information specialists in the library dedicated to serving the information needs of the researchers of this faculty, the population group was very small. All three participated.

Although this sample size may be perceived as very small, Daniel (2011:237) suggests that in exploratory studies where the researcher does not attempt “to make conclusive analyses”, a small sample size may be acceptable. Other considerations he mentions to justify a small sample size are a small population, a homogeneous population and the availability of resources. These considerations are all applicable to this study. As the focus of this study is on the information needs of the researchers, data collected from the information specialists are indeed very important, but also serve as supplementary information to form a better understanding of the information needs of researchers.

The next section will discuss the data collected from the three information specialists. Each information specialist completed a printed questionnaire. All of them also participated in the

focus group interview. The results of the questionnaire and focus group interview are presented in the following section.

### **6.3.1 Involvement in research**

Darch and de Jager (2014:146) suggest that by actively engaging in research and the research process, librarians will have a better understanding of the information and research support needs of faculty researchers and postgraduate students and eventually act “more sympathetic towards the researchers in what they experience, the support they need, and the continued guidance necessary”. In a study on the factors contributing to the large number of publications produced by Penn State librarians, Fennewald (2008:107) found that “engagement in research strengthens and improves library services”.

The aim of the first part of the questionnaire for the information specialists was to determine to what extent information specialists were involved in their own research projects and their own postgraduate studies. The results are presented below.

#### *6.3.1.1 Involvement in research projects*

None of the respondents indicated any involvement in research projects (not linked to research for formal studies) or involvement in postgraduate studies.

#### *6.3.1.2 Publication output of information specialists*

Increasingly, pressure is placed on librarians to become actively involved in scholarly publication – not only as providers of information, but also as creators of knowledge (Sugimoto *et al.* 2014). According to Connaway and Powell (2005:9), one of the main benefits of librarians doing their own research and publishing it is “greater understanding of the needs of researchers”. They also remark that “... the librarian’s status is likely to benefit from being knowledgeable about the researchers’ techniques and from being able to discuss them intelligently with his or her clientele” (Connaway & Powell 2005:9).

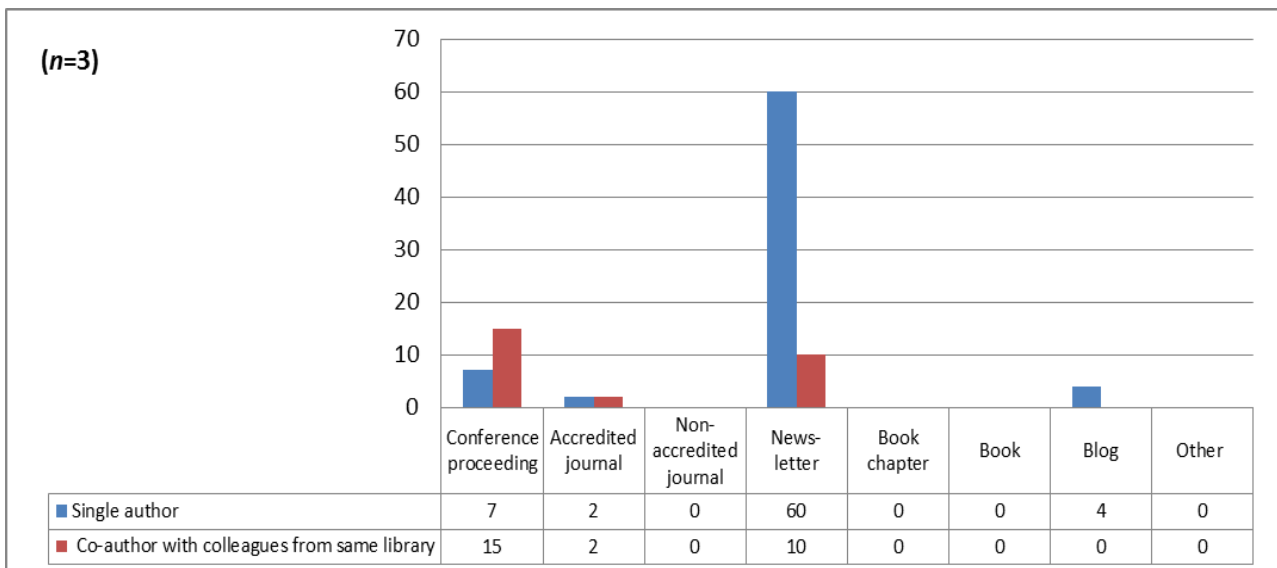
Chart 6.23 illustrates the main publication output of information specialists at the Jotello F Soga Library and their collaboration trends for these publications. As can be seen in this chart, the publication output of information specialists is very low (except for publications in newsletters).

The information specialists indicated they had produced 100 publications. Only four articles (4%) indicated in response to this question were scientific and were published in accredited journals (two as single authors and two in collaboration with other library colleagues). The rest of the publications were articles in newsletters. Respondents also indicated involvement

in conference proceedings (22/100; 22%), of which 15/100 (15%) were co-authored with library colleagues and 7/100 (7%) single-authored. Four single-author blogs (which involve the information specialists as the creators and owners of the specific blog, not only blog postings) were also indicated as part of the publication output of this library. None of the respondents indicated involvement in any publications in non-accredited journals, book chapters, books or any other form of publication. There were no indications either of involvement in other forms of collaboration (apart from collaboration with other colleagues from the Jotello F Soga Library).

The Jotello F Soga Library has its own newsletter called *Infomania* (<http://www.library.up.ac.za/vet/infomania.htm>) and the information specialists are mainly responsible for writing articles for this publication. The main purpose of this newsletter, which is issued twice a year, is to share information and to market the services and products of the Jotello F Soga Library to faculty staff and students. Although it is an electronic newsletter, a few copies are printed and distributed to each department, as well as other strategic areas on campus. Of the 100 publications mentioned by the information specialists, 70 (70%) were in this newsletter. Most of these articles were single-authored (60/100; 60%), with 10/100 (10%) being co-authored with library colleagues.

From time to time, the information specialists also write articles for the *OPNEWS*, which is the biannual newsletter of the Faculty of Veterinary Science.



**Chart 6.23: Publication output of information specialists at the Jotello F Soga Library indicating publication and collaboration trends**

Although the information specialists are involved with publishing, the aim of their publishing efforts is rather the provision of information and training of users; it does not involve academic research output and communication. Their experience of the academic publishing environment is thus different from the environment in which the researchers are involved.

### 6.3.2 Current information support services to researchers

The aim of data collected and presented in the following section was to determine which research and information support services and products were offered by the Jotello F Soga Library at the time of the research. Both the questionnaire and focus group interview were used as data collection methods for addressing the different aspects of this sub-question.

#### 6.3.2.1 Departments or research centres served

Information specialists are assigned to specific departments to look after their information needs. All faculty departments and research centres are distributed among the three information specialists. Table 6.11 indicates the distribution of the faculty departments among the information specialists. The purpose of this question in the questionnaire was only to provide background information or a better understanding of the involvement of each information specialist in faculty departments.

Information specialist 1	Information specialist 2	Information specialist 3
Companion Animal Clinical Studies Anatomy and Physiology Equine Research Centre	Veterinary Tropical Diseases Paraclinical Studies, UP Biomedical Research Centre	Production Animal Studies Centre for Wildlife Studies

**Table 6.11: Distribution of faculty departments among information specialists**

#### 6.3.2.2 Current information support services provided to researchers

During the focus group interview, the three participating information specialists reported a list of services they provided to the veterinary science researchers at the faculty (please note that this list is exactly as they provided it; phrases were not edited by the researcher). These services were organised according to themes and are presented in Table 6.12.

<b>Information searching (discovery)</b>	<ul style="list-style-type: none"> <li>•Doing literature searches</li> <li>•Providing alerting services</li> </ul>
<b>Information use (resources)</b>	<ul style="list-style-type: none"> <li>•Collection development and management</li> <li>•Development and management of digital and institutional repositories</li> <li>•Creation of subject portals and web products</li> <li>•Document delivery</li> </ul>
<b>Information regarding research and methodology</b>	<ul style="list-style-type: none"> <li>•Advising on research methodology</li> <li>•Advising on research publication</li> <li>•Compiling bibliometric information reports</li> <li>•Providing advice on copyright, plagiarism and referencing</li> <li>•Providing support and advice on reference management tools</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>•Providing information literacy training</li> <li>•Marketing and outreach services</li> </ul>

**Table 6.12: Information support services provided to researchers**

### 6.3.2.3 Time spent on research support services to faculty

Respondents were asked to give the estimated time they spent on the different research support services. The purpose of this question was to evaluate information specialists' time and effort devoted to certain tasks and to investigate the importance of these tasks in addressing the information needs of researchers. The results of this question are presented in Table 6.13. As indicated in this table, most respondents spent most of their time on information seeking and literature searches for researchers (two respondents indicated an average of 31 – 40% of their time was spent on this), followed by advising on selecting appropriate databases and searching databases for information. The third most time-consuming service is the creation of research support products such as training material and tutorials, subject portals, guidelines to access relevant products and compilations of relevant resources for research.

Time spent on research support services at the faculty:		0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
Collection building and management			1	1	1							
Advice / training on selecting and searching electronic and print databases			1	1		1						
Advice / training on general information / research skills			1	1	1							
Advice / support on reference management tools and techniques			1	2								
Assistance in impact factors and other bibliometric information			2	1								
Document delivery / ILL services to researchers			2	1								
Digitisation and preservation of research output			1	2								
Information seeking and literature searches for researchers			1			2						
Advising on copyright / intellectual property right issues			1	1	1							
Providing IT support			1	1	1							
Facilitating e-learning			1	2								
Creating research support products			1	1		1						
Marketing (newsletters, webpages, blogs, etc.)			1		2							
Other												

**Table 6.13: Estimated time information specialists spend on support services to researchers**

#### 6.3.2.4 Perceptions of the information needs of researchers and postgraduate students

Information specialists were asked in an open-ended question in the questionnaire what they thought the information needs of researchers and postgraduate students were. This question was also discussed in the focus group interview. Response data on this were then organised in a simplified document on Excel. After several rounds of analysis and interpretation, the data were categorised into four main headings: information searching (discovery); information use (resources); information on research and methodology and other. The thematic analysis process was described in section 5.7 of this study (Leedy & Ormrod 2014; Struwig & Stead 2007). A summary of the results is presented in Table 6.14.

Although the literature indicates access to information as being the most important information need for researchers (Case 2008; Munde & Marks 2009; Mullins 2012; Schonfeld & Housewright 2010), information specialists are also aware of needs regarding research and research output (Allan 2010; Johnson 2011; Neal 2009).

Information searching (discovery)	Information use (resources)	Information on research and methodology	Other
Knowledge about tools to search for information	Access to resources (local collection; e-collections; interlibrary loans and document delivery)	Information on research methods	Library as a place to study or research
Database and literature searches	Knowledge about resources (“to know which sources to access to obtain the latest or relevant information”)	Guidelines for presenting and communicating research (help with referencing; proposal or article writing)	Knowledge to use computer programmes and research support software (such as software for statistics)
	Knowledge on the use of resources	Information on where to publish (accredited journals; impact factor; open access)	
		Assistance in writing grant proposals or applications for funding	

**Table 6.14: Information specialists’ perceptions of the information needs of researchers and postgraduate students**

#### 6.3.2.5 Information needs that information specialists cannot address

During the focus group interview respondents were asked if they were aware of information needs of researchers they could not address.

Most of the needs that could not be addressed were more specific to the research itself, and not related to traditional library work as such. One respondent remarked that it is “*typical information that supervisors should assist with (e.g. funding applications and writing proposals).*” Apart from providing efficient literature, it is difficult to assist postgraduate students with decisions on issues such as research topics and research methodologies, the writing of grant proposals or applications for funding.

One respondent also mentioned in the focus group interview that she had experienced a significant increase in the need raised by researchers and postgraduate students for help and support with more complicated IT problems, as well as assistance with the use of different software (e.g. statistical analysis programmes).

Another issue raised by an information specialist in the focus group interview was insufficient knowledge to guide researchers where to publish and how to select the most appropriate research outlets. She mentioned that she was aware of tools, such as Thomson Reuters’ Journal Citation Index (JCI) on the ISI Web of Knowledge platform,

(<http://thomsonreuters.com/journal-citation-reports/>), which assist with decisions regarding accredited journals and impact factors (and other bibliometric information), but it was difficult to guide researchers and postgraduate students with more discipline-specific journal information (for example the target audience). Because of pressure to publish in high-impact, internationally visible journals, researchers need more guidance in selecting appropriate journals for research publication. Basic knowledge of the core journals in the different subject areas is recommended.

All information specialists mentioned that they lacked knowledge of new formats of presenting theses or dissertations (e.g. a manuscript format option referring to a thesis or dissertation that is made up of several scholarly manuscripts or journal articles addressing a common theme and with each article constituting a separate chapter) in order to assist researchers with advice in this regard.

#### 6.3.2.6 Skills and professional development initiatives

Information specialists were asked in the questionnaire to list recently attended workshops or training courses that helped to develop their skills to provide support to researchers. The purpose of this question was to investigate initiatives that are available and attended by information specialists to acquire new knowledge, skills and competencies to improve their support to researchers. The skills and professional development initiatives were listed and grouped into themes and these are presented in Table 6.15.

Product-related training (marketing)	Professional development (continuing education)	Development of research and methodology skills	Other
Thomson Reuters Research workshop (on bibliometric information and citation analysis)	Collection development workshop	Bibliometrics workshop/course	South African Online Users Group workshop: "Technology planning in a hyperlinked world"
University of Pretoria Library Service Database training day		The Southern African Research and Innovation Management Association research librarians' workshop	Tablets and mobile applications
ISI Webometrics training		Carnegie Research Libraries USA Internship	
ClickUP (virtual learning environment and course management system)			

**Table 6.15: Recent professional development initiatives of information specialists**



Although some of the skills and development initiatives mentioned by the information specialists were in line with trends mentioned in the literature on the future role of information specialists (Fourie 2004; Mullins 2012; Neal 2009; Pinfield 2001), not all needs for professional development in order to allow the information specialists to address the information needs of researchers more efficiently were included.

## **6.4 ROLE AND FUTURE OF THE INFORMATION SPECIALIST**

The focus of this section is mainly on investigating if the information support provided by information specialists is in line with the information needs of researchers and postgraduate students. Section 6.2 dealt with information use, but addressed this issue only from the perspective of the researchers. Section 6.3 presented data given by the information specialists on their input and services to researchers' information needs.

The data presented in this section focus on the current and future role of the information specialist and were collected from both researchers and information specialists. Data collection was by means of questionnaires and focus group interviews (with researchers and information specialists respectively).

The purpose of presenting these data in a separate section is mainly to compare the different perspectives and opinions of researchers with those of information specialists in order to identify gaps, opportunities and challenges in information support services.

This follows on the issue of "awareness of information" proposed in the model by Leckie, Pettigrew and Sylvain (1996). Findings on this may indicate reasons why the information specialists are used (or not used) as a source of information.

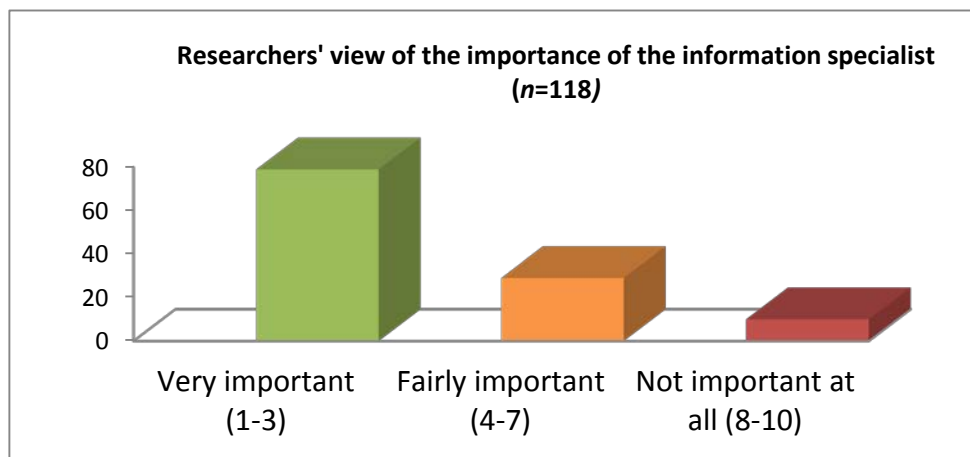
### **6.4.1 Personal acquaintance with information specialist**

Information specialists are assigned to specific departments to look after their information needs. Researchers and postgraduate students of all faculty departments and research centres are distributed among the three information specialists. Researchers and postgraduate students in the faculty thus have access to an information specialist who supports their information needs (as discussed in 6.3.2.1 and Table 6.11). Researchers were asked in the questionnaire if they had met their information specialist yet. Of the 119 respondents, 115 (97%) answered "yes" and four (3%) answered "no". The significance of this question was mainly to investigate researchers' awareness of the information specialists.

### 6.4.2 Importance of the information specialist

To learn more about the importance of the role of the information specialists, according to themselves as well as the researchers, both groups were asked in the questionnaires to rate the importance on a ten-point scale (where one indicated “very important” and ten indicated “not important at all”). This question was answered by 118 respondents and all three information specialists. The results indicated that both information specialists and researchers viewed the role of the information specialist in research support as relatively important. Responses from researchers were as follows: 31/118 (26%) indicated the information specialists’ role as very important (rated it as “1”); followed by 30/118 (25%) who rated it as “2”; 18/118 (15%) rated it as “3”; 11/118 (9%) rated it as “4”; 12/118 (10%) rated it as “5”; 6/118 (5%) rated it as “7”; 7/118 (6%) rated it as “8”; 2/118 (2%) rated it as “9” and only 1/118 (1%) rated it as “10” (which means that the information specialist is not viewed as important at all). A summary of these results is presented in Chart 6.24.

The same question was asked of the three information specialists in the survey they needed to complete. Two of the three respondents (67%) rated the importance of the information specialist in research support as “1” and 1/3 (33%) rated it as “3”. All information specialists thus viewed their role as very important.



**Chart 6.24: Views of researchers on the importance of the information specialist**

All three information specialists viewed their role as important, but although most researchers viewed the role of the information specialists as important, there were also a number of researchers for whom the role of the information specialists was only fairly important or not important at all. The model by Leckie, Pettigrew and Sylvain (1996) suggests variables such as familiarity, trustworthiness, timeliness, quality and accessibility of an information source as important to be selected when information is sought. They mention the importance of awareness of the information source. A large number view the information

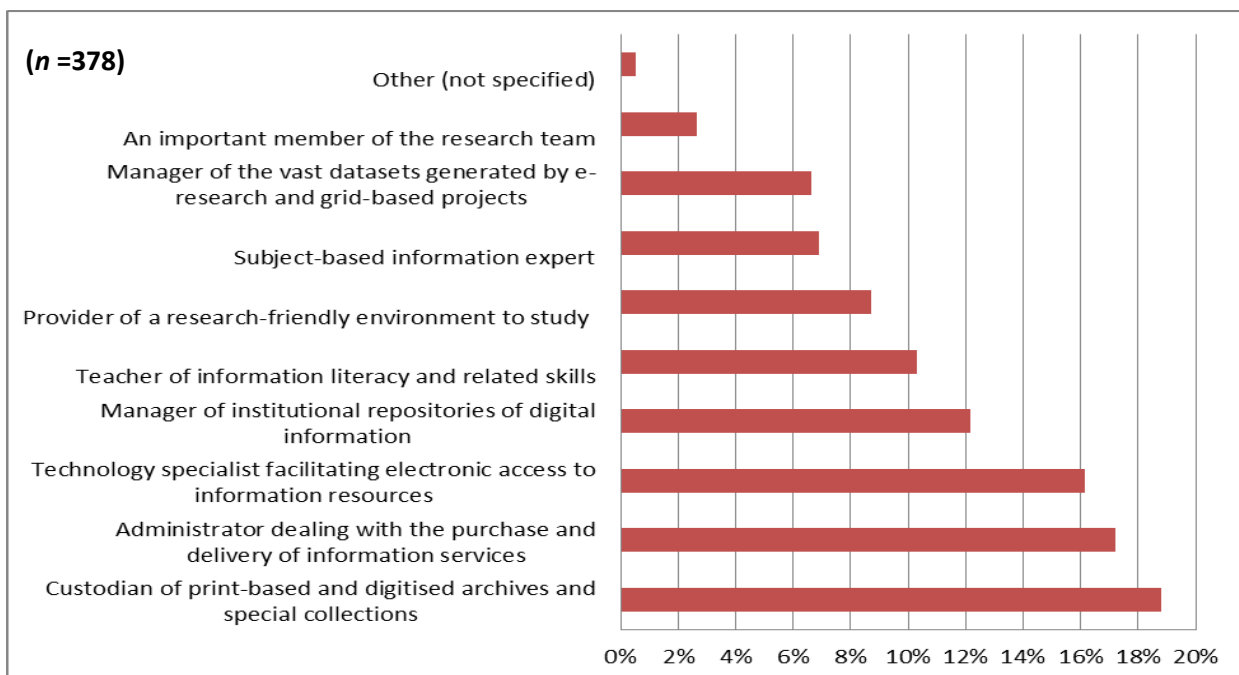
specialist as important, but do not use the information specialist as a source of information. This may indicate lack of awareness of the expertise and skills in information support the information specialist can offer researchers.

