An analysis of the e-research needs of postgraduate students at higher education institutions

by

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Samevatting

'n Analise van die e-navorsingsbehoeftes van nagraadse studente by hoër onderwysinstansies

deur

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Studieleier	**Prof Dr JC Cronjé**
Departement	**Departement Kurrikulumstudies**
Graad	**MEd (Rekenaargesteunde Onderwys)**

Hierdie verhandeling lewer verslag oor die elektroniese navorsingsbehoeftes wat ervaar word deur nagraadse studente verbonde aan hoër onderwysinstansies binne 'n toenemend elektroniese navorsingsomgewing. As gevolg van innovasie en tegnologiese verbeterings is die behoeftes wat deur studente op nagraadse vlak ervaar word, heelwat anders as die behoeftes en verwagtinge wat voorheen deel was van so 'n student se navorsingsomgewing binne 'n nie-elektroniese biblioteek.

Hierdie studie word as 'n kwantitatiewe studie beskou wat van empiriese data gebruik maak.

Uit beide die literatuurondersoek en die navorsing vir hierdie studie het dit duidelik geword dat nagraadse studente in Suid-Afrika en wêreldwyd soortgelyke e-navorsingsbehoeftes ervaar met betrekking tot die beskikbaarstelling van primêre datastelle, die oordra van data en die verwerking daarvan, e-toegang, e-kommunikasie, e-opleiding en e-publisering. Deur die spesifieke e-navorsingsbehoeftes van nagraadse studente in ag te neem, kan die biblioteek daarin slaag om 'n e-navorsingsomgewing te skep wat onderskei word i.t.v. gebruikersvriendelike toegang – die belangrikste en waardevolste vennoot in 'n nagraadse student se strewe na akademiese uitnemendheid en sukses.

Sleutelwoorde:

Navorsingsbehoeftes | Inligtingsbehoeftes | Elektroniese behoeftes | Nagraadse studente | Navorsers | Inligting | Inligtingshulpbronne | Internet | Rekenaars | Hoër onderwys | Tersiêre onderwys | Navorsing | World Wide Web | Biblioteek | Inligtingkundige | Bibliotekaris | Rol | Intydse behoeftes | Intydse navorsingomgewing | Virtuele navorsingsomgewing

Summary

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This dissertation reports on an analysis conducted to establish the electronic research needs experienced by postgraduate students at higher education institutions within an increasing electronic research environment. Innovation and improvements in technology have caused research students to approach the library with a whole