### 6.4.3 Roles of the information specialist

The survey of researchers, as well as the one of information specialists, asked respondents to indicate the three most important roles of the information specialists.

In total 378 replies (marked options) were received to this question from the 119 respondents completing the questionnaire for researchers. Chart 6.25 presents these data. As can be seen on this chart, researchers view the following roles of information specialists as most important to support their information needs: custodian of print-based and digitised archives (71/378; 19%); administrator for purchasing (and subscribing to) information services (65/378; 17%); and technology specialist facilitating electronic access (61/378; 16%).

Other roles of information specialists, according to researchers, are manager of institutional repositories (46/378; 12%), teacher of information literacy skills (39/378; 10%), provider of a research-friendly environment to study (33/378; 9%), subject-based information expert (26/378; 7%), manager of datasets for e-research (25/378; 7%), important member of the research team (10/378; 3%) and other roles (these were not specified) (2/378; 1%).



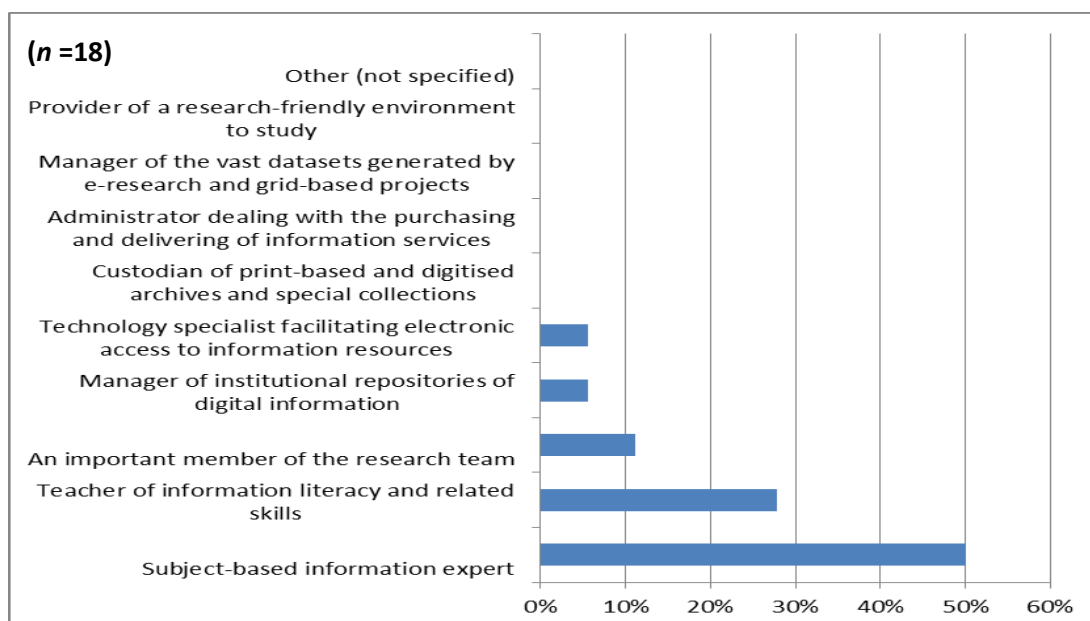
**Chart 6.25: Most important roles of the information specialist (according to researchers)**

Information specialists also provided their responses to the question on which of their roles they viewed as most important for supporting the information needs of researchers. They however ranked their views from 1 to 3, where 1 indicated the option they viewed as the first (most) important role followed, by 2 for the second most important and 3 for the third important role. To analyse the response, 3 points were awarded for a 1; 2 points for a 2 and 1 point for a 3. This resulted in a total value of 18 ( $n=18$ ) for this question. Their feedback is presented in Chart 6.26.

Although the opinion of only three information specialists is a very limited base from which to make significant conclusions, it indicates the need for academic librarians to compare their perceptions to those of their users in order to identify gaps in their service.

All respondents rated the role of “a subject-based information expert” as the most important role of the information specialist, followed by the role of a “teacher of information literacy and related skills” and “an important member of the research team”. They also viewed the roles of “manager of institutional repositories” and “technology specialists facilitating electronic access” as relatively important.

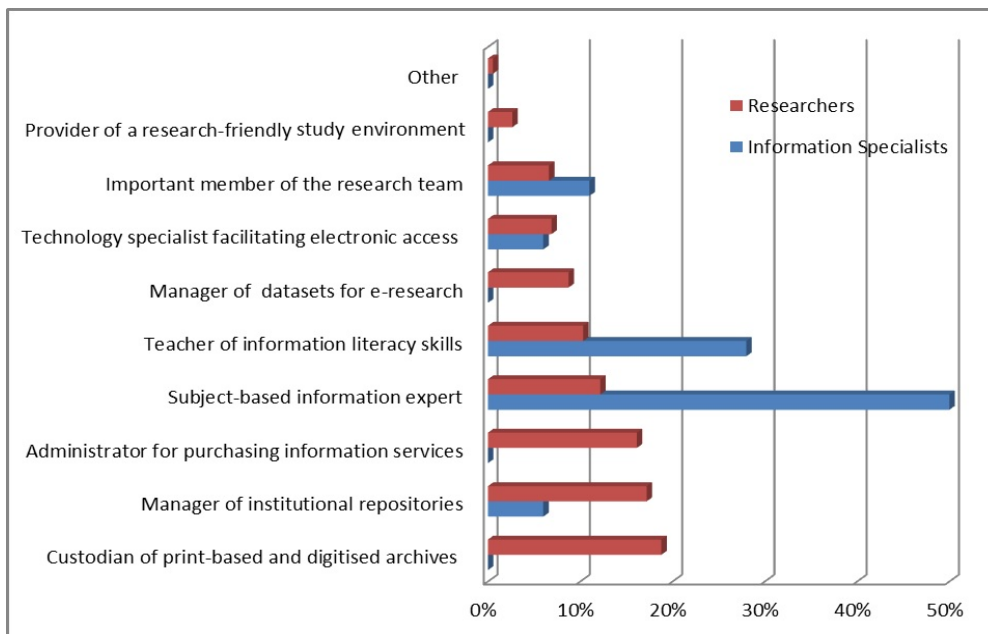
According to the information specialists, the least important roles were the following: provider of a research-friendly environment (area) to study or work; custodian of print-based and digitised archives and special collections; administrator dealing with the purchasing and delivery of information services and manager of the vast datasets generated by e-research and grid-based projects.



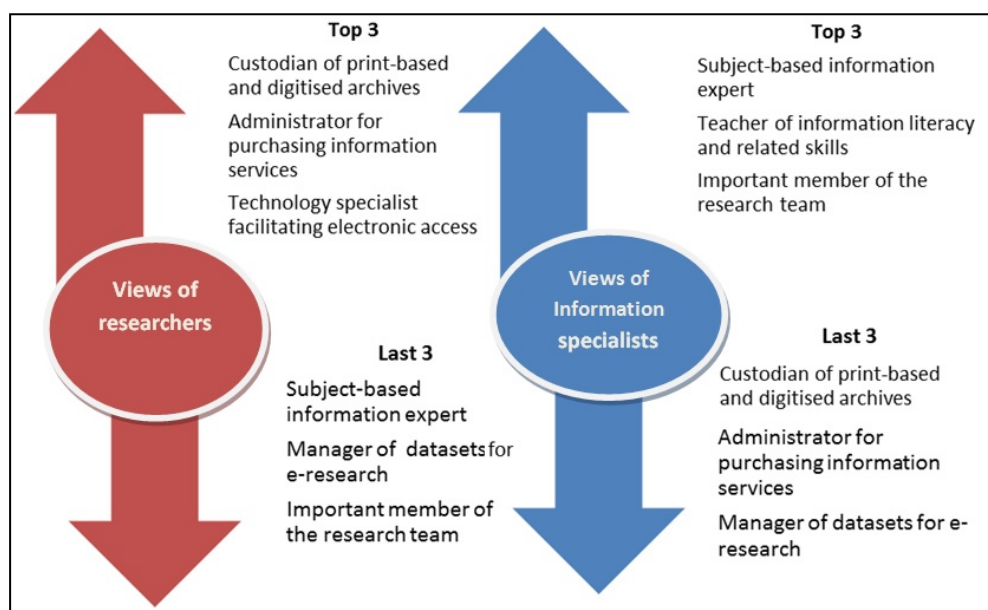
**Chart 6.26: Most important roles of the information specialist (according to information specialists)**

Both the responses of the researchers and information specialists were normalised and average percentages were worked out in order to compare them with one another. The results are presented in Chart 6.26 to highlight the difference in the perceptions of the two groups.

Chart 6.27 indicates that there is dissimilarity between the perceptions of the researchers and the perceptions of the information specialists on the information specialists' roles which are important to support the information needs of researchers. The differences between the three most important roles for each group are summarised in Figure 6.2



**Chart 6.27: Comparison of the different views of the important roles of the information specialist**



**Figure 6.2: Summary of the different views on the roles of the information specialists**

Several authors argue that traditional library roles (such as information management and organising) are still what distinguish the library from other information services (Allan 2010; Pinfield 2001; Ross & Sennyey 2008). They also mention that new, extended and more sophisticated roles are awarded to information specialists. New roles such as publishers, educators and information advocates (Neal 2009), buyers, gateways to information and teachers (Schonfeld & Housewright 2010), promoters of access to digital information, facilitators for information sharing (Brown & Swan 2007), translators, information specialists, subject experts and counsellors (Webb *et al.* 2008) are mentioned as useful for the study.

#### **6.4.4 Skills of the information specialist**

Researchers were asked if they thought the information specialists of the Jotello F Soga Library were adequately skilled to support their information needs. Of the 119 respondents, 115 (97%) indicated that they felt the information specialists were adequately skilled, while only 4/119 (3%) answered negatively to this question. It is however important to note that libraries cannot simply rely on this, since the rest of the results pointed to the need for re-assessment of skills development. Although the response to this question indicated that researchers experienced the information specialists as adequately skilled, this must be viewed in relation to responses to other questions, and against what could be learned from the literature review.

Data were collected from researchers in an-open ended question in the questionnaire, as well as from the focus group interviews. Participants were asked to elaborate on the skills of the information specialists. Their responses were organised, perused and summarised into the following main themes: traditional library skills; people skills and other (training and support with IT). Most remarks were positive (compliments). There was only one negative remark, which indicated lack of visibility of the information specialists, which may be an indication of the need for improved marketing and outreach skills. Table 6.16 summarises the skills and some of the statements that were transcribed verbatim. It was necessary to edit a few statements in order to present the responses in correct English for academic purposes.

Although the findings presented in Table 6.16 indicate that the information specialists are viewed as effective and efficient in providing information, as well as friendly and helpful, it is disturbing that higher level skills (e.g. regarding information organisation, research publishing, etc.) are not mentioned. Linked to this is a negative remark regarding unawareness of the skills (and existence) of information specialists, which is highlighted as an important component in the model by Leckie, Pettigrew and Sylvain (1996).

Skills	Phrases from open-ended question and focus group interviews addressing skills of the information specialist
<b>Traditional library skills (information management, organising, searching, using and handling skills)</b>	<i>She leads me to information need satisfaction; ... knowledgeable ...; ...help to discover (difficult to find) information;</i> <i>They know all the different ways to find information;</i> <i>Their skills to sourcing information are so important ...;</i> <i>Her knowledge and skills to manage and locate information saves time and frustration ...;</i> <i>They are skilled to buy and provide excellent information sources;</i> <i>... knowledgeable in information management</i>
<b>People skills</b>	<i>The librarians are always willing to help ...</i> <i>They are helpful ...</i> <i>They provide effective service ...</i> <i>They know how to communicate with less skilled students ...</i> <b>Other words used:</b> <i>friendliness; patience; professional; creates confidence; organised;</i> <i>“friendly to new library users”; always available; fast, quick, prompt response to user needs; objective; trust</i>
<b>Other (training, IT skills)</b>	<i>Their training skills are good ...</i> <i>The librarian addresses the technical problems I have with the computer software I use ...</i> <i>Technical skills to help with RefWorks are very important ...</i>
<b>Negative remarks (unawareness of services – lack of marketing skills)</b>	<i>“I do not even know of their presence and they have not been recommended to me by anybody. It is my first time hearing of their presence. I guess if they were that skilled, at least one person would have recommended them to me ...”</i>

**Table 6.16: Response from researchers on the skills of the information specialists**

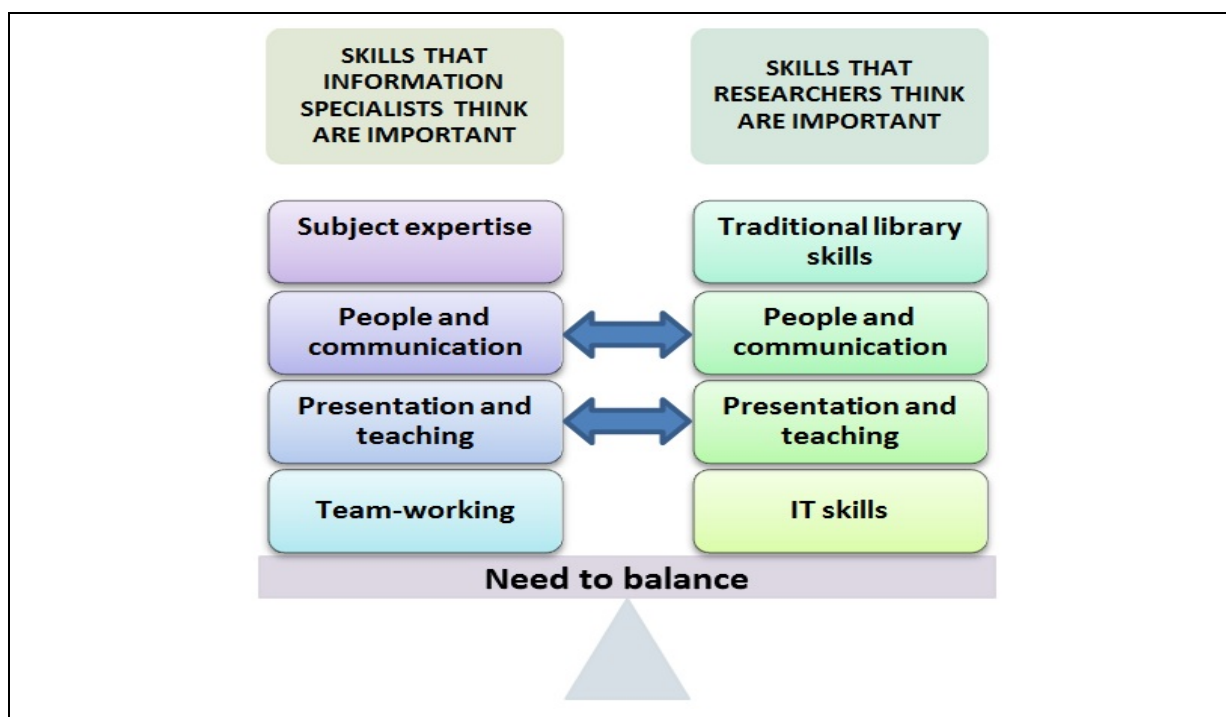
The information specialists were also asked in the questionnaire to list the most important skills they felt were needed to support the information needs of researchers effectively. All three respondents indicated the following skills as important for information specialists to support the information needs of researchers: subject expertise, people skills, communication skills, presentation and teaching skills and team-working and team-building skills.

These were followed by technical and IT skills and the ability to learn quickly. Only one respondent indicated vision as an important skill. Financial management skills, analytical and evaluative skills, project management skills and flexibility were not regarded by any of the respondents as important skills to support researchers' information needs. The list of these skills is presented in Table 6.17.

Subject expertise	3
People skills	3
Communication skills	3
Presentation and teaching skills	3
Team-working and team-building skills	3
Technical / IT skills	2
Ability to learn quickly	2
Vision	1
Financial management skills	0
Analytical and evaluative skills	0
Project management skills	0
Flexibility	0

**Table 6.17: Skills information specialists regard as important for effective information support to researchers**

When comparing the data collected from researchers with data collected from information specialists on what skills they thought were important for an information specialist, a few differences in opinion became clear. This comparison of opinions is visually portrayed in Figure 6.3.



**Figure 6.3: Summary of the different views on the skills of the information specialists**



Both groups mentioned people and communication skills and presentation and teaching skills. Good people and communication skills were also mentioned by the researchers as a success of the library (section 6.4.6). The importance of training was also mentioned by the researchers as a success of the library (section 6.4.6), and information specialists were aware of the training needs (in the use of information resources) of researchers (section 6.3.2.4). Presentation however can also mean marketing and informing users (researchers) of services and products available to them. Lack of proper marketing initiatives from the library was mentioned by researchers as being a shortcoming of the library (section 6.4.6) and it was also mentioned as a suggestion for new services (section 6.4.7 and Table 6.17).

Information specialists see subject expertise as an important skill to offer better support to researchers, but in contrast to this, researchers think that traditional library skills (including the skills to facilitate the management, organising, searching, using and effective handling of information) are important skills. This also relates to the different perceptions of the role of the information specialists perceived by both groups (as illustrated in Figure 6.2). Information specialists position themselves more in the faculty departments (in this case the Faculty of Veterinary Science) and want to play a more important role in the disciplines and research processes of the faculty. Information specialists think subject information is important for them to provide better support, but researchers only want information specialists to be “librarians” – providing information resources and easy and effortless access to all information needed for their research.

Information technology skills are also mentioned by the researchers as an important skill for information specialists. A technology specialist facilitating electronic access is also mentioned by the researchers as the third most important role of the information specialist (section 6.4.3; Chart 6.25; Figure 6.2). Lack of support with information technology is further mentioned as a shortcoming of the library (section 6.4.5) and as a suggestion for new and improved services to be provided by the library (section 6.4.7 and Table 6.18). Information specialists mentioned support with information technology as one of the information needs of researchers and postgraduate students (section 6.3.2.4 and Table 6.9), but they were aware of the fact that they could not address it at the time. Information specialists however did not mention information technology skills as one of the more important skills needed to provide more effective support to researchers (Table 6.12).

These needs link to the importance of the accessibility of information sources, mentioned by Leckie, Pettigrew and Sylvain (1996). When the quality of access is disrupted, researchers may feel frustrated (as explained in Kuhlthau’s ISP model). The role of the library in

providing effortless, timely and high-quality access to information is again emphasised in the discussion of the above-mentioned findings.

#### 6.4.5 Shortcomings of the library

Researchers were asked to note shortcomings of the Jotello F Soga Library in the questionnaire. Fifty-two of the 119 respondents (44%) commented on this question. These remarks were categorised and the following main problem areas were identified: problems with information resources and access to information, technical (IT) problems, problems with research publication, marketing and training and library space. The following section will present some of the responses under each heading.

##### (a) Information resources and access to information

Most of the remarks referring to information resources and access to information indicate lack of awareness or knowledge of the products and services provided by the library. This issue was raised in other sections (see Table 6.15 and section 6.4.7) as well and is mentioned later in this section (see 6.4.5(d)). Although it is important to investigate it further, more attention will only be devoted to it in the next chapter. This section will only briefly present the remarks of participants on information resources and access to information:

One respondent indicated that he or she experienced difficulty with finding printed books on the shelf.

*Catalogue numbering system (books) also very frustrating to use.*

The following statement may indicate unawareness of the current awareness services provided to academic staff, researchers and postgraduate students of the faculty, or it may express a need for support with information management and organising.

*Maybe they can be more pro-active and forward articles that appear interesting or valuable to us as we cannot screen everything.*

Difficulties to navigate and find information on the library website were also mentioned.

*Website could be more user-friendly.  
I often experience problems in accessing through the website.  
Finding information on the library website is not always easy.*

Most users use the online collections of the library, which allow access to a very large spectrum of information resources. All information needed is however not always available

or accessible. A number of respondents expressed the need for access to more electronic information (not in collection).

*Need to advertise other online libraries that may be free to the public.  
The university is not always subscribed to the journal that I'm looking for.  
Some journals we do not have electronic access to.  
At times only abstracts are available on particular articles we need.  
Possibly direct access to more e-journals?*

A few respondents also raised challenges regarding accessing electronic collections.

*Technical difficulties sometimes experienced in accessing electronic databases.  
Electronic access to articles is not always working.*

(b) Technical (IT) problems

Computer-related and technical problems were also raised in other sections (see section 6.4.7). In this case it was mentioned as part of problems experienced with reference management software (RefWorks).

*I really struggled with the referral program that the library provides (Refworks). The software has just too many problems given and the program itself is very bearish. I currently use Zotero (it's a 'freeware' program); much less problematic. I think it will be useful to other researchers if they have this type of options to showcase and training in these alternative programs.*

(c) Research publication

The university and the library encourage researchers to publish in open access journals (see also section 6.3.2.5). Although the university has prepaid membership with a few open access publishers, it is not financially possible to cover all article processing charges for every journal. A need for more publishers in this prepaid open access model was raised by one respondent:

*I recently considered publishing in an open-access journal (Elsevier if I remember correctly) but UP did not support that journal as an open-access source. Widening the scope of open-access journals UP supports will be very helpful, although I realise it is expensive.*

(d) Marketing and training

Although some of the responses to the questions discussed in this section indicate lack of knowledge of what library products and services are available to users, researchers are also aware of the fact that they lack awareness of what the library can offer them. This is clearly expressed in the following statements:

[They need to ] ... *making me know what they offer.*

*We the researchers are unaware of what the library has to offer. If they could have like a session where they not only teach about accessing information but also about what and how else they can assist us in obtaining information.*

*So many tools are available, I don't always know which ones are good to use, and which ones are important to remember, but over this last year, I have managed to get around to the basics.*

Researchers are unaware of the support of the information specialists who are available to assist them:

*I don't really know how to use an information specialist and how much and for what I can use one.*

*I do not even know if I am allowed to contact her ...*

(e) Library space

More quiet space to work was raised by one respondent:

*A nice, large, quiet study area would be nice, although I realise space is limited.*

There is also a need for a study area allocated to researchers only:

*More space to study – which is only focussed on postgraduate students.*

*A postgraduate study area - like what is seen in the research commons room at Hatfield campus.*

Other physical and environmental factors in the library (noise and air conditioner) were also mentioned:

*It can sometimes be very noisy in the library ...*

*It is very cold on level 5 ...*

Although virtual spaces for seeking and disseminating information are important, there is also a need to give attention to the physical space. Although emotions and anxiety were not investigated in this study, the provision of a quiet, pleasant area, devoted to researchers for work, may contribute to less stress and anxiety, which in turn might assist researchers to be more productive in their research output. Webb *et al.* (2008) used the term “safe harbour” for the need for research space mentioned by researchers. The importance of research areas in the library was also found in studies by Fox and Stuart (2009) and Ross and Sennyey (2008).

#### 6.4.6 Successes of the library

An open-ended question in the questionnaire, as well as a discussion in the focus group interviews with researchers, addressed successes of the library. Of the 119 respondents to the questionnaire, 40 (34%) elaborated on this question. These responses, together with data collected during the focus group interviews, were carefully perused and interpreted. The remarks were then organised into smaller units and categorised into the following main themes: access to information and information resources, quality of service (interactions, helpfulness and competency of library staff) and the library's contribution to information skills development of researchers. These findings are presented in the following discussion:

##### (a) Access to information and information resources

This category received most positive comments regarding the successes of the library in the questionnaire. Participants in all focus group interviews also complimented the Jotello F Soga Library for its excellent information resource collections and efforts to facilitate access to all needed information.

Of the 40 comments in the questionnaire, 29 (73%) were related to information finding and discovery. These mainly involved library support services such as conducting literature searches, as well as assistance with such searches on different databases, interlibrary loans and document delivery. Some of these are presented here:

*Help with article requests, help with database use, and providing online access to the multitude of journals we all need which is hugely appreciated!!*

*Unfortunately, I do my research in a remote area in the Free State, so I haven't been to the library yet. But I asked a couple of times for hard-to-find book chapters and she kindly and efficiently got the copies for me.*

*Speed of help with problems with obtaining articles or other information, as well as on the technical side - regarding electronic services and databases of the library.*

*Finding articles, books, book chapters and so on when we did not have them. Being able to answer my questions and help resolve my problems with the methods of finding information.*

*Being able to quickly obtain copies of papers that I can't find.*

*Quick inter-lending service.*

*If these journals are not available online, one can actually request the library to source it for them.*

*They are tremendously helpful with getting reprints through interlibrary loans – especially old articles that are not available online. Obtaining old articles and other articles that are difficult to find electronically.*

A number of positive remarks (14/40; 35%) were made regarding information resources. Both the printed and online collections were mentioned. Some of the remarks were:

*We have access to most veterinary journals ...*  
*Excellent resources ...*  
*It is up to date with the current publications ...*  
*Provide in-office, and at-home access, to eJournals and other publications ...*  
*Providing access to most of the sources required to complete my research ...*  
*Provide excellent sources of information ... and a good variety of books ...*  
*The major databases of e-journals are available.*  
*As I seldom visit campus, I rely on the use of electronic journal articles – which are excellent.*  
*The library ensures that we have access to most journals in every field of study.*  
*I think the library services are valued but used little by many academic staff due to the ease of direct, electronic sources.*

(b) Quality of service (interactions, helpfulness and competency of library staff)

A number of respondents to the questionnaire (9/40; 23%) as well as most participants in the focus group interviews described the quality of service provided by the information specialists as very good. Extracts from some of the remarks are as follows:

*Always available*  
*Query was attended to immediately*  
*So far, I am very pleased with the service.*  
*The staff is lovely too!*  
*Friendly efficient service*  
*Quick response ...*  
*Small community. Feeling of personal attention ... efficiency and helpfulness ...*  
*Quite a successful role player ...*  
*They make me feel comfortable ...*  
*I can approach them every time I need information or articles*

(c) Contribution to information skills development

Two comments regarding information skills development were made in the questionnaires and are presented here. Gratitude for the library's successful contribution to their information skills development was also raised in all focus group interviews.

*Updating my library skills/knowledge through training and workshops.*

*I had a brilliant postgraduate training and part of the success can be attributed to the library.*

*I still use them as a senior lecturer now although mainly from my office due to volume of work (undergraduate and postgraduate students).*

#### 6.4.7 Suggestions for new products or services

Data gathered from respondents from the questionnaire as well as from the focus group interviews with researchers were organised and analysed and thereafter categorised into five main headings, namely access to information and information resources, research support products, information technology related services, library as place and marketing and training. These are presented in Table 6.18. Some of the comments (verbatim) were inserted to facilitate better understanding of remarks.

<p><b>Access to information and information resources</b></p>	<p>More books (hard copy) and more electronic journals</p> <p>Guidelines to the use of information resources and databases</p> <p><i>If there is a list of guidelines to the use all the databases for veterinary science researchers and how to use it – maybe on the web</i></p> <p>Notices about new resources in the library (alerting services)</p> <p><i>To send me notices about new resources in the library</i></p> <p>There is a need for more personalised support and services (focus on the information needs of the individual)</p> <p><i>Provide me with lists of the journals in which UP staff publish; their research topic and with current impact factors; e-mail notification of new publications (including contents of journals) in my study field to me ...</i></p> <p><i>It would be nice to have software that with a few keywords inserted can direct you to a list of books, e-books and journal articles related to them in order to facilitate the research of information especially for “beginners” researchers (e.g. master students)</i></p> <p>Agreements with publishers (open-access) regarding publication fees</p> <p><i>More agreements with open access publishers, e.g. PLoS, to reduce or avoid publication fees.</i></p> <p><i>[Increase] the scope of open-access journals that are supported.</i></p>
<p><b>Research support products</b></p>	<p>Assistance with citation reports; researcher profiles (ResearcherID) and other bibliometric information</p>

	<p><i>Assist researchers with creating an electronic research output profile.</i> <i>Assist with capturing articles on InfoEd system.</i> <i>Helping researchers to build an on-line profile</i></p> <p>A website for research support</p> <p><i>A website that is more geared towards research information.</i></p>
<b>Information technology related services</b>	<p>Assistance with the use of new technology and research support software</p> <p><i>For the library to always be at the cutting edge of new technologies and be at par with international development ... in order to help us efficiently ...</i></p>
<b>Library as place</b>	<p>Research commons (quiet space for study) in the library</p> <p><i>Research commons at main campus is a great idea - sometimes I need place to work on research - where I cannot be disturbed and the librarian is nearby.</i></p>
<b>Marketing and training</b>	<p>Marketing of services and products available to researchers</p> <p><i>It will be very useful for the library to undertake "roadshows" within departments to market the skills and value offered by the information specialists.</i> <i>Would like my librarian to assist me with a subject search. Just not sure I am allowed to ask them ...</i></p>

**Table 6.18: Suggestions by researchers for new services**

#### **6.4.8 Role information specialists will play in the future in supporting the information needs of researchers**

The future role of the information specialist in addressing the information needs of researchers was discussed in the focus group interviews with the researchers as well as the one with the information specialists. A summary of the respective discussions is presented in Table 6.18. Although it was easy for the information specialists to answer and elaborate on this question, researchers found it more difficult to express their views of the future role of the information specialists in research support. The different statements collected from all five focus group interviews were carefully studied and summarised in the following table. Statements from the focus group interview with the information specialists are also presented in Table 6.19.



Researchers	Information specialists
<p>Researchers will need more assistance with research during all phases of the research process (e.g. assistance with literature searches, identification of possible publications, help with research methodology).</p> <p>The information specialists need to be part of the guidance committee assisting the postgraduate student from the start (e.g. when deciding on a topic, writing the proposal, etc.) – the information specialists must be more involved in contact sessions between the supervisor and postgraduate student.</p> <p><b>A senior lecturer in Focus group 1 said the following:</b></p> <div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #e6f2e6;"> <p><i>The university's primary vision is to become a research-intensive university. Lecturers' work load has increased, thus they will need more help to enable them to do more research – and the librarian will be useful in assisting them ...</i></p> </div>	<p>The publishing environment is changing – information specialists need to learn more about it in order to assist researchers with new developments in research communication. Information specialists will also assist more with this by creating institutional repositories (not only for publications, but also for research data).</p> <p>Information specialists' role in assisting researchers with information about research (e.g. bibliometrics, altometrics, webometrics) will become more important.</p> <p>There is an increasing need for information specialists to play a role in assisting with IT and research software (and other computer programmes researchers use).</p> <p>With more information published daily, information specialists' role to help researchers to evaluate and manage information, becomes more important.</p>

**Table 6.19: Role information specialists could play in the future in supporting the information needs of researchers**

Findings on the role of the information specialist in supporting the information needs of researchers highlighted the challenges in the research environment regarding information needs. There are however a number of opportunities for the library to become more involved in supporting researchers in the context of the research environment. These will be discussed in more detail in Chapter 7.

#### **6.4.9 Suggestions for collecting data from researchers**

In the focus group interview with information specialists, the following ideas to learn more about the information needs of researchers were presented:

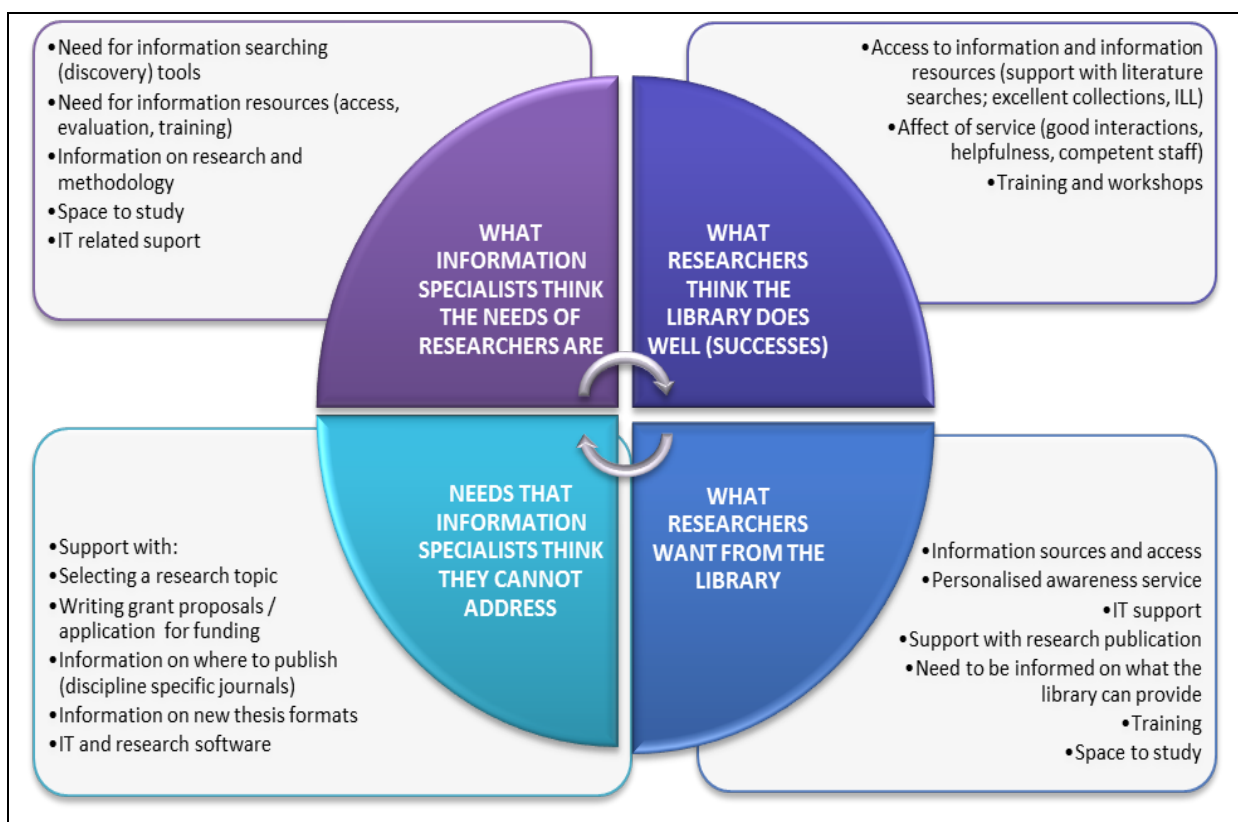
- Information specialists need to attend faculty research committee meetings and must be informed on the topics of research proposals (in this way the service can be more proactive; more specific to the research problems and value can be added to the service).
- More personal communication with researchers.

- Regular meetings with departments as well as heads of departments to determine their specific information needs.

These findings link to the need described by Shumaker (2012:17) for academic libraries to move towards “embedded librarianship”, which he describes as follows: “The embedded librarian, who is truly integrated into the academic, administrative, athletic, cultural, research, teaching, and learning arenas of the university, provides quality and depth to the total campus experience. ... Recognition of the power of embedding, integrating, and collaborating leads to amazing innovations in the academy that would not exist without the influence and leadership of librarians.”

#### 6.4.10 Summary of the needs of researchers and how these are addressed by the library

In the preceding sections data on the needs of researchers as well as the role of the information specialist in addressing these information needs were analysed and presented. Figure 6.4 summarises the data in order to indicate gaps in the service provided by the Jotello F Soga Library to researchers at the Faculty of Veterinary Science, University of Pretoria.



**Figure 6.4: Overview on the information needs of researchers and how these are addressed by the library**

As Figure 6.4 only serves as a summary of data already discussed, it will not be discussed again in this section. Chapter 7 will summarise and discuss the findings and will present a framework for recommendations to fill gaps in the services delivered to researchers.

## 6.5 CONCLUSION

In this chapter the data collected to determine the information needs, information seeking behaviour and information use of researchers and postgraduate students at the Faculty of Veterinary Science, University of Pretoria were discussed. Data were collected from this population by means of a questionnaire, a focus group interview and a citation analysis of the 2012 and 2013 research output of this faculty. Results of a recent LibQUAL survey will also be added in the discussion following in the next chapter, to add value to certain aspects of this study, and to put some of the findings and results of the Faculty of Veterinary Science in the context of the University of Pretoria as whole.

In addition to this, data were also collected from the information specialists from the Jotello F Soga Library by means of a separate questionnaire and a focus group interview. The purpose with these data was to determine what the current services are that the Jotello F Soga Library provides to researchers at this faculty. The final section of this chapter focussed on the role and future of the information specialist in research support to faculty researchers. Data collected from both the researchers and information specialists on certain aspects were compared in order to provide a platform to identify gaps in the products and service delivery.

Data analysed and presented in this chapter were consistently compared, supported by and supplemented with findings from the literature review. The analysis included the descriptive analysis as well as analysis from the qualitative data. These empirical findings were also viewed against the background of the information seeking models that were used to serve as framework for this study.

In the next chapter the results of the data presented in this chapter will be interpreted and discussed in order to make recommendations on more effective ways to address the information needs of researchers.

## CHAPTER 7:

### PROPOSED FRAMEWORK FOR SUPPORTING THE INFORMATION NEEDS, INFORMATION SEEKING BEHAVIOUR AND INFORMATION USE OF RESEARCHERS

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#### 7.1 INTRODUCTION

The aim of this study was to investigate the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria. The intention was also to assess the current information services provided by the Jotello F Soga Library and the information professionals to determine whether these services were meeting the information needs and expectations of the researchers.

Chapter 2 gave an overview of the research environment in South Africa and focussed on challenges faced by researchers, especially veterinary science researchers at academic institutions. It highlighted the link between institutional rating and the quantity of research output, and emphasised the importance of high-quality, internationally competitive research output.

Chapter 3 discussed the information needs, information seeking behaviour and information use behaviour of researchers. Among others, the importance of information resources in both the information seeking and information use behaviour of researchers was highlighted.

A literature analysis of the role of the information specialist in addressing the information needs of researchers was discussed in chapter 4. Reference was made to several new roles of the information specialists in supporting the information needs of researchers, but the discussion emphasised the need for traditional skills and ways to apply them, for example information management and information organising skills in the research environment.

In the previous chapter data collected for this study were analysed and presented. Data presented focussed on addressing sub-questions 3 and 4, namely:

How are the information needs of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria, at present being met and satisfied?

What research and information support services and products are currently offered by the Jotello F Soga Library?

The aim of this chapter is to discuss the issues raised in previous chapters and the data analysis to align the findings on the information needs, information seeking and information use behaviour to the models noted with regard to the conceptual framework for the study and to make recommendations to fill gaps in the services delivered to researchers at the Faculty of Veterinary Science, University of Pretoria. Suggestions in this chapter concern sub-question 5:

How can the Jotello F Soga Library of the University of Pretoria address the information needs of researchers at this faculty and fill gaps in the service?

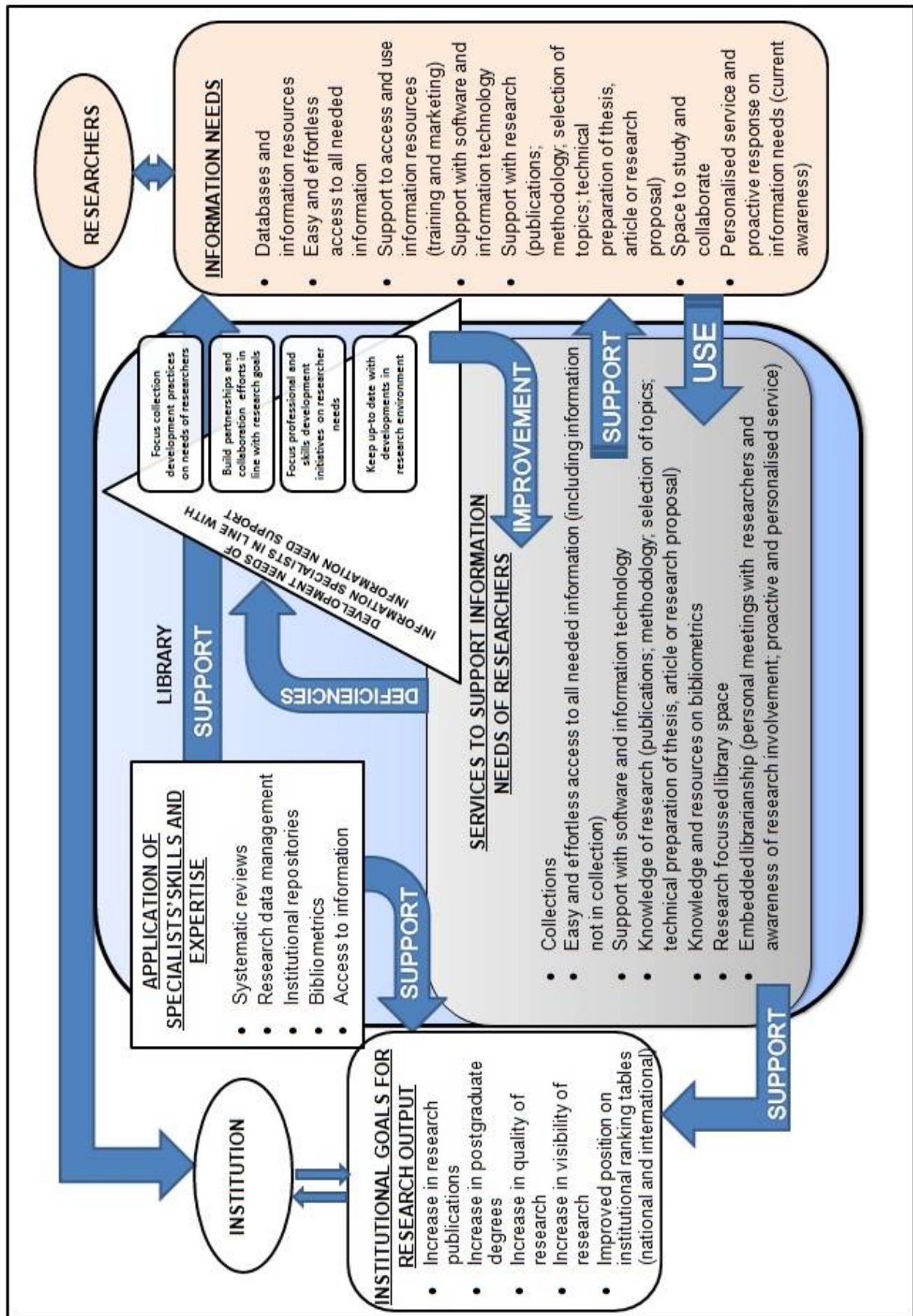
To address this question, it is important to understand researchers in the context of the institutional research environment with goals regarding research, their own information behaviour (including information needs, information seeking and information use) and ways in which the library can address researchers' information needs.

Proposed ways to address the information needs of researchers as well as to contribute to institutional goals will be discussed in the next section. It will also make suggestions for development initiatives for information specialists in response to these suggested services.

## **7.2 PROPOSED FRAMEWORK FOR LIBRARY SUPPORT**

It has been argued that the context and environment may have an impact on the information needs, information seeking behaviour and information use behaviour of information users (Courtright 2007; Johnson 2003). The role and function of the library and information specialists as an important component in supporting researchers to meet institutional goals in the context of the research environment was investigated. By meeting information needs and supporting information seeking behaviour as well as information use behaviour, the library will be able to become an important asset in reaching institutional goals for research output.

Figure 7.1 gives an overview of the library in the context of the institutional research goals and the researchers' information needs, information seeking and information use behaviour. It will also propose ways for better support.



.Figure 7.1 Role of the library in institutional research goals

This study was shaped by the information seeking/information behaviour models of Wilson (1981), Krikelas (1983), Kuhlthau (1991; 1993; 1999) and Leckie, Pettigrew and Sylvain (1996) (section 3.2.3 and Figure 3.7). According to these models information needs are motivated by the environment or work role of a person. The findings of this study indicated that the information needs, information seeking behaviour and information use behaviour of researchers are influenced by the context of the research environment. Support services to researchers therefore need to be developed in relation to this.

The three main components illustrated in Figure 7.1 are:

- the institution with certain goals to meet regarding research;
- researchers, with several information needs developed as a result of the pressure to meet goals for their research (which are linked to the goals of the institution)
- library and information specialists, who provide services to support the information needs of researchers, in order to assist them in meeting the overall goals of the institution (University of Pretoria).

Each of these components will be discussed in more detail in the following section.

### **7.2.1 Research goals of the institution as context for veterinary and academic researchers and library services**

Chapter 2 of this study discussed challenges regarding research in South Africa. This discussion highlighted that academic institutions need to meet several research goals to be eligible for funding and other incentives.

Academic institutions in South Africa need to increase the number of research publications in high-quality, internationally visible and accredited journals in order to meet the goals and requirements of the NRF and to compete with world-ranked universities. There is thus pressure to increase both the quantity and the quality of research output. In addition to this, universities are expected to award more postgraduate degrees.

Krikelas (1983), Leckie, Pettigrew and Sylvain (1996) and Wilson (1981) view information needs in the context of the environment. Wilson's 1981 model emphasises the environment, role and person in information seeking behaviour. This study found that the context (research environment) in which veterinary researchers function directs their information seeking and information use. In the context of this research, the goal is to deliver more research output of high quality and with international impact. The impact of this is visible in the increase found in the research output, as well as the increase in publications in high-impact factor journals (as seen in the findings from the citation analysis).

Wilson (1981) also includes the person's physiological, affective and cognitive environments as determining information seeking. These are however primary needs, that lead to secondary needs. As researchers receive incentives for their research output (funding acknowledgement as rated researchers, etc.) this may also encourage them to publish more, which may have an impact on their information needs.

The data discussed in chapter 6 of this study indicated that researchers experience pressure to produce research output and need support to meet institutional goals. Several information needs were indicated. These will be discussed further in the next section, which forms the second component, as illustrated in Figure 7.1.

### **7.2.2 Information needs of researchers – instigated by the institutional contexts**

Data analysed for this study identified several information needs of researchers at the Faculty of Veterinary Science, University of Pretoria.

Access to information resources and collections is very important for researchers. This study found that researchers make adequate use of information resources and databases provided by the library for information for their research. Researchers prefer the use of electronic information sources for information for their research. They are able to use the online resources and products effectively and efficiently. Researchers mostly prefer to work alone on searching for information for their research, they feel confident that their information needs are met, they do not attend training sessions on library products and do not visit the physical library often.

Leckie, Pettigrew and Sylvain (1996) mention the effect of work roles and tasks on information behaviour and suggest that the sources of information are also affected by these work roles. They also consider knowledge and personal experience as important. Factors affecting a person's information awareness are accessibility of the sources, the cost involved, familiarity with using the sources, packaging and usefulness of the sources, the quality and accuracy of the information, timeliness and trustworthiness, helpfulness and the overall reliability of the sources, which can be linked to the findings of this study on the information use of researchers.

This study found that researchers tend to use different information sources for different purposes (needs). Specialised electronic databases (e.g. CAB Direct) are used as first access point for information searching and discovery, while journal articles and information found on scientific full-text databases (e.g. ScienceDirect and Scopus) are used for their research. To keep up to date they prefer more personal (face-to-face) sources of



information, such as conferences, meetings or workshops and personal communication with colleagues or peers in their discipline. Most of these factors are also mentioned in the models by Leckie, Pettigrew and Sylvain (1996) and Krikelas (1983).

Researchers want access to a spectrum of information – even that not in library collections. This includes among others access to grey literature (not published), reports, blogs, informal communication and artefacts. This access must be without any limitation, effortless and easy. To facilitate effective and efficient access to information, they need support with information technology and software (in cases where technology impedes access to information). A number of researchers often experience problems with the installation and use of reference management software such as Reference Manager and Endnote.

Researchers also want the library to assist them with issues regarding the research process. These include support with research methodology, selecting a topic, technical preparation of research proposals, theses or articles. They also need information on selecting a journal in which to publish. This includes, among others, the provision of guidelines on journal accreditation, impact factors, open access titles, copyright issues, etc. This again indicates the impact of the context of the research environment on the information seeking and information use behaviour of researchers (Wilson 1981).

The study indicated that researchers experience pressure to do research and to publish. It was indicated in the findings from the focus group interviews as well as in the questionnaires (for example in Table 6.18 and Table 6.19). Although researchers did not explicitly mention that they experienced anxiety and emotional difficulties while doing research, it was implied.

Neumann (2006) mentions that scholarly work of researchers is emotional in content. Affect in information seeking was incorporated in the ISP model by Kuhlthau (2004). Feelings (affective realm) in the information seeking process are presented in the following stages: uncertainty in the initiation phase; optimism in the selection phase; confusion, frustration and doubt in the exploration phase; sense of direction or confidence in the collection phase; satisfaction or disappointment in the presentation phase and sense of accomplishment in the final phase of assessment. If information specialists take note of these emotions mentioned by Kuhlthau (2004), they can act proactively to ensure a more comfortable experience. These may include practical examples such as training and workshops focussing on specific difficulties experienced during the research process (e.g. critical thinking, creative writing, preparation of the thesis / dissertation, etc.), creating a dedicated space for researchers in the library where they can work productively or assisting researchers with support while doing information seeking or using challenging software (e.g. complicated statistical programmes).

Information specialists are not actively involved in research and their own experience of scholarly publication is very limited (discussed in section 6.3.1.2). Their experience in the competitive world of higher education is thus different, and therefore their understanding of the emotional challenges involved in doing research may be limited as well. Apart from engaging in their own research and getting exposed to the intellectual as well as emotional challenges involved in research, there are other ways in which the emotional information needs of researchers can be addressed by the library. Kwon, Onwuegbuzie and Alexander . (2007:276) suggest that libraries can assist research students to experience less anxiety by developing “effective teaching strategies to equip students with positive dispositions toward critical thinking”, as they found a relationship between critical thinking (which is a main component in research) and library anxiety (which involves the use of information sources to do research).

Information specialists can also act proactively by presenting information and information sources that can assist researchers through all stages of the research process. In order to reduce uncertainty, the information specialists need to be introduced to the researchers (postgraduate students) in the initial stage of information seeking. Researchers need to be informed of the valuable role information specialists can play throughout the information seeking and information use processes, as well as in providing support with research publication. Information specialists can also contribute to reducing anxiety by providing the latest information technology and software and assist researchers in how to apply the latter to their advantage.

Another way to support the emotional information needs of researchers is to provide a research-focussed area in the library where researchers can work purposefully and without interference. The need for a space dedicated to researchers was mentioned in the questionnaire as well as in several focus group interviews.

### **7.2.3 Role of library in providing contextualised research and information support to academic veterinary researchers**

It is important for the library and information specialists to support the veterinary science researcher in the context of the research environment. Although there are overlapping ideas in what information specialists think researchers need and what the researchers actually need, several gaps have also been identified regarding information services, as well as support for the information seeking behaviour and the information use behaviour of veterinary science researchers at the Faculty of Veterinary Science, University of Pretoria. These gaps will be addressed in the following discussion.

### *7.2.3.1 Suggested services to support the information needs of researchers*

Researchers view library collections and information resources as the library's most important contribution to their research. This emphasises the importance of user focussed (researcher-focussed) collection building and management decisions and practices. Some of the important aspects regarding collection building practices of the library are the importance of including both specialised referencing databases and full-text databases in the collection, investment in electronic resources (as researchers want to access library resources and collections wherever they are and whenever they need it) and establishment of initiatives for collaboration, communication and partnerships between institutions to allow access to information and collections not owned.

To have timeless, effortless and limitless access to electronic information, researchers may sometimes need support with information technology and software (with special reference to reference management software such as RefWorks and Endnote). Challenges with technology can be a frustration for researchers, as this may hinder the accessibility of information, which may again cause anxiety, and according to Kuhlthau's ISP model, may affect their information seeking. Although this might not be viewed as a traditional library function, to address these problems, the library can contribute to reducing anxiety in the information seeking process of researchers.

In order to provide effective support regarding research methodology, research publication and other research-related needs, information specialists need to be familiarised with the research environment. They need to be encouraged to engage in their own research projects and research publication. It is further important for the library to acquire and manage sustainable, current and comprehensive information resources on research methodology.

Although the role of emotions was not investigated in this study, it is necessary to mention the following here: if one assumes that researchers experience anxiety and frustration during the research process, it makes sense that if information specialists themselves went through the same process, they will demonstrate more empathy and understanding with researchers and their information needs.

Information specialists need to be informed and to be aware of events, trends and changes in the local as well as global research environments. They also need to be aware of research trends and events applicable to the discipline and subject areas they support. Examples of ways in which information specialists can ensure that they stay informed are, among others, the following: subscribing to online current awareness services on topics related to research, but also on subjects of the departments they support (RSS feeds, subject alerts, table of

contents alerts, alerts on conferences, etc.); attending university, faculty or departmental meetings, seminars or other events where issues related to research of the institution or faculty are discussed; paying regular (formal or informal) visits to their faculty departments; attending conferences and workshops and participating in virtual research environments.

Information specialists need to stay aware of information needs and research activities of researchers in the departments they serve. In order to allow them to best respond to these needs and to provide a proactive and personalised service, they need to pay regular visits to departments.

Knowledge of bibliometrics and databases (e.g. ISI InCites and ISI Journal Citation Reports), resources and other tools to measure and evaluate research and research output is also important to enable an information specialist to respond to researchers and institutional needs. Information specialists need to familiarise themselves with these tools and resources and their use by attending training sessions and workshops presented by vendors, but also other meetings, workshops and conferences where the application of bibliometric and research evaluation and the role of the information specialist in this are discussed.

The need for space to work on research is a very important issue and the library needs to prioritise response to this. Library space needs to be designed to incorporate a diversity of needs, which may include both quiet space to work and study, seminar rooms for group work and rooms equipped with technology and equipment to assist researchers in writing research publications (e.g. scanners, audio-visual equipment, etc.). As researchers prefer personal communication with colleagues and peers to keep up to date, the library can facilitate this by providing seminar rooms.

Apart from the physical space, the information specialist can also create online discussion rooms and research collaboration platforms for researchers (virtual research environments). With their information organisation skills, information specialists can play an excellent role in organising the shared information, preserving (archiving) it, but also assigning metadata to enable future retrieval of it. An example of this is found in the work of Coetsee (2011), who describes how Refshare (part of RefWorks) was used as an effective tool to support a community of practice and to promote research collaboration in the Phytomedicine Programme, Faculty of Veterinary Science, University of Pretoria.

#### *7.2.3.2 Application of information specialists' skills and expertise*

If information specialists want to improve support services to researchers, these services need to be in line with the information needs of researchers.

Information specialists think subject expertise is the most important skill to support the information needs of researchers, but according to researchers, information specialists' traditional library skills (which include the skills to facilitate, manage, organise, search, use and retrieve information) are the most important expertise needed to support their needs. Information specialists position themselves more in the faculty departments and want to play a more important role in the disciplines and research processes of the faculty. Information specialists think subject information is important for them to provide better support, but researchers only want information specialists to be “librarians” – providing information resources and easy and effortless access to all needed information for their research. It is therefore important to focus on these traditional skills and apply them in such a way that they will address the information needs of researchers as well as the research goals of the institution.

Information specialists need to monitor IT changes and new developments regarding technology, information and information networks in order to benefit users. They need to identify means to keep in touch with user needs and user expectations and this needs to be attended to regularly, as users and their circumstances change continuously.

An example of where these outstanding skills and knowledge can play an active role and at the same time contribute to the research output of the university is getting involved in systematic reviews. Information specialists have information management and information organising skills and are excellent at information searching and creating search strategies. They are aware of the functions and features of different databases and know the tools that support them. With an understanding of the importance of research output of the university, and appropriate knowledge of the scholarly publishing environment, they may be able to create opportunities where their skills and knowledge can be applied more effectively.

It is recommended that information specialists expand their knowledge on all aspects involved in systematic reviews and invest in training courses addressing this.

Faculty researchers are unaware of the skills and expertise of information specialists. By publishing a systematic review or collaborating with researchers in systematic reviews, researchers may become more aware of the important role information specialists can play in the research environment and the direct contribution they can make to the research output of the university.

Traditional librarian skills can further be applied in new developments in the research environment. Another example is the role information specialists can play in research data management. With their skills at organising, preserving, managing and facilitating access to

information, research data management and curation hold a great opportunity where information specialists can apply their knowledge and expertise and become an important asset in making institutional research output available, accessible and more visible.

Information specialists have an active role to play in institutional research repositories. Although researchers can self-archive their research output in these repositories, the library needs to ensure that the information in these repositories is accessible and retrievable. By adding additional metadata and subject headings according to researchers' needs, information specialists can improve retrieval and research visibility. The library can also play an active role in managing these repositories and ensuring that all research outputs are uploaded and stored.

Other ways in which information specialists can contribute to institutional goals for research output is through their knowledge of the scholarly communication environment, as well as their knowledge and access to different databases. Bibliometrics is used to explore the citation output and publication behaviour of researchers (Moed 2005). By providing bibliometric information, they can guide researchers with useful information to make their research more visible and make higher citations possible.

#### *7.2.3.3 Suggestions for skills development of information specialists*

Information specialists indicated in the survey that they had attended a number of skills and professional development initiatives during the previous year (discussed in section 6.3.2.6 and Table 6.15). As indicated in the analysed data, these initiatives included several training and marketing sessions on products (such as databases and tools used in the library) and a number of workshops on research-related skills, one on collection development and two on technology-related topics.

If information specialists want to improve the support services to researchers, it is suggested that skills enhancement, as well as professional development needs, have to be aligned with the information needs of researchers.

As discussed earlier, researchers rank access to information resources very high. For them, the most important role of the information specialist is to serve as a facilitator and enabler of access to all information and sources of information. That is why researchers also want information specialists to have adequate knowledge of information technology and software to assist them with problems regarding access to online information. This study indicated a gap in the knowledge of information specialists regarding information technology and

software support. This deficiency needs to be addressed through continuing professional development initiatives.

While information is growing and library budgets are shrinking, researchers need access to (even more) information. It is impossible to own all available information resources. Therefore it is important that libraries should build sustainable partnerships and get involved in collaboration efforts to negotiate and provide in the increasing, diverse information needs of researchers.

Information specialists also need to be informed of developments in the research environment, as well as in the scholarly communication environment. Not only current awareness services are suggested, but also formal training and engaging in their own research projects.

### **7.3 AWARENESS OF SERVICES OF THE INFORMATION SPECIALISTS**

The model by Leckie, Pettigrew and Sylvain (1996) acknowledges the work role of a professional, which is influenced by related tasks and serves as motivator for information seeking. Although Leckie, Pettigrew and Sylvain (1996) state that there are differences between the information seeking of professionals and academics, their view can still provide valuable insight for this study. Leckie, Pettigrew and Sylvain (1996) suggest that information needs create an awareness of sources and content motivating information use. The most important variables, according to this model determining whether a source is to be used or not, are “the familiarity and prior success with the source ... along with the trustworthiness, packaging, timeliness, cost, quality and accessibility of the source(s)” (Case 2007:128).

The findings of this study indicate that veterinary science researchers normally use the online information sources of the library daily (discussed in sections 6.2.2. and 6.2.3.). They are familiar with these sources, which are timely, cost-effective and accessible. The above-mentioned variables may therefore apply to this information use behaviour. However, the library has changed in recent years (e.g. new personnel, services, etc.). The library is less accessible as a source of information when compared to online sources, and researchers may not feel familiar with it anymore. To allow information specialists to play a more prominent role in addressing the information needs of veterinary science researchers, they need to create awareness of their skills, abilities and knowledge in environments where researchers feel familiar (online and in their work environment). They need to promote their services as trustworthy, of high quality and focussed on researchers' needs.

There is thus a huge need for marketing the skills and expertise of the information specialists and ways in which they can support researchers and the institution. Researchers are informed about information sources and how to use them, but they are not aware of the expertise of the information specialists.

The Jotello F Soga Library uses its newsletter (two issues a year), *Infomania*, as main marketing tool. The aim of the newsletter articles is to market the library and its products and sources. Considering the data discussed in section 6.4, where respondents indicated that they were not properly informed about the products and services of the library to researchers, one needs to ask if the newsletter is indeed an appropriate source for marketing the library. Other marketing tools are library blogs and a library Facebook page.

Information specialists must turn the focus of marketing initiatives from products to skills. The focus must rather be on what researchers can accomplish with the unique skills and expertise of information specialists, than only telling them about products. An example of this can be the involvement of information specialists in systematic reviews. By doing systematic reviews, the information specialists apply their information seeking and information handling skills with the knowledge of databases. By publishing a systematic review (or acting as co-authors with faculty researchers), the expertise of information specialists will be more visible to the research community.

It is therefore important for marketing initiatives to be aligned with institutional focus areas, including the research environment and challenges in the discipline. These initiatives must be re-monitored at regular intervals.

#### **7.4 CONCLUSION**

The aim of this chapter was to suggest ways in which the Jotello F Soga Library of the University of Pretoria can address the information needs of researchers at this faculty and fill gaps in the service. A framework was suggested that indicated the linkage of institutional research output goals with information needs and the role of the library in meeting these goals.

It suggested that services provided to researchers by the library, as well as skills development initiatives, need to be in line with the information needs of researchers. Several suggestions for services were made. It is clear that library support must address expressed needs of users, trends expressed in the literature and what they can and need to contribute in alignment with institutional goals.



Marketing initiatives need to focus on the skills and expertise of information specialists and ways in which these can contribute directly to addressing the institutional research output goals.

The next chapter will present the conclusion and the recommendations of the study, based on the research question and its sub-questions.

## CHAPTER 8:

### CONCLUSIONS AND RECOMMENDATIONS

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#### 8.1 INTRODUCTION

This study investigated the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria. It also assessed the current information services provided by the Jotello F Soga Library to determine whether these services are meeting the information needs of researchers. This chapter presents the concluding findings and the recommendations of the study, based on the research question and its sub-questions.

The following research question had to be addressed:

What are the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria, and how are these needs being met by the information support delivered by the Jotello F Soga Library?

In order to address the problem statement, the research question was divided into the following sub-questions:

1. What has been reported on the information needs, information seeking behaviour and information use behaviour (nationally and internationally) of the following: veterinary researchers, veterinary faculty staff, postgraduate students in veterinary science and veterinary practitioners?
2. What has been reported (nationally and internationally) on information support by academic and research libraries to the following: faculty, researchers and postgraduate students?
3. What are the information needs, information seeking behaviour and information use behaviour of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria?
4. What information support services and products are currently offered by the Jotello F Soga Library?

5. How can the Jotello F Soga Library address the information needs and support the information seeking behaviour and information use behaviour of the researchers at the Faculty of Veterinary Science, University of Pretoria and fill gaps in the service?

Research participants included researchers (including all academic staff as well as masters' and doctoral students) and the three information specialists at the Jotello F Soga Library designated to supporting the information needs of researchers.

Several methods were used to collect data, namely:

- Literature analysis
- Questionnaire for researchers (and postgraduate students) at the Faculty of Veterinary Science, University of Pretoria
- Questionnaire for information specialists at the Jotello F Soga Library, Faculty of Veterinary Science, University of Pretoria
- Focus group interviews with researchers and (postgraduate students) at the Faculty of Veterinary Science, University of Pretoria
- Focus group interview with information specialists at the Jotello F Soga Library, Faculty of Veterinary Science, University of Pretoria
- Citation analysis of the 2012 and 2013 research output of researchers and postgraduate students at the Faculty of Veterinary Science, University of Pretoria
- LibQual results (only as additional information)

## 8.2 FINDINGS

The next section will give a short summary of the main research findings for each sub-question.

### 8.2.1 Sub-question 1 – What has been reported on the information needs, information seeking behaviour and information use behaviour (nationally and internationally) for the following: veterinary researchers, veterinary faculty staff, postgraduate students in veterinary science and veterinary practitioners?

This question was addressed by the literature analysis presented in Chapter 3 of the study. Context plays an important role in the information behaviour of researchers. The literature analysis revealed that information needs, information seeking behaviour and information use behaviour differ between disciplines. Developments in the online environment resulted in the fact that the library is no longer the only source of information (or point of access to information) for researchers. Researchers prefer electronic information resources as methods for searching and accessing information and library collections are the preferred

support service needed from the library. Researchers however need library support with more complicated topics. It is important to inform users (researchers) of the services the library provides.

Context as well as work roles and tasks play an important role in the information behaviour of veterinary science researchers. Although veterinary science researchers prefer online information sources, they still need the library for information. They need assistance especially when seeking information on new or complicated topics.

### **8.2.2 Sub-question 2 – What has been reported (nationally and internationally) on information support by academic and research libraries to the following: faculty, researchers and postgraduate students?**

This question was addressed by the literature analysis in Chapter 4 of the study. The following findings are notable:

The role of the information specialist is changing and fraught with challenges in order to meet the evolving information needs and expectations of faculty and researchers in a technology-driven society. Planning and management of library collections, services, technology and space (facilities), need to incorporate the changing information needs of researchers. As researchers rank access to information resources very high, it is one of the main responsibilities of academic libraries to ensure that researchers have access to all the information resources that support their information needs and that collection management activities recognise and accommodate diversity and change from the perspective of researchers. Information management and information organising skills are still viewed as the most important attributes of information specialists.

### **8.2.3 Sub-question 3 – What are the information needs, information seeking behaviour and information use behaviour of veterinary researchers at the Faculty of Veterinary Science, University of Pretoria?**

This question was addressed by the empirical investigation and the findings are presented in Chapter 6. The main findings can be summarised as follows:

Information needs of veterinary science researchers are motivated by the research environment (context). This is also clear from findings from the citation analysis that indicated an increase in research output in high-quality journals. Based on these findings, it is clear that researchers need to respond to challenges of the research environment and institutional goals to increase the quantity and quality of research output. Researchers need information resources and extensive and effortless access to all the information they need.

They need information specialists to enable such access to information for them and to solve all problems that may hinder their effortless access to information.

Most researchers spend a large part of their time on information seeking, searching online databases and other information sources such as electronic books, electronic journals and other online information. They prefer seeking their own information. They prefer to use online databases and information resources to search for information. Most researchers feel confident that their information needs are being satisfied.

Researchers do not often use the physical library. The findings from the literature however indicate that in other studies the library sometimes plays a much more prominent role in addressing the information needs of veterinary science researchers (Chikongo & Aina 2001; Nweke 1995), although more recent studies among veterinary science researchers also found that because of the increased use of online sources, researchers tend to visit the physical library less often (Prakash 2013; Shokeen & Kuman 2009). Researchers do not attend scheduled library training sessions (lunch-hour sessions), but will attend at least one one-on-one training session presented by an information specialist.

Researchers do not often use information services provided by the library to keep up to date with new developments. They prefer face-to-face contact with peers (e.g. attending conferences, meetings or workshops; personal communication with colleagues) as a method to keep abreast with information in their research field.

Criteria used for selecting a publication in which to publish their research output are the reputation of a journal, whether the journal is on the list of accredited journals (to qualify for an NRF subsidy), and the likelihood of acceptance of the article.

The information needs of veterinary science researchers are thus motivated by the research environment, which puts pressure on researchers for increased high-quality research output. Models by Wilson (1981), Krikelas (1983), and Leckie, Pettigrew and Sylvain (1996) include information in the context of the environment. Leckie, Pettigrew and Sylvain (1996) suggest that information needs create an awareness of sources, which results in information use. According to this model, the most important variables, determining whether a source is to be used or not, is “the familiarity and prior success with the source ... along with the trustworthiness, packaging, timeliness, cost, quality and accessibility of the source(s)” (Case 2007:128). This may indicate a preference for online resources.

#### **8.2.4 Sub-question 4 – What information support services and products are currently offered by the Jotello F Soga Library?**

This question was addressed by the data presented in Chapter 6. The following summarises the main findings:

Information specialists provide access to information, information resources and information discovery tools. They also provide information and information resources on research, support with research methodology and ethics, as well as information management tools (e.g. RefWorks and Endnote). Other services provided include information literacy training and marketing and outreach services.

#### **8.2.5 Sub-question 5 – How can the Jotello F Soga Library address the information needs and support the information seeking behaviour and information use behaviour of the researchers at the Faculty of Veterinary Science, University of Pretoria and fill gaps in the service?**

In Chapter 7 the data analysed and presented in Chapter 6 were further interpreted to compile a framework in which the library was presented in the context of the institutional research goals and the researchers' needs. The aim of this framework was to provide recommendations for efficient and effective ways to address the information needs of researchers and eventually assist the institution in meeting strategic research goals.

The following services were recommended in Chapter 7:

Collection development practices need to incorporate information needs of researchers. Building of partnerships and collaboration initiatives for resource sharing and access to information and collections not owned is essential. Professional skills development and continuing professional development initiatives need to be based on the information needs of researchers. Library space for research and learning needs to be designed to incorporate the diverse needs of researchers.

Information specialists need to focus awareness services and marketing activities on their skills and how they can contribute to institutional research goals rather than only on library products. Ways to do this are getting involved in systematic reviews, providing research data management tools, platforms and services and providing bibliometric services and advice.

### **8.3 LIMITATIONS OF THE STUDY**

Participation from information specialists was limited to only three; these are, however, the only information specialists for veterinary science researchers in South Africa. One may

presume that the results of such a small sample may have a negative impact on the reliability of results. This shortcoming can however be overlooked since this study used a case study method, which allows the researcher to do an intense study on a small population. The input from the information specialists is also not presented with the intention to generalise, but to compare information support with expressed information needs.

The response rate to the questionnaires to researchers was very low and participants had to be invited several times to complete the questionnaire. Although some researchers were reluctant to participate in the focus group interviews, claiming “lack of time”, an acceptable number of participants could be gathered through several invitation rounds.

#### **8.4 RECOMMENDATIONS**

The aim of this study was to determine the information needs, information seeking behaviour and information use of researchers at the Faculty of Veterinary Science, University of Pretoria. It also attempted to assess current information services provided by the Jotello F Soga Library in order to find out if these services were meeting the information needs of researchers. Based on the findings, Chapter 7 discussed a framework for recommendations to fill the gaps in the service to researchers, which served as the foundation for the following recommendations:

- (1) The study found that challenges posed by the research environment and institutional goals affect the information needs of researchers. Therefore information support initiatives need to be aligned with institutional goals and to be focussed on challenges in the research environment. The library must address the expressed needs of users and explore trends in the global research library environment.
- (2) Given that researchers rank access to information resources very highly, this study recommends that collection development and management must be viewed as priority for the library. Bearing in mind that researchers prefer online information resources, the library needs to invest in electronic resources, which are easy to access and use. It is further suggested that in order to include access to information not owned, the library must establish more partnerships and get involved in collaboration initiatives.
- (3) Given that the Jotello F Soga Library is the only academic library supporting a veterinary science faculty in South Africa, it is recommended that this library benchmarks its collection with other international veterinary faculties and schools, for example in the USA or Europe. This will enable the library to determine the quality of

the collection, identify best practices and evaluate whether the collection is in line with institutional strategies and goals regarding research output.

- (4) The study also found that researchers are unaware of the skills and expertise of information specialists. It is suggested that information specialists market their expertise by getting involved in their own research.
- (5) Information specialists need to be more involved in institutional as well as faculty goals and initiatives and become more involved in the research activities of the researchers they support. They need to provide customised research support products that are aligned with institutional goals.

## **8.5 SUGGESTIONS FOR FUTURE RESEARCH**

The study indicated that researchers experience pressure to do research and to publish. Although researchers did not explicitly mention that they experienced anxiety and emotional difficulties while doing research, it was implied. It is suggested that future research investigate the emotional information needs of researchers in the context of the research environment and explore ways to address these.

Models for information seeking were briefly discussed and this study referred to a few aspects of these models, but these were not significantly applied in this study. There were however a few components of the models mentioned from which the information behaviour of veterinary science researchers could be investigated further. These include the importance of the environment as motivator for information seeking, as mentioned by the Krikelas model (1983) as well as in Wilson's models and the impact of work roles and tasks on information seeking of professionals of professionals, as developed by Leckie, Pettigrew and Sylvian (1996). Emotional information needs of researchers can be further investigated by using Kuhlthau's Information Search Process model.

## **8.6 CONCLUSION**

The aim of this chapter was to confirm that the problem statement and the sub-questions, presented in Chapter 1 had been addressed successfully. The concluding findings and the recommendations of the study, based on the research question and its sub-questions, were discussed. The chapter also addressed the limitations of the study and suggested future research on this topic.

In conclusion it is confirmed that the research question and all the sub-questions were successfully addressed. The study pointed out that national and institutional strategies



regarding research output have an impact on the information needs of researchers. It confirmed that information needs of veterinary science researchers are mainly based on access to information, information resources and online collections. Although many of the identified needs are currently being addressed by the library, several potential areas of improvement were identified. These include technical support with accessing online collections, as well as support with research methodology and publishing. Another challenge is that researchers are often not aware of the information organising skills and expertise of information specialists. The study recommends that library collections and information resources be better aligned with user (researcher) needs. In addition, the establishment of initiatives for collaboration and partnerships between institutions is recommended to allow access to information and collections not owned by the library. Information specialists need to make researchers aware of their skills and expertise by engaging directly in institutional research activities. The role of the academic librarian is indeed changing and increasingly fraught with challenges. At the same time, opportunities for meeting the evolving information needs of faculty and researchers in the technology-driven society, research-intensive and dynamic veterinary environment in South Africa are abundant.

## REFERENCES

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- Albach, P.G. & Knight, J. 2007, The internationalization of higher education: Motivations and realities, *Journal of Studies in International Education*, 11(3-4):290 – 305.
- Al-Suqri, M.N. 2011, Information-seeking behavior of social science scholars in developing countries: A proposed model. *The International Information and Library Review*, 43(1):1 – 14.
- Altbach, P.G., Reisberg, L. & Rumbley, L.E. 2009, *Trends in global higher education: Tracking an academic revolution*, Paris: UNESCO.
- Allan, B. 2010, *Supporting research students*, London: Facet Publishing.
- Allen, D. & Wilson, T.D. 2003, Information overload: Context and causes, *New Review of Information Behaviour Research*, 4(1):31 – 44.
- As, S. 2004, Information needs and seeking behaviour of Tanzanian forestry researchers in the electronic environment, *University of Dar es Salaam Library Journal*, 6(1):78 – 89.
- Association of College and Research Libraries, 2010, *Value of academic libraries: A comprehensive research review and report* (Researched by Megan Oakleaf), Chicago: Association of College and Research Libraries, viewed 10 May 2013 at <http://www.acrl.ala.org/value>.
- Association of Research Libraries & Texas A & M University. 2013, *LibQUAL 2013 Survey: University of Pretoria, Department of Library Services*, Washington: Association of Research Libraries.
- Association of Southeastern Research Libraries. 2001, *Shaping the future: ASERL's competencies for research librarians*, viewed 5 December 2013 at <http://www.aserl.org>.
- Barnard, H., Cowan, R. & Müller, M. 2012, Global excellence at the expense of local diffusion, or a bridge between two worlds? Research in science and technology in the developing world, *Research Policy*, 41(4):756 – 769.
- Barry, C.A. 1997, The research activity timeline: A qualitative tool for information research, *Library and Information Science Research*, 19(2):153 – 179.

Bates, M.J. 2005, 'An introduction to metatheories, theories, and models', in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of Information Behaviour*, pp. 1 – 24, Medford: Information Today.

Bates, M.J. 2010, 'Information Behavior', in M.J. Bates & M.N. Maack (eds.), *Encyclopedia of Library and Information Sciences*, 3<sup>rd</sup> edn., vol. 3, pp. 2381 – 2391, New York: CRC Press.

Bazeley, P. 2010, Conceptualising research performance, *Studies in Higher Education*, 35(8):889 – 903.

Becker, C.H. 2009, Student values and research: Are Millennials really changing the future of reference and research? *Journal of Library Administration*, 49(4):341 – 364.

Berger, C.R. 1987, 'Communicating under uncertainty', in M. Roloff & G. Miller (eds.), *Interpersonal Processes: New Directions in Communication Research*, pp. 39 – 62, Newbury Park, CA: Sage.

Berger, C.R. & Calabrese, R. 1975, Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication, *Human Communication Research*, 1(2):99 – 112.

Biswas, B. & Haque, E. 2008, Information use pattern of researchers in veterinary science and animal husbandry: A citation study, *SRELS Journal of Information Management*, 45(3):355 – 363.

Bitso, C.L.M. & Fourie, I. 2011, Information-seeking behaviour of in-service secondary level geography teachers in Lesotho, *Mousaion*, 29(2):173 – 194.

Blake, C. & Pratt, W. 2006, Collaborative information synthesis I: A model of information behaviors of scientists in medicine and public health, *Journal of the American Society for Information Science and Technology*, 57(13):1740 – 1749.

Blaxter, L., Hughes, C. & Tight, M. 2011, *How to Research*. New York: Open University Press.

Bogdan, A.T., Predoi, G., Cornila, N., Sonea, A., Ionita, L., Simona, I., Ipate, I., Toba, G.F., Diaconescu, D.L. & Strateanu, A. 2010, The need for progress in veterinary medicine and farm animals bioproducts between 2020 – 2050 – 2100 through social knowledge based on scientific researches and technological innovation, *Scientific Works - University of*

*Agronomical Sciences and Veterinary Medicine, Bucharest Series C, Veterinary Medicine*, 26(2):1 – 8.

Borgman, C.L. & Furner, J. 2002, Scholarly communication and bibliometrics, *Annual Review of Information Science and Technology*, 36(1):2 – 72.

Borgman, C.L., Smart, L.J., Millwood, K.A., Finley, J.R., Champeny, L., Gilliland, A.J., *et al.* 2005, Comparing faculty information seeking in teaching and research: Implications for the design of digital libraries, *Journal of the American Society for Information Science and Technology*, 56(4):636 – 657.

Borrego, A. & Urbano, C. 2007, Analysis of the behaviour of the users of a package of electronic journals in the field of chemistry, *Journal of Documentation*, 63(2):243 – 258.

Bradac, J.J. 2001, Theory comparison: Uncertainty reduction, problematic integration, uncertainty management and other curious constructs, *Journal of Communication*, 51(3):456 – 476.

Branch, J.L. 2001, Information-seeking processes of junior high students: A case study of CD-ROM encyclopedia use, *School Libraries Worldwide*, 7(1):11 – 27.

Braun, V. & Clarke, V. 2006, Using thematic analysis in psychology, *Qualitative Research in Psychology*, 3(1):77 – 101.

Brophy, P. 2008, Telling the story: Qualitative approaches to measuring the performance of emerging library services, *Performance Measurement and Metrics*, 9(1):7 – 17.

Brown, C.M. 1999, Information seeking behaviour of scientists in the electronic information age: Astronomers, chemists, mathematicians and physicists, *Journal of the American Society for Information Science and Technology*, 50(10):929 – 943.

Brown, C. 2010, Communication in the sciences, *Annual Review of Information Science and Technology*, 44(1):285 – 316.

Brown, S. & Swan, A. 2007, Researchers' use of academic libraries and their services: A report commissioned by the Research Information Network and the Consortium of Research Libraries, viewed 5 March 2013 at <http://0-eprints.soton.ac.uk.innopac.up.ac.za/263868/>

Bryman, A. 2006, Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, 6(1):97 – 113.

- Case, D.O. 2002, *Looking for information: A survey of research on information seeking, needs, and behaviour*, Amsterdam: Academic Press.
- Case, D.O. 2006, Information behaviour, *Annual Review of Information Science and Technology*, 40:293 – 327.
- Case, D.O. 2007, *Looking for information: A survey of research on information seeking, needs, and behaviour*, 2<sup>nd</sup> edn., Amsterdam: Elsevier.
- Case, D.O. (ed.). 2012, *Looking for Information: A survey of research on information seeking, needs and behaviour*, 3<sup>rd</sup> edn., London: Emerald Group.
- Case, M.M. 2008, Partners in knowledge creation: An expanded role for research libraries in the digital future, *Journal of Library Administration*, 48(2):141 – 156.
- Cherry, M. 2010, South African science: Black, white and grey, *Nature*, 463(7282):726 – 728.
- Chikonzo, A.C. & Aina, L.O. 2001, The information environment of veterinary researchers at the University of Zimbabwe, *International Information and Library Review*, 33(1):97 – 111.
- Choudury, S. 2010, Data curation: An ecological perspective, *College and Research Libraries News*, 71(4):194 – 196.
- Chowdhury, S., Gibb, F. & Landoni, M. 2011, Uncertainty in information seeking and retrieval: A study in an academic environment, *Information Processing and Management*, 47(2):157 – 175.
- Coetsee, T. 2011, RefShare: A community of practice to enhance research collaboration, *Ariadne*, vol. 66, viewed 19 March 2015 at <http://dev.ariadne.ac.uk/issue66/coetsee/>
- Connaway, L.S. & Powell, R.R. 2005, *Basic research methods for librarians*, 4<sup>th</sup> edn., Westport: Libraries Unlimited.
- Connaway, L.S., & Powell, R.R. 2010, *Basic research methods for librarians*, 5<sup>th</sup> edn., Westport: Libraries Unlimited.
- Connaway, L.S., Dickey, T.J., & Radford, M.L. 2011, “If it is too inconvenient I’m not going after it:” Convenience as a critical factor in information-seeking behaviors, *Library and Information Science Research*, 33(3):179 – 190.

- Conrad, P.A., Mazet, J.A., Clifford, D., Scott, C. & Wilkes, M. 2009, Evolution of a transdisciplinary "One Medicine-One Health" approach to global health education at the University of California, Davis, *Preventive Veterinary Medicine*, 92(4):268 – 274.
- Cook, C., Thompson, B., Heath, F. & Thompson, R. 2001, LibQUAL+: Service quality assessment in research libraries, *IFLA Journal*, 27(1):264 – 268.
- Corrall, S. 1995, Academic libraries in the information society, *New Library World*, 96(1120):35 – 42.
- Corrall, S. 2010, Educating the academic librarian as a blended professional: A review and case study, *Library Management*, 31(8/9):567 – 593.
- Council of Higher Education. 2009, *Higher education monitor no. 7: Postgraduate studies in South Africa: A statistical profile – A report commissioned by the Council of Higher Education, Pretoria: Council on Higher Education*, viewed 15 March 2012 at [http://www.che.ac.za/media\\_and\\_publications/higher-education-monitor/higher-education-monitor-7-postgraduate-studies](http://www.che.ac.za/media_and_publications/higher-education-monitor/higher-education-monitor-7-postgraduate-studies)
- Council on Higher Education. 2013, *Higher education participation 2011*. Pretoria: Council on Higher Education viewed on 23 March 2015 at <http://www.che.ac.za/sites/default/files/publications/Higher%20Education%20Participation%202011.pdf>.
- Courtright, C. 2007, Context in information behaviour research, *Annual Review of Information Science and Technology*, 41:273 – 306.
- Creswell, J.W. 2013, *Research design: Qualitative, quantitative, and mixed methods approaches*, 3<sup>rd</sup> edn., Thousand Oaks, CA: Sage.
- Daniel, J. 2011, *Sampling essentials: Practical guidelines for making sampling choices*, Thousand Oaks, CA: Sage.
- Darch, C. & de Jager, K. 2012, 'Making a difference in the research community': South Africa's library academy experience and the researcher–librarian relationship, *Journal of Academic Librarianship*, 38(3):145 – 152.
- Davies, B., Stutz, A. & Thomson, G. 2000, We should vet together, *Library Association Record*, 102(7):390 – 391.

- Davies, M.B. 2007, *Doing a successful research project: Using qualitative and quantitative methods*, New York: Palgrave MacMillan.
- De Beer, C.S. 2003, Scholarly work: Demands, challenges and excitements: Topical, *Mousaion*, 21(1):117 – 136.
- De Jager, K. 1991, Researcher as library user: A study of library support for successful research activities, *South African Journal of Library and Information Science*, 59(2):43 – 47.
- De Jager, K., Nassimbeni, M., & Crowster, N. 2014, Developing a new librarian library research support in South Africa, *Information Development*, viewed 26 August 2014 at [http://0-  
idv.sagepub.com.innopac.up.ac.za/content/early/2014/07/11/0266666914542032.abstract](http://0-<br/>idv.sagepub.com.innopac.up.ac.za/content/early/2014/07/11/0266666914542032.abstract)
- Dell, R.B. 2010, Animal studies and One Health: IACUC considerations, *ILAR Journal*, 51(3):288 – 290.
- Dervin, B. 1992, 'From the mind's eye of the user: The sense-making qualitative-quantitative methodology', in J.D. Glazier & R.R. Powell (eds.), *Qualitative research in information management*, pp. 61-84, Englewood, CO: Libraries Unlimited.
- Dervin, B. 2000, 'Chaos, order, and sense-making: A proposed theory for information design', in R. Jacobson (Ed.), *Information design*, pp. 35 – 57, Cambridge, MA: MIT Press.
- Devadason, F.J. & Lingam, P.P. 1997, A methodology for the identification of information needs of users, *IFLA Journal*, 23(1):41 – 51.
- De Vos, A.S. (ed.). 1998, *Research at grassroots: A primer for the caring professions*, Pretoria: J.L. van Schaik.
- Diab, R. & Gevers, W. (ed). 2009, *The state of science in South Africa*, Pretoria: Academy of Science of South Africa.
- Drago, I., Mellia, M., Munafo, M., Sperotto, A., Sadre, R., & Pras, A. 2012, Inside dropbox: understanding personal cloud storage services, in *Proceedings of the 2012 ACM Conference on Internet Measurement*, Boston, MA, USA, November 14 - 16, 2012, pp. 481 – 494.
- Drake, A. & Woods, L.A. 1978, An information service for practicing veterinarians, *Bulletin of the Medical Library Association*, 66(4):437 – 440.

Drost, E.A. 2011, Validity and reliability in social science research, *Education, Research and Perspectives*, 38(1):105 – 123.

Du Preez, M. 2007, Information needs and information seeking behaviour of engineers: A systemic review, *Mousaion*, 25(2):72 – 94.

Durrheim, K., 2006, 'Research design', in M.J.T. Blanche, M.T. Blanche, K. Durrheim & D. Painter, (eds.), *Research in practice: Applied methods for the social sciences*, pp. 33 – 59, Cape Town: Juta.

Eisenberg, M. & Berkowitz, R. 1992, Information problem – solving: the 'Big Six Skills Approach', *School Library Media Activities Monthly*, 8(5):27 – 42.

Eldredge, J.D. 2004, Inventory of research methods for librarianship and informatics, *Journal of the Medical Library Association*, 92(1):83 – 90.

Ellis, D. 1989, A behavioural approach to information science retrieval design, *Journal of Documentation*, 45(3):171 – 212.

Ellis, D. 1993, Modelling the information-seeking patterns of academic researchers: A grounded theory approach, *Library Quarterly*, 63(4):469 – 486.

Ellis, D. 1997, Modelling the information seeking patterns of engineers and research scientists in an industrial environment, *Journal of Documentation*, 53(4):384 – 403.

Ellis, D., Cox, D. & Hall, K. 1993, A comparison of the information seeking patterns of researchers in the physical and social sciences, *Journal of Documentation*, 49(4):356 – 369.

Erdelez, S. & Means, T. 2005, 'Measuring changes in information sharing among life science researchers', in *Knowledge Management: Nurturing Culture, Innovation and Technology : Proceedings of the 2005 International Conference on Knowledge Management*, North Carolina, USA, October 27-28, 2005, pp. 29 – 40 New Jersey: World Scientific.

Fennewald, J. 2008, Research productivity among librarians: Factors leading to publications at Penn State, *College and Research Libraries*, 69(2):104 – 116.

Fidel, R. 1984, The case study method: A case study, *Library and Information Science Research*, 6(1):273 – 288.

Fidel, R. 2008, Are we there yet? Mixed methods research in library and information science, *Library and Information Science Research*, 30(1):265 – 272.



- Fidel, R., Mark Pejtersen, A., Cleal, B. & Bruce, H. 2004, A multidimensional approach to the study of human-information interaction: A case study of collaborative information retrieval, *Journal of the American Society for Information Science and Technology*, 55(11):939 – 953.
- Fidzani, B.T. 1998, Information needs and information-seeking behaviour of graduate students at the University of Botswana, *Library Review*, 47(7):329 – 340.
- Fisher, K.E., Erdelez, S. & McKechnie, E.F. (eds.). 2005, *Theories of information behaviour*, Medford, NJ: Information Today.
- Fisher, K.E. & Julien, H. 2009, Information behaviour, *Annual Review of Information Science and Technology*, 43:1 – 73.
- Fleishman-Hillard International Communications. 2008, Digital Clinic Study, viewed 21 May 2013 at <https://www.avma.org/News/JAVMANews/Pages/080415p.aspx>
- Ford, N., Miller, D. & Moss, N. 2001, The role of individual differences in internet searching: An empirical study, *Journal of the American Society for Information Science and Technology*, 52(12):1049 – 1066.
- Foster, A. 2004, A nonlinear model of information-seeking behaviour, *Journal of the American Society for Information Science and Technology*, 55(1):228 – 237.
- Foster, J. 2006, Collaborative information seeking and retrieval, *Annual Review of Information Science and Technology*, 40:329 – 356.
- Fouché, C.B. 1998, 'Data collection methods', in A.S. de Vos (ed.), *Research at grassroots: A primer for the caring professions*, pp. 152 – 174, Pretoria: J.L. van Schaik.
- Fourie, I. 2004, Librarians and the claiming of new roles: How can we try to make a difference?, *Aslib Proceedings*, 56(1):62 – 74.
- Fourie, I. 2009, Learning from research on the information behaviour of healthcare professionals: A review of the literature 2004 – 2008 with a focus on emotion, *Health Information and Libraries Journal*, 26(1):171 – 186.
- Fourie, I. & Bothma, T. 2007, Information seeking: An overview of web tracking and the criteria for tracking software, *Aslib Proceedings*, 55(3):264 – 284.
- Fox, R. & Stuart, C. 2009, Creating learning spaces through collaboration: How one library refined its approach, *EDUCAUSE Quarterly*, (April 2009) viewed 6 March 2013 at

<http://www.educause.edu/EQ/EDUCAUSEQuarterlyMagazineVolum/CreatingLearningSpacesThroughC/163850>

Frantz, J.M., Rhoda, A., Struthers, P. & Phillips, J. 2010, Research productivity of academics in a physiotherapy department: A case study, *African Journal of Health Professions Education*, 2(2):18 – 20.

Fry, J. & Talja, S. 2004, The cultural shaping of scholarly communication: Explaining e-journal use within and across academic fields, *Proceedings of the American Society for Information Science and Technology*, 41(1):20 – 30.

Fry, J. & Talja, S. 2007, The intellectual and social organisation of academic fields and the shaping of digital resources, *Journal of Information Science*, 33(2):115 – 133.

Galloway, T.O. & Starkey, J. 2013, Google Drive, *The Charleston Advisor*, 14(3):16 – 19.

Gannon–Leary, P., Bent, M. & Webb, J. 2008, Researchers and their information needs: A literature review, *New Review of Academic Librarianship*, 13(1):51 – 69.

Garcia, A.C., Dawes, M.E., Kohne, M.L., Miller, F.M., & Groschwitz, S.F. 2006, Workplace studies and technological change, *Annual Review of Information Science and Technology*, 40:393 – 437.

Genoni, P., Merrick, H., & Willson, M.A. 2006, Scholarly communities, e-research literacy and the academic librarian, *Electronic Library*, 24(6):734 – 746.

George, C., Bright, A., Hurlbert, T., Linke, E.C., St. Clair, G. & Stein, J. 2006, Scholarly use of information: Graduate students' information seeking behaviour, *Information Research*, 11(4) paper 272, viewed 8 April 2013 at <http://InformationR.net/ir/11-4/paper272.html>

Gerolimos, M., 2009, Skills developed through library and information science education, *Library Review*, 58(7):527 – 540.

Gibbs, E.P.J. & Anderson, T.C. 2009, Essential veterinary education: Equipping students with an understanding of the need for research in global veterinary public health, *Revue Scientifique et Technique - Office International des Épizooties*, 28(2):663 – 669.

Glavan, J.L. 2006, *Writing literature reviews: A guide for students of the social and behavioral sciences*, 3<sup>rd</sup> ed., Glendale, CA: Pycszak.

Goetsch, L.A. 2008, Reinventing our work: New and emerging roles for academic librarians, *Journal of Library Administration*, 48(2):157 – 172.

Gorman, G.E. & Clayton, P. 2005, *Qualitative research for the information professional: A practical handbook*. London: Facet Publishing.

Gorman, P.N. 1995, Information needs of physicians, *Journal of the American Society for Information Science*, 46(10):729 – 736.

Gross, J., Chan, J. & Fetherston, T. 2013, Open-access publishing advantages: A case study at the " Australian Journal of Teacher Education", viewed 8 December 2014 at <http://digitalcommons.bepress.com/webinars/44/>

Habib, A. & Morrow, S. 2007, Research, research productivity and the state in South Africa, *Journal of Higher Education in Africa*, 5(1):113 – 130.

Haines, L.L, Light, J., O'Malley, D. & Delwiche, F.A. 2010, Information-seeking behaviour of basic science researchers: Implications for library services, *Journal of the Medical Library Association*, 98(1):73 – 81.

Hansson, J. & Johannesson, K. 2013, Librarians' views of academic library support for scholarly publishing: An every-day perspective, *The Journal of Academic Librarianship*, 39(3):232 – 240.

Hara, N., Solomon, P., Kim, S.L. & Sonnewald, D.H. 2003, An emerging view of scientific collaboration: Scientists' perspectives on collaboration and factors that impact collaboration, *Journal of the American Society for Information Science and Technology*, 54(10):952 – 965.

Hardre, P.L., Crowson, H.M., Xie, K., & Ly, C. 2007, Testing differential effects of computer-based, web-based and paper-based administration of questionnaire research instruments, *British Journal of Educational Technology*, 38(1):5 – 22.

Harley, D., Acord, S.K., Earl-Novell, S., Lawrence, S. & King, C.J. 2010, Assessing the future landscape of scholarly communication: An exploration of faculty values and needs in seven disciplines. UC Berkeley: Center for Studies in Higher Education, viewed 26 September 2011 at <http://escholarship.org/uc/item/15x7385g>

Hart, G. & Kleinveldt, L. 2011, The role of an academic library in research: Researchers' perspectives at a South African university of technology, *South African Journal of Library and Information Science*, 77(1):37 – 50.

- Heinström, J. 2005, Fast surfing, broad scanning and deep diving: The influence of personality and study approach on students' information-seeking behavior, *Journal of Documentation*, 61(2):228 – 247.
- Heinström, J. 2006, Broad exploration or precise specificity: Two basic information seeking patterns among students, *Journal of the American Society for Information Science and Technology*, 57(11):1440 – 1450.
- Hemminger, B.M., Lu, D., Vaughan, K. & Adams, S.J. 2007, Information seeking behavior of academic scientists, *Journal of the American Society for Information Science and Technology*, 58(14):2205 – 2225.
- Henefer, J. & Fulton, C. 2005, 'Krikelas's model of information seeking', in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of information behaviour*, pp. 225 – 229, Medford: Information Today.
- Henry, L., Mohan, G. & Yanacopulos, H. 2004, Networks as transnational agents of development, *Third World Quarterly*, 25(5):839 – 855.
- Herman, E. 2001, End-users in academia: Meeting the information needs of university researchers in an electronic age: Part 2 innovative information-accessing opportunities and the researcher: User acceptance of IT-based information resources in academia, *Aslib Proceedings*, 53(10):431 – 457.
- Herther, N.K. 2009, Research evaluation and citation analysis: Key issues and implications, *Electronic Library*, 27(3):361 – 375.
- Hofman, K.J., Kanyengo, C.W., Rapp, B.A. & Kotzin, S. 2009, Mapping the health research landscape in Sub-Saharan Africa: A study of trends in biomedical publications, *Journal of the Medical Library Association*, 97(1):40 – 43.
- Hofstee, E. 2006, *Constructing a good dissertation*, Johannesburg: EPE.
- Hoonakker, P. & Carayon, P. 2009, Questionnaire survey nonresponse: A comparison of postal mail and internet surveys, *International Journal of Human-Computer Interaction*, 25(5):348 – 373.
- Howard, S. 1998, 'Verbal protocol analysis', in B. Henderson-Sellers, A. Simons & H. Younessi (eds.), *The Open Process Specification*, pp. 272-274, Sydney: Addison Wesley.

Hyldegård, J. 2006, Collaborative information behaviour – exploring Kuhlthau’s information search process model in a group – based educational setting, *Information Processing and Management*, 42(1):276 – 298.

Ikpaahindi, L. 1985, An overview of bibliometrics: Its measurements, laws and their applications, *Libri*, 35(2):163 – 177.

Ilesanmi, T.C. 2013, Roles of the librarian in a research library in the digital era: Challenges and the way forward, *New Review of Academic Librarianship*, 19(1):5 – 14.

Inglesi-Lotz, R. & Pouris, A. 2011, Scientometric impact assessment of a research policy instrument: The case of rating researchers on scientific outputs in South Africa, *Scientometrics*, 88(3):747 – 760.

Inglesi, R. & Pouris, A. 2008, Where are our universities going? A review, twenty years later: Commentary, *South African Journal of Science*, 104(9/10):345 – 348.

Ingwersen, P. & Järvelin, K. 2005, *The turn: Integration of information seeking and retrieval in context*, Dordrecht: Springer.

Jamali, H.R. & Nicholas, D. 2006, *Communication and information-seeking behaviour of research students in physics and astronomy*, Paper presented at the Annual Meeting of the American Society of Information Science and Technology, November 3 – 9, 2006, Austin, TX.

Jeenah, M. & Pouris, A. 2008, South African research in the context of Africa and globally, *South African Journal of Science*, 104(9/10):351 – 354.

Johnson, J.D. 2003, On contexts of information seeking, *Information Processing and Management*, 39(5):735 – 760.

Johnson, J.D. 2009, An impressionistic mapping of information behavior with special attention to contexts, rationality, and ignorance, *Information Processing and Management*, 45(5):593 – 604.

Johnson, W.G. 2011, The evolution of the reference librarian, *Community and Junior College Libraries*, 17(2):91 – 103.

Julien, H., McKechnie, L.E.F. & Hart, S. 2005, Affective issues in library and information science systems work: A content analysis, *Library and Information Science Research*, 27(2):453 – 466.

Kahn, M. 2011, A bibliometric analysis of South Africa's scientific outputs – some trends and implications, *South African Journal of Science*, 107(1/2):27 – 32.

Kari, J. & Savolainen, R. 2007, Relationships between information seeking and context: A qualitative study of internet searching and the goals of personal development, *Library and Information Science Research*, 29(1):47 – 69.

Kayongo, J. & Helm, C. 2012, Relevance of library collections for graduate student research: A citation analysis study of doctoral dissertations at Notre Dame, *College and Research Libraries*, 73(1):47 – 67.

King, C. 2010, South African science: Signs of progress, *Science Watch Newsletter*, Thomson Reuters, May/June 2010, viewed 11 November 2011 at <http://sciencewatch.com/ana/fea/10mayjunFea/>

Kizza, J.M., Muchie, M. & Waema, T. 2010, Reaching out: Efforts to build sustainable African research and innovation capacity, *African Journal of Science, Technology, Innovation and Development*, 2(2):215 – 229.

Klein, D., Bosley, J., Conrad, F., Zach, L. & Schamber, L. 2002, Methodological issues in user studies, *Proceedings of the American Society for Information Science and Technology*, 39(1):503 – 504.

Kleynhans, S. 2012, The new PC era – the personal cloud, *Gartner Inc.* viewed 20 January 2015 at <https://www.gartner.com/doc/1890215/new-pc-era-personal-cloud>

Korjonen-Close, H. 2005, The information needs and behaviour of clinical researchers: A user-needs analysis, *Health Information and Libraries Journal*, 22(2):96 – 106.

Kracker, J. 2002, Research anxiety and students' perceptions of research: An experiment, Part 1: Effect of teaching Kuhlthau's ISP model, *Journal of the American Society for Information Science and Technology*, 53(4):282 – 294.

Krikelas, J. 1983, Information-seeking behaviour: Patterns and concepts, *Journal of Documentation*, 19(2):5 – 20.

Kroll, S. & Forsman, R. 2010, *A slice of research life: Information support for research in the United States*, Report commissioned by OCLC Research in support of the RLG Partnership, viewed 31 March 2013 at <http://www.oclc.org/research/publications/library/2010/2010-15.pdf>

Kuhlthau, C. 1991, Inside the search process: Information seeking from the user's perspective, *Journal of the American Society for Information Science*, 42(5):361 – 371.

Kuhlthau, C. 1993, *Seeking meaning: A process approach to library and information services*, Norwood, NJ: Ablex Publishing Company.

Kuhlthau, C.C. 1999, The role of experience in the information search process of an early career information worker: Perceptions of uncertainty, complexity, construction, and sources, *Journal of the American Society for Information Science*, 50(2):399 – 412.

Kuhlthau, C.C. 2004, *Seeking meaning: A process approach to library and information services*, 2<sup>nd</sup> edn., Westport, CT: Libraries Unlimited.

Kuhlthau, C.C. 2005, 'Kuhlthau's information search progress, in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of information behaviour*, pp. 230 – 234, Medford: Information Today.

Kuhlthau, C.C., Heinström, J. & Todd, R.J. 2008, The 'information search process' revisited: Is the model still useful? *Information Research*, 13(4), paper 355, viewed 8 February 2012 at <http://0-informationr.net.innopac.up.ac.za/ir/13-4/paper355.html>

Kumar, D. 2009, Information needs of faculty members and research scholars of Chaudhary Charan Singh University: A case study, library philosophy and practice, viewed on 5 February 2014 at <http://www.webpages.uidaho.edu/~mbolin/kumar.htm>

Kwasitsu, L. 2003, Information seeking behaviour of design, process and manufacturing engineers, *Library and Information Science Research*, 25(4):459 – 476.

Kwon, N., Onwuegbuzie, A.J. & Alexander, L. 2007, Critical thinking disposition and library anxiety: Affective domains on the space of information seeking and use in academic libraries, *College & Research Libraries*, 68(3):268 – 278.

Lamb, R., King, J.L. & Kling, R. 2003, Informational environments: Organizational contexts of online information use, *Journal of the American Society for Information Science and Technology*, 54(1):97 – 114.

Landman, W.A. 1988, *Basic concepts in research methodology*, Pretoria: Serva.

Landry, C.F. 2006, Work roles, tasks, and the information behaviour of dentists, *Journal of the American Society for Information Science and Technology*, 57(14):1896 – 1908.

- Law, D. 2010, The changing roles and identities of library and information services staff, in G. Gordon & C. Whitchurch (eds.), *Academic and professional identities in higher education: The challenges of a diversifying workforce*, pp. 185 – 198, New York: Routledge.
- Leckie, G.J., Pettigrew, K.E. & Sylvain, C. 1996, Modelling the information seeking of professionals: A general model derived from research on engineers, health care professionals and lawyers, *Library Quarterly*, 66(2):161 – 193.
- Leckie, G.J. 2005, 'General model of the information seeking of professionals', in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of information behaviour*, pp. 158 – 163, Medford: Information Today.
- Leech, N.L. & Onwuegbuzie, A.J. 2009, A typology of mixed methods research design, *Quality & Quantity*, 43(2):265 – 275.
- Leedy, P.D. & Ormrod, J.E. 2005, *Practical research*, Upper Saddle River, NJ: Prentice Hall.
- Leedy, P.D. & Ormrod, J.E. 2014, *Practical research planning and design*, 10<sup>th</sup> edn., Essex: Pearson Education.
- Lonnqvist, H. 2007, The research processes of humanities scholars, *Advances in Library Administration and Organization*, 25(1):175 – 201.
- Lumley, J.S.P. & Benjamin, W. 1994, *Research: Some ground rules*, Oxford: Oxford University Press.
- Lynch, B.P. & Smith, K.R. 2001, The changing nature of work in academic libraries, *College and Research Libraries*, 62(5):407 – 420.
- MacDonald, S. & Uribe, L.M. 2008, Libraries in the converging worlds of open data, e-Research and Web 2.0, *Online*, 32(2):36 – 40.
- Macgregor, K. 2007, South Africa: Universities set priorities for research, *University World News*, Issue 0005, viewed 11 November 2013 at <http://www.universityworldnews.com/article.php?story=20071108145540742>
- Mackenzie, M.L. 2003, An exploratory study investigating the information behaviour of line managers within a business environment, *New Review of Information Behaviour Research*, 4(1):63 – 78.
- Matthews, J.R. 2007, *Library assessment in higher education*, Westport: Libraries Unlimited.



McCaffrey, C. 2013, LibQUAL in Ireland: Performance assessment and service improvement in Irish university libraries, *The Journal of Academic Librarianship*, 39(4):347 – 350.

McKechnie, L., Goodall, G.R., Lajoie-Paquette, D. & Julien, H. 2005, How human information behaviour researchers use each other's work: A basic citation analysis study, *Information Research*, 10(2):10 – 12, viewed 11 November 2013 at <http://www.informationr.net/ir/10-2/paper220.html>

McKnight, L.K., Stetson, P.D., Bakken, S., Curran, C. & Cimino, J.J. 2002, Perceived information needs and communication difficulties of inpatient physicians and nurses, *Journal of the American Medical Informatics Association*, 9(Suppl 6):S64 – S69.

McKnight, M. 2006, The information seeking of on-duty critical care nurses: Evidence from participant observation and in-context interviews, *Journal of the Medical Library Association*, 94(2):145 – 151.

Meho, L.I. 2006, E-mail interviewing in qualitative research: A methodological discussion, *Journal of the American Society for Information Science and Technology*, 57(10):1284 – 1295.

Meho, L.I. & Haas, S.W. 2001, Information-seeking behaviour and use of social science faculty studying stateless nations: A case study, *Library and Information Science Research*, 23(1):5 – 25.

Mehrjerdi, Y.Z., Toranlo, H.S. & Jamali, R. 2009, Measuring academic libraries service quality in fuzzy environment, *Performance Measurement and Metrics*, 10(2):94 – 115.

Mellon, C. 1986, Library anxiety: A grounded theory and its development, *College and Research Libraries*, 47(1):160 – 165.

Middleton, M. 2003, Skills expectations of library graduates, *New Library World*, 104(1184/1185):42 – 56.

Moloi, K.C., Gravett, S.J. & Petersen, N.F. 2009, Globalization and its impact on education with specific reference to education in South Africa, *Education Management Administration & Leadership*, 37(2):278 – 297.

Morse, J.M., Barrett, M., Mayan, M., Olson, K. & Spiers, J. 2008, Verification strategies for establishing reliability and validity in qualitative research, *International Journal of Qualitative Methods*, 1(2):13 – 22.

- Mulligan, A. & Mabe, M. 2011, The effect of the internet on researcher motivations, behaviour and attitudes, *Journal of Documentation*, 67(2):290 – 311.
- Mullins, J.L. 2012, The changing definition and role of collections and services in the university research library, *Indiana Libraries*, 31(1):18 – 24.
- Munde, G. & Marks, K. 2009, *Surviving the future: Academic libraries, quality and assessment*, Oxford: Chandos.
- Murray, A.L. & Sisco, W.M. 2007, Addressing educational challenges in veterinary medicine through the use of distance education, *Journal of Veterinary Medical Education*, 34(3):279 – 285.
- Musoke, M.G.N. 2007, Information behaviour of primary health care providers in rural Uganda: An interaction-value model, *Journal of Documentation*, 63(2):299 – 322.
- Musoke, M.G.N. 2008, Strategies for addressing the university library users' changing needs and practices in Sub-Saharan Africa, *Journal of Academic Librarianship*, 34(6):532 – 538.
- Nahl, D. & Bilal, D. (eds.). 2007, *Information and emotion: The emergent affective paradigm in information behaviour research and theory*, Medford, NJ: Information Today.
- National Research Council. 2005, *Critical needs for research in veterinary science*, Washington, DC: National Academies Press.
- National Research Foundation. 2011, *Department of Science and Technology, South Africa*, viewed 13 June 2013 at <http://www.nrf.ac.za/funding>
- Neal, J.G. 2009, What do users want? What do users need? W(h)ither the academic research library? *Journal of Library Administration*, 49(5):463 – 468.
- Nel, M. & Fourie, I. 2010, An exploratory study of the information behaviour of veterinary practitioners in South Africa, *Mousaion*, 28(2):107 – 133.
- Neumann, A. 2006, Professing passion: Emotion in the scholarship of professors at research universities, *American Educational Research Journal*, 43(3):381 – 424.
- Nicholas, N., Rowlands, I., Huntington, P., Jamali, H.R. & Hernández Salazar, P. 2010, Diversity in the e-journal use and information-seeking behaviour of UK researchers, *Journal of Documentation*, 66(3):409 – 433.

Nicholas, D. & Martin, H. 1997, Assessing information needs: A case study of journalists, *Aslib Proceedings*, 49(2):43 – 52.

Nicolaisen, J. 2007, Citation analysis, *Annual Review of Information Science and Technology*, 41:609 – 641.

Nitecki, D. & Herson, P. 2000, Measuring service quality at Yale University's libraries, *Journal of Academic Librarianship*, 26(4): 259 – 273.

Niu, X., Hemminger, M., Lown, C., Adams, S., Brown, C., Level, A., McLure, M., Powers, A., Tennant, M.R. & Catalso, T. 2010, National study of information seeking behavior of academic researchers in the United States, *Journal of the American Society for Information Science and Technology*, 61(5):869 – 890.

Palmer, C.L. & Cragin, M.H. 2008, Scholarship and disciplinary practices, *Annual Review of Information Science and Technology*, 42(1):163 – 212.

Pancheshnikov, Y. 2007, A comparison of literature citations in faculty publications and student theses as indicators of collection use and a background for collection management at a university library, *Journal of Academic Librarianship*, 33(6):674 – 683.

Pantry, S. & Griffiths, P. 2009, *How to give your users the LIS services they want*, London: Facet Publishing.

Pappaioanou, M. 2004, Veterinary medicine protecting and promoting the public's health and well-being, *Preventive Veterinary Medicine*, 62(2):153 – 163.

Pelzer, N.L. & Leysen, J.M. 1988, Library use and information-seeking behaviour of veterinary medical students, *Bulletin of the Medical Library Association*, 76(4):328 – 333.

Pelzer, N.L. & Leysen, J.M. 1991, Use of information resources by veterinary practitioners, *Bulletin of the Medical Library Association*, 79(1):10 – 16.

Pelzer, N., Wiese, W., & Leysen, J. 1998, Library use and information-seeking behavior of veterinary medical students revisited in the electronic environment, *Bulletin of the Medical Library Association*, 86(3):346 – 355.

Pelzer, N.L. & Wiese, W.H. 2005, Online tools for accessing veterinary information: Electronic continuing resources, *Journal of Electronic Resources in Medical Libraries*, 2(4):53 – 79.

Pickard, A. 2012. *Research methods in information*. London: Facet Publishing.

Pike, R.W., Solem, L. & Arch, D. 2000, *One-on-one training: How to effectively train one person at a time*, San Francisco: CreativeTraining Techniques Press.

Pinfield, S. 2001, The changing role of subject librarians in academic libraries. *Journal of Librarianship and Information Science*, 33(1):32 – 38.

Pinto, R. 2010, 'Mixed methods design', in N.J. Salkind (ed.), *Encyclopedia of research design*, pp. 813 – 819, Thousand Oaks, CA: Sage, viewed 12 September 2014 at doi: <http://0-dx.doi.org.innopac.up.ac.za/10.4135/9781412961288.n245>.

Poggenpoel, M., Myburg, C.P.H. & van der Linde, C.H. 2001, Qualitative research strategies as prerequisite for quantitative strategies, *Education-Indianapolis then Chula Vista*, 122(2):408 – 413.

Pouris, A. 2007, The National Research Foundation's rating system: Why scientists let their ratings lapse, *South African Journal of Science*, 103 (2):439 – 441.

Pouris, A. & Pouris, A. 2009, The state of science and technology in Africa (2000 – 2004): A scientometric assessment, *Scientometrics*, 79(2):297 – 309.

Pouris, A. & Pouris, A. 2010, Competing in a globalizing world: International ranking of South African universities, *Procesia Social and Behavioural Sciences*, 2(2):515 – 520.

Pouris, A. 2010a, A scientometric assessment of the Southern African Development Community: Science in the tip of Africa, *Scientometrics*, 85(1):145 – 154.

Pouris, A. 2010b, Still a way to go for South Africa's science revolution, *Nature*, 463(7282):729.

Prabha, C., Connaway, L.S., Olszewski, L. & Jenkins, L.R. 2007, What is enough? Satisficing information needs, *Journal of Documentation*, 63(1):74 – 89.

Prakash, G. 2013, Use of internet by the researchers of Indian Veterinary Research Institute, Izzatnagar, Bareilly: A survey, viewed 29 October 2014 at <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2311&context=libphilprac>

Quick, D. & Choo, K.K.R. 2014, Google Drive: Forensic analysis of data remnants, *Journal of Network and Computer Applications*, 40:179 – 193.

Raw, M.E. 1987, Survey of libraries in veterinary practice, *The Veterinary Record*, 121(1):129 – 131.

- Raza, M., Fatima, S. & Upadhyay, A. 2010, Information seeking behaviour of researchers in Central Drug Research Institute (CDRI), Lucknow, *Library Philosophy & Practice*, 12(2):1 – 10.
- Read, E.J. 2007, Data services in academic libraries: Assessing needs and promoting services, *Reference & User Services Quarterly*, 46(3):61 – 75.
- Rhoten, D. & Parker, A. 2004, Risks and rewards of an interdisciplinary research path, *Science*, 306(5704):2046.
- Ross, L. & Sennyey, P. 2008, The library is dead, long live the library! The practice of academic librarianship and the digital revolution, *The Journal of Academic Librarianship*, 34(2):145 – 152.
- Rousseau, R. 2002, Journal evaluation: Technical and practical issues, *Library Trends*, 50(3):418 – 439.
- Rowlands, I., Nicholas, D., Williams, P., Huntington, P. & Fieldhouse, M. 2008, The Google generation: The information behaviour of the researcher of the future, *Aslib Proceedings: New Perspectives*, 60(4):290 – 310.
- Rowley, J. 2000, The question of electronic journals, *Library Hi Tech*, 18(1):46 – 54.
- Sadler, E. & Given, L.M. 2007, Affordance theory: A framework for graduate students' information behaviour, *Journal of Documentation*, 63(1):115 – 141.
- Salazar, P.H., Marmolejo, M.I., Angeles, G.Y.V. & Malagon, C.V. 2007, Analysis of behavioral models in information search, *Ciencia da Informacao*, 36(1):36 – 146.
- Savolainen, R. 2008, *Everyday information practices: A social phenomenological perspective*, Lanham, MD: Scarecrow Press.
- Schmidt, D. 1991, Information resources in animal behaviour, *Science and Technology Libraries*, 12(1):69 – 83.
- Schonfeld, R.C. & Guthrie, K.M. 2007, The changing information services needs of faculty, *EDUCAUSE review*, July / August: 8 – 9.
- Schonfeld, R.C. & Long, M.P. 2010, *Ithaka S+R Library Survey 2010: Insights from U.S. academic library directors*, viewed 10 May 2013 at

<http://www.sr.ithaka.org/sites/default/files/reports/insights-from-us-academic-library-directors.pdf>.

Schonfeld, R.C. & Housewright, R. 2010, *Faculty Survey 2009: Key strategic insights for libraries, publishers, and societies*, viewed 9 May 2013 at [http://www.sr.ithaka.org/sites/default/files/reports/Faculty\\_Study\\_2009.pdf](http://www.sr.ithaka.org/sites/default/files/reports/Faculty_Study_2009.pdf)

Sheeja, N.K. 2010, Science vs social science: A study of information-seeking behavior and user perceptions of academic researchers, *Library Review*, 59(7):522 – 531.

Shiri, A & Revie, C. 2003, The effects of topic complexity and familiarity on cognitive and physical moves in a thesaurus-enhanced search environment, *Journal of Information Science*, 29(6):517 – 526.

Shokeen, A. & Kumar, S. 2009, Need of library training programme and importance of information sources for the veterinary scientists, *Indian Journal of Animal Production and Management*, 25(1/2):38 – 40.

Shuler, J. 2007, Academic libraries and the global information society, *Journal of Academic Librarianship*, 33(6):710 – 713.

Shumaker, D. 2011, 'Beyond instruction: Creating new roles for embedded librarians', in C. Kvenild & K. Calkins (eds.), *Embedded librarians: Moving beyond one-shot instruction*, pp. 17 – 31, Chicago: ACRL.

Sonnewald, D.H. 2007, Scientific collaboration, *Annual Review of Information Science and Technology*, 41:643 – 727.

Sooryamoorthy, R. 2013, Scientific research in the natural sciences in South Africa: A scientometric study, *South African Journal of Science*, 109(7/8):1 – 11.

Sooryamoorthy, R. 2015, *Transforming science in South Africa: Development, collaboration and productivity*, New York: Palgrave Macmillan.

South African Veterinary Council. 2011, The South African Veterinarian and Continued Professional Development, viewed 16 November 2013 at <http://www.savc.org.za/act-rule-regulations-forms/regulations/cpd-guide>

Spence, P.R., Reddy, M. & Hall, R. 2005, *A survey of collaborative information seeking of academic researchers*, Paper presented at the *ACM Conference on supporting group work (GROUP'05)*, Sanibel Island, FL, November 6 – 10, 2005, pp. 85–88.

Spink, A. 2000, Toward a theoretical framework for information science, *Journal of Information Science*, 3(2):77 – 82.

Spink, A. & Cole, C. 2004, Introduction to information seeking research, *Journal of the American Society for Information Science and Technology*, 55(8):657 – 659.

Spink, A. & Cole, C. 2006, Human information behaviour: Integrating diverse approaches and information use, *Journal of the American Society for Information Science and Technology*, 57(1):25 – 35.

Struwig, F.W. & Stead, G.B. 2007, *Planning, designing and reporting research*, Cape Town: Pearson Education South Africa.

Sugimoto, C.R., Tsou, A., Naslund, S., Hauser, A., Brandon, M., Winter, D. & Finlay, S.C. 2014, Beyond gatekeepers of knowledge: Scholarly communication practices of academic librarians and archivists at ARL institutions, *College and Research Libraries*, 75(2):145 – 161.

Swan, G.E. & Kriek, N.P.J. 2009, Veterinary education in Africa: Current and future perspectives, *Onderstepoort Journal of Veterinary Research*, 76(1):105 – 114.

Talja, S. 2005, 'The domain analytic approach to scholars' information practices', in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of information behaviour*, pp. 123 – 127, Medford: Information Today.

Talja, S. & Hansen, P. 2006, 'Information sharing', in A. Spink & C. Cole (eds.), *New Directions in Human Information Behavior*, pp. 113 – 134, Dordrecht: Springer.

Talja, S., Vakkary, P., Fry, J. & Wouters, P. 2007, The impact of research cultures on the use of digital resources, *Journal of the American Society for Information Science and Technology*, 58(1):1674 – 1685.

Taylor, R.S. 1962, The process of asking questions, *American Documentation*, 13(4):391 – 396.

Taylor, R. 1968, Question-negotiation and information seeking in libraries, *College and Research Libraries*, 29(2):178 – 194.

Tennant, M.R. 2005, Bioinformatics librarian: Meeting the information needs of genetics and bioinformatics researchers, *Reference Services Review*, 33(1):12 – 19.

- Tennant, M.R. & Cataldo, T.T. 2002, Development and assessment of specialized liaison librarian services, *Medical Reference Services Quarterly*, 21(2):21 – 37.
- Tenner, E. & Ye (Lan) Yang, Z. 2000, End-user acceptance of electronic journals: A case study from a major academic research library, *Technical Services Quarterly*, 17(2):1 – 14.
- Tenopir, C. 2003, Information metrics and user studies, *Aslib Proceedings*, 55(1/2):13 – 17.
- Tenopir, C., Mays, R. & Lei, W. 2011, Journal article growth and reading patterns, *New Review of Information Networking*, 16(1): 4 – 22.
- Tenopir, C., King, D.W., Boyce, P., Grayson, M., Zhang, Y. & Ebuon, M. 2003, Patterns of journal use by scientists through three evolutionary phases, *D-Lib Magazine*, 9(5), viewed 12 March 2012 at [www.dlib.org/dlib/may03/king/05king.html](http://www.dlib.org/dlib/may03/king/05king.html)
- Tijssen, R.W. 2007, Africa's contribution to the worldwide research literature: New analytical perspectives, trends, and performance indicators, *Scientometrics*, 71(2):303 – 327.
- Times Higher Education, 2015, *World University Rankings 2014-2015*, viewed 23 March 2015 at <http://www.timeshighereducation.co.uk/world-university-rankings/2014-15/world-ranking>
- Tongai, I. 2013, Incentives for researchers drive up publication output, *University World News* (Global Edition), 280:13 viewed on 23 March 2015 at <http://www.universityworldnews.com/article.php?story=20130712145949477>
- Trainor, A.A. & Graue, E. (eds.), 2013, *Qualitative methods in the social and behavioral sciences: A guide for researchers and reviewers*, Florence, KY: Routledge.
- Udofia, U.I. 1997, Selecting veterinary medical periodicals through citation analysis, *Library Review*, 46(2):105 – 112.
- University of Pretoria. 2009, *Research report*, viewed 19 April 2013 at <http://www.up.ac.za/en/research-innovation/article/271011/research-reports>
- University of Pretoria. 2013, *Research review*, viewed 19 January 2015 at <http://www.up.ac.za/en/research-innovation/article/271011/research-reports>
- Urquhart, C. & Rowley, J. 2007, Understanding student information behaviour in relation to electronic services: Lessons from longitudinal monitoring and evaluation, Part 2, *Journal of the American Society for Information Science and Technology*, 58(1):1188 – 1197.



- Vakkari, P. 2008, Trends and approaches in information behaviour research, *Information Research*, 13(4) paper 361, viewed 13 August 2014 at [www.informationr.net/ir/13-4/paper361.html](http://www.informationr.net/ir/13-4/paper361.html).
- Vaughan, C.L. 2008, Alternatives to the publication subsidy for research funding, *South African Journal of Science*, 104(3-4):91 – 96.
- Viera, D. & Faraino, R. 1997, Analyzing the research record of an institution's list of faculty publications, *Bulletin of the Medical Library Association*, 85(2):154 – 157.
- Wakeham, M. & Garfield, D. 2005, Supporting both learning and research in a UK post-1992 university library: A case study, *Journal of Librarianship and Information Science*, 37(4):175 – 186.
- Wales, T. 2000, Practice makes perfect? Vets' information seeking behaviour and information use explored, *Aslib Proceedings: New Perspectives*, 52(7):235 – 247.
- Wallace, D.P. & Van Fleet, C. 2012, *Knowledge into action: Research and evaluation in library and information science*, Santa Barbara: Libraries Unlimited.
- Wang, P. 1999, Methodologies and methods for user behavioural research, *Annual Review of Information Science and Technology*, 34:53 – 99.
- Wang, P. & White, M.D. 1999, A cognitive model of document use during a research project. Study 2. Decisions at the reading and citing stages, *Journal of the American Society for Information Science and Technology*, 50(2):98 – 114.
- Webb, J., Gannon – Leary, P. & Bent, M. 2007, *Providing effective library services for research*, London: Facet Publishing.
- Weiler, A. 2007, Information-seeking behaviour in Generation Y students: Motivation, critical thinking and learning theory, *The Journal of Academic Librarianship*, 31(1):46 – 53.
- Weiner, S.A., Stephens, G, & Nour, A.Y. 2011, Information-seeking behaviors of first-semester veterinary students: A preliminary report, *Journal of Veterinary Medical Education*, 38(1):21 – 32.
- White, D.A. & Wilson, T.D. 1988, *Information needs in industry: A case study approach*, Sheffield: University of Sheffield, Department of Information Studies, 1988. (British Library R & D Report 5954).

Wilkinson, M.A. 2001, Information sources used by lawyers in problem-solving: An empirical exploration, *Library and Information Science Research*, 23(2):257 – 276.

Wilson, C.S. & Tenopir, C. 2008, Local citation analysis, publishing and reading patterns: Using multiple methods to evaluate faculty use of an academic library's research collection, *Journal of the American Society for Information Science and Technology*, 59(9):1393 – 1408.

Wilson, T., Ford, N., Ellis, D., Foster, A. & Spink, A. 2002, Information seeking and mediated searching: Part 2. Uncertainty and its correlates, *Journal of the American Society for Information Science and Technology*, 53(1):704 – 715.

Wilson, T.D. 1981, On user studies and information needs, *Journal of Documentation*, 37(1):3 – 15.

Wilson, T.D. 2000, Human Information behaviour, *Informing Science*, 3(2):49 – 55.

Wilson, T.D. 2005, 'Evolution in information behaviour modelling: Wilson's model', in K.E. Fisher, S. Erdelez & L. McKenchie (eds.), *Theories of information behaviour*, pp. 31 – 36, Medford: Information Today.

Wilson, T.D. 2006, 60 years of the best in information research on user studies and information needs, *Journal of Documentation*, 62(6):658 – 670.

World Health Organization. 1999, Veterinary medicine in public health, *Weekly Epidemiological Record*, 19(1):154 – 156.

Wusteman, J. 2008, Virtual research environments: What is the librarians' role? *Journal of Librarianship and Information Science*, 40(2):67 – 70.

Wusteman, J. 2009, Virtual research environments: Issues and opportunities for librarians, *Library Hi Tech*, 27(2):169 – 173.

Yin, R.K. 2003, *Case study research: Design and methods*, 3<sup>rd</sup> edn., Thousand Oaks, CA: Sage.

Yin, R.K. 2009, *Case study research: Design and methods*. 4<sup>th</sup> edn., Thousand Oaks, CA: Sage.

Yin, R.K. 2013, *Case study research: Design and methods*. 5<sup>th</sup> edn., Thousand Oaks, CA: Sage.

York, M.C. 2000, Calling the scholars home: Google Scholar as a tool for rediscovering the academic library, *Internet Reference Services Quarterly*, 10(3-4):117 – 133.

Yu-Ping, S, & Hao-Ren, K. 2010, Information behavior of the semiconductor foundry industry engineers, *Journal of Educational Media & Library Sciences*, 48(1):87 – 118.

Zhang, Y. 2000, Using the Internet for survey research: A case study, *Journal of the American Society for Information Science*, 51(1):57 – 68.

Zinsstag, J., Schelling, E., Wyss, K. & Mahamat, M.B. 2005, Potential of cooperation between human and animal health to strengthen health systems, *Lancet*, 336:1242 – 1245.

## APPENDIX A: Questionnaire for researchers

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**What are the information needs, information seeking behaviour and information use of researchers at the faculty of Veterinary Science, University of Pretoria, and are these needs being met by the Jotello F Soga Library?**

Questionnaire for researchers to determine information needs, information seeking behaviour and information use behaviour, as well as the need for library support

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**Please mark (X) the option(s) corresponding to your choice:**

### 1. INFORMATION NEEDS

#### 1.1 Faculty involvement

Please indicate your involvement in the Faculty of Veterinary Science:

Professor	
Associate professor	
Senior lecturer	
Lecturer	
Junior lector	
Assistant lector	
Research staff	
Post-doctoral	
Doctoral student	
Masters student	
Other (specify)	

#### 1.2 Research involvement

1.2.1 Are you currently involved in any research projects? (Please indicate how)

NO	Yes, for master's degree purposes	Yes, for doctoral degree purposes	Yes, for post-doctoral degree purposes	Contract researcher	Other (specify)

1.2.2 Are you currently supervising post-graduate students conducting research projects?

	NO	Yes, students doing master's dissertation	Yes, students doing mini-research dissertation	Yes, PhD students	Other supervision of research projects (Please specify)
Number of students					

**2 INFORMATION SEEKING**

**2.1 What estimated percentage of your time do you spend on information seeking?**

0%	1 -10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%

**2.2 Please indicate the estimated percentage of involvement of other people in information seeking for your research:**

Information searches are done by:	0%	1 - 10%	11- 20%	21- 30%	31- 40%	41- 50%	51- 60%	61- 70%	71- 80%	81- 90%	91- 100%
Yourself											
Information specialist (subject librarian) for your section/department											
Research assistant											
Postgraduate student(s)											
Undergraduate student(s)											
Secretary/administrative staff											
Other (please specify)											

### 2.3 How often do you use each of the following methods to find information for your research?

1.	Searching in published hard-copy directories/bibliographies	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
2.	Searching in electronic databases for citations (e.g. CAB Direct)	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
3.	Reading/skimming the important journals in your field	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
4.	Getting references and recommendations from colleagues	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
5.	Using Google/Google Scholar	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
6.	Searching full-text electronic databases (e.g. Science Direct)	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
7.	Following citations from other journal articles	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
8.	Using a reference/footnote in one article to link to another (CrossRef)	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
9.	Browsing for articles in an online table of contents	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
10.	Other (please specify)	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never

### 2.4 Please indicate on the scale below how confident you are that you are finding everything you should for your information needs:

Very confident  Not confident at all

### 3 INFORMATION USE

#### 3.1 The use of libraries and collections

3.1.1 Please indicate how often do you use the following sources of information:

1.	Journal articles	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
2.	Textbooks	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
3.	Preprints	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
4.	Conference attendance	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
5.	Conference proceedings	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
6.	Departmental colleagues	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
7.	Other researchers/contacts	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
8.	Personal notes/files	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
9.	Scientific databases, such as Science Direct, CAB Direct, Scopus, ISI Web of Science, etc.	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
10.	Internet search tools, such as Google, Yahoo	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
11.	Social networks, such as Facebook, Mendeley, CiteULike, Blogs, etc.	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
12.	Visits to the physical library	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never
13.	Other (please specify)	Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Never

3.1.2 On average, how many times in the last 12 months did you perform the following actions?

	Never	1 – 5 times	6 – 10 times	11 – 20 times	21 – 30 times	More than 30 times
1.	Visited the Jotello F Soga Library (at the Faculty of Veterinary Science) in person					
2.	Discussed your research or information needs with your information specialist (including face-to-face meetings, e-mail, telephone or via social networks)					
3.	Received one-to-one training in information or research-related products from your information specialist (e.g. in the library or your office)					
4.	Attended a scheduled library training session					

3.1.3 How do you keep up to date with new developments and information in your field? (Please mark all relevant options):

- |     |  |                          |
|-----|--|--------------------------|
| 1.  | Looking at contents pages of printed journals in the library                                     | <input type="checkbox"/> |
| 2.  | Looking at contents pages of electronic journals   | <input type="checkbox"/> |
| 3.  | Looking at contents pages of new books in the library  | <input type="checkbox"/> |
| 4.  | Looking at contents pages of new e-books published in your field of interest                     | <input type="checkbox"/> |
| 5.  | RSS feeds (news feeds from the internet)   | <input type="checkbox"/> |
| 6.  | Journal contents pages email alerting services (e.g. EBSCO TOC Premier and ScienceDirect Alerts) | <input type="checkbox"/> |
| 7.  | Database email alerting services (e.g. keyword searches from databases)                          | <input type="checkbox"/> |
| 8.  | Personal communication with colleagues   | <input type="checkbox"/> |
| 9.  | Attending conferences, meetings and workshops  | <input type="checkbox"/> |
| 10. | Discussions on social networks (e.g. Facebook, ResearchGate, Nature Network, Mendeley, etc.)     | <input type="checkbox"/> |
| 11. | Subscribing to current awareness services provided by the Jotello F Soga Library                 | <input type="checkbox"/> |
| 12. | Other (please specify)   | <input type="checkbox"/> |
- 

**3.2 Collaboration**

**3.3 Information presentation and communication**

3.3.1 What are the most important criteria used when selecting an appropriate publication outlet for your research? (Please mark all relevant options):

- |     |  |                          |
|-----|--|--------------------------|
| 1.  | Likelihood of acceptance                                       | <input type="checkbox"/> |
| 2.  | Timeline from submission to publication                        | <input type="checkbox"/> |
| 3.  | Journal reputation (impact factor, credibility and prestige)   | <input type="checkbox"/> |
| 4.  | Journal visibility   | <input type="checkbox"/> |
| 5.  | Focus and orientation of journal (relevance to research topic) | <input type="checkbox"/> |
| 6.  | Open access  | <input type="checkbox"/> |
| 7.  | Intellectual property / copyright issues                       | <input type="checkbox"/> |
| 8.  | Cost (page charges and other fees)                             | <input type="checkbox"/> |
| 9.  | Accredited journal to qualify for subsidy                      | <input type="checkbox"/> |
| 10. | Past experience with journal                                   | <input type="checkbox"/> |
| 11. | Recommendation by peers  | <input type="checkbox"/> |



12. Other (please specify)

#### 4 THE ROLE OF THE INFORMATION SPECIALIST (SUBJECT LIBRARIAN)

##### 4.1 Have you met your information specialist (subject librarian) yet?

YES	NO

##### 4.2 Please indicate on the scale below how you view the relative importance of the information specialist (subject librarian) in research support:

Very important           Not important at all

##### 4.3 In your opinion, what are the 3 most important roles of the information specialist (subject librarian)? (Please rate 1, 2 and 3; where 1 indicates the most important role)

- |    |  |                          |
|----|--|--------------------------|
| 1. | Custodian of print-based and digitised archives and special collections        | <input type="checkbox"/> |
| 2. | Manager of institutional repositories of digital information                   | <input type="checkbox"/> |
| 3. | Administrator dealing with the purchasing and delivery of information services | <input type="checkbox"/> |
| 4. | Subject-based information expert   | <input type="checkbox"/> |
| 5. | Teacher of information literacy and related skills                             | <input type="checkbox"/> |
| 6. | Manager of the vast datasets generated by e-research and grid-based projects   | <input type="checkbox"/> |
| 7. | Technology specialist facilitating electronic access to information resources  | <input type="checkbox"/> |
| 8. | An important member of the research team                                       | <input type="checkbox"/> |
| 9. | Provider of a research-friendly environment (area) to study/work               | <input type="checkbox"/> |
| 9. | Other librarian roles, in your opinion (please specify)                        | <input type="checkbox"/> |

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**4.4 In your opinion, do you think the information specialists (subject librarians) of the Jotello F Soga Library are adequately skilled for supporting your information needs?**

YES	NO

**4.5 Can you please elaborate on the answer you gave in 4.4?**

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**4.6 In your opinion, what are the shortcomings of the library in supporting your information needs?**

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**4.7 In your opinion, what are the successes of the library in supporting your information needs?**

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**4.8 What new or different services would you like to see provided by the library?**

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Thank you for your time and cooperation!

## APPENDIX B: Questionnaire for information specialists

**What are the information needs, information seeking behaviour and information use of researchers at the faculty of Veterinary Science, University of Pretoria, and are these needs being met by the Jotello F Soga Library?**

Questionnaire for information specialists (subject librarians) to determine research and information support to researchers and postgraduate students served by the Jotello F Soga Library, University of Pretoria

**Please mark (X) the option(s) corresponding to your choice:**

### 1. INFORMATION SPECIALIST

#### 1.1 Research involvement

1.1.1 Are you currently involved in any research projects (not linked to research for formal studies)?

YES	NO

1.1.2 If YES, can you please briefly elaborate?

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1.1.3 Are you currently enrolled for postgraduate studies? (Please indicate the academic programme and specify the area of specialisation)

NO	YES, postgraduate diploma	YES, honours degree	YES, master's (course work)	YES, master's (research)	YES, doctorate	Other (specify)
Area of specialisation:						

1.1.4 Please indicate (X) the departments or research centres at the Faculty of Veterinary Science, University of Pretoria, for which you are an information specialist. (You may indicate more than one.)

- |     |                                    |                          |
|-----|------------------------------------|--------------------------|
| 1.  | Anatomy and Physiology             | <input type="checkbox"/> |
| 2.  | Paraclinical Sciences              | <input type="checkbox"/> |
| 3.  | Companion Animal Clinical Studies  | <input type="checkbox"/> |
| 4.  | Production Animal Clinical Studies | <input type="checkbox"/> |
| 5.  | Veterinary Tropical Diseases       | <input type="checkbox"/> |
| 6.  | Equine Research                    | <input type="checkbox"/> |
| 7.  | Veterinary Wildlife Studies        | <input type="checkbox"/> |
| 8.  | Pharmacovigilance                  | <input type="checkbox"/> |
| 9.  | Biomedicine                        | <input type="checkbox"/> |
| 10. | Other (please specify)             | <input type="checkbox"/> |
-

1.1.5 Please indicate the estimated number of articles you have published in the following publications:

		Conference proceeding	Accredited journal	Non-accredited journal	News-letter	Book chapter	Book	Blog	Other (please specify)
1.	Single author								
2.	Co-author with colleagues from the same library								
3.	Co-author with colleagues of another library of the UP Library services								
4.	Co-author with researchers from your faculty								
5.	Co-author with researchers from other UP faculties								
6.	Co-author with researchers from the Department of LIS								
7.	Co-author with researchers from other universities in South Africa								
8.	Co-author with researchers from universities outside South Africa								
9.	Co-author with researchers from other institutions (not universities)								
10.	Other (please specify)								

## 2 THE ROLE OF THE INFORMATION SPECIALIST (SUBJECT LIBRARIAN)

**2.1 Please indicate on the scale below how you view the relative importance of the information specialist (subject librarian) in research support:**

Very important 

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 Not important at all

**2.2 Can you please briefly elaborate on the answer given in 2.1?**

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**2.3 Please indicate the estimated percentage of time you spend on the following services to support research at your faculty:**

		0%	1 - 10%	11- 20%	21- 30%	31- 40%	41- 50%	51- 60%	61- 70%	71- 80%	81- 90%	91- 100%
1.	Collection building and management											
2.	Advice/training on selecting and searching electronic and print databases											
3.	Advice/training on general information/research skills											
4.	Advice/support on reference management tools and techniques											
5.	Assistance in finding impact factors for journals and other bibliometric information											
6.	Document delivery/ILL services to researchers											
7.	Digitisation and preservation of research output and scholarly communication											
8.	Information seeking and literature searches for researchers											

9.	Advising on copyright/intellectual property right issues											
10.	Providing IT support											
11.	Facilitating e-learning											
12.	Creating research support products											
13.	Marketing and communication of research products (newsletters, webpage, blogs, etc.)											
14.	Other (please specify)											

**2.4 In your opinion, what are the 3 most important roles of the information specialist (subject librarian)? (Please rate 1, 2 and 3; where 1 indicates the most important role)**

1. Custodian of print-based and digitised archives and special collections
2. Manager of institutional repositories of digital information
3. Administrator dealing with the purchasing and delivery of information services
4. Subject-based information expert
5. Teacher of information literacy and related skills
6. Manager of the vast datasets generated by e-research and grid-based projects
7. Technology specialist facilitating electronic access to information resources
8. An important member of the research team
9. Provider of a research-friendly environment (area) to study/work
9. Other librarian roles, in your opinion (please specify)

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**2.5 In your opinion, what skills are the most important for an information specialist (subject librarian) to have in order to support the information needs of researchers effectively?**

- |     |                                       |                          |
|-----|---------------------------------------|--------------------------|
| 1.  | Subject expertise                     | <input type="checkbox"/> |
| 2.  | People skills                         | <input type="checkbox"/> |
| 3.  | Communication skills                  | <input type="checkbox"/> |
| 4.  | Technical/IT skills                   | <input type="checkbox"/> |
| 5.  | Presentation and teaching skills      | <input type="checkbox"/> |
| 6.  | Financial management skills           | <input type="checkbox"/> |
| 7.  | Analytical and evaluative skills      | <input type="checkbox"/> |
| 8.  | Team-working and team-building skills | <input type="checkbox"/> |
| 9.  | Project management skills             | <input type="checkbox"/> |
| 10. | Flexibility                           | <input type="checkbox"/> |
| 11. | Ability to learn quickly              | <input type="checkbox"/> |
| 12. | Vision                                | <input type="checkbox"/> |

**2.6 What do you think are the information needs of researchers and postgraduate services?**

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**2.7 What services and products do you currently provide to support the information needs of researchers?**

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**2.8 What information needs (if any) are you aware of that you cannot address?**

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**2.9 What skills or professional development initiatives (training/courses) did you attend (if any) in the last 24 months in preparation to provide support to your researchers?**

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*Thank you for your time and cooperation!*



## APPENDIX C: Cover letter for questionnaire for researchers

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September 2013

Dear Researcher

The traditional relationship between faculty researchers and the librarian has shifted radically in recent years owing to factors such as technological innovations, digital access developments and networking opportunities and tools. Research libraries needed to respond to the complex challenges and opportunities in the new research environments and had to develop new processes, systems, tools and skills to support and assist diverse needs of researchers. Libraries and librarians have a notion of what support has to be given to the researchers they serve, but do this support really meet the complex and dynamic information and research needs of faculty researchers?

The aim of a study for my M. Information Science dissertation is therefore to determine what support is needed from information specialists (subject librarians) in order to meet the complete spectrum of information and research needs of faculty researchers. In order to find out if the library services and support to the researchers of the Faculty of Veterinary Science are adequate and meet the information needs of researchers, a questionnaire was compiled, which addresses your experience, involvement, opinions and suggestions regarding current and future information and research support delivered by the Jotello F Soga Library to researchers of the Faculty of Veterinary Science, University of Pretoria. The questionnaire will take approximately 10 minutes to complete.

Your participation is completely voluntary and if you feel uncomfortable with any questions, you are allowed to leave them out. You may also withdraw at any point. Your responses and information will be handled strictly confidentially. Data retrieved from this study will be reported only in the aggregate.

For any assistance regarding this survey, please contact Marguerite Nel at  
012 529 8474.

Thank you for your time and support. Your participation is sincerely appreciated.

Kind regards



Mrs MA Nel

## APPENDIX D: Cover letter for questionnaire for information specialists

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21 October 2013

Dear Information Specialist

The traditional relationship between faculty researchers and the librarian has shifted radically in recent years owing to factors such as technological innovations, digital access developments and networking opportunities and tools. Research libraries need to respond to the complex challenges and opportunities in the new research environments and have to develop new processes, systems, tools and skills to support and assist diverse needs of researchers. Libraries and librarians have a notion of what support has to be given to the researchers they serve, but do this support really meet the complex and dynamic information and research needs of faculty researchers?

The aim of a study for my M. Information Science dissertation is therefore to determine what support is needed from information specialists (subject librarians) in order to meet the complete spectrum of information and research needs of faculty researchers. In order to find out if the library services and support to the researchers of the Faculty of Veterinary Science are adequate and meet the information needs of researchers, a questionnaire was compiled, which addresses your experience, involvement, opinions and suggestions regarding current and future information and research support delivered by the Jotello F Soga Library to researchers of the Faculty of Veterinary Science, University of Pretoria. The questionnaire will take approximately 10 minutes to complete.

Your participation is completely voluntary and if you feel uncomfortable with any questions, you are allowed to leave them out. You may also withdraw at any point. Your responses and information will be handled strictly confidentially. Data retrieved from this study will be reported only in the aggregate.

For any assistance regarding this survey, please contact Marguerite Nel at

012 529 8474 or 082 774 2517

Thank you for your time and support. Your participation is sincerely appreciated.

Kind regards



Mrs MA Nel

**APPENDIX E: Informed consent form**

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**INFORMED CONSENT FORM**

1 Title of research project:

**The information needs, information seeking behaviour and information use of researchers at the faculty of Veterinary Science, University of Pretoria, and how these needs are being met by the information support delivered**

**by the Jotello F Soga Library**

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

.....

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 In the case of interviews, I grant my permission that all information provided in the interview may be recorded for research purposes

6 I understand that upon signature of this form, I will be provided with a copy.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Witness: \_\_\_\_\_ Date: \_\_\_\_\_

Researcher: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX F: Researcher declaration

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### RESEARCHER DECLARATION

#### APPLICATIONS MUST INCLUDE THE FOLLOWING STATEMENTS

Hereby I, **Margaretha Alice Nel** in my capacity as **researcher**, declare that

- 1 Research subjects will be informed, information will be handled confidentially, research subjects reserve the right to choose whether to participate and, where applicable, written permission will be obtained for the execution of the project (example of permission attached).
- 2 No conflict of interests or financial benefit, whether for the researcher, company or organisation, that could materially affect the outcome of the investigation or jeopardise the name of the university is foreseen.
- 3 Inspection of the experiments in loco may take place at any time by the committee or its proxy.
- 4 The information I furnish in the application is correct to the best of my knowledge and that I will abide by the stipulations of the committee as contained in the regulations.



16 September 2013

5 Signed: \_\_\_\_\_

Date: \_\_\_\_\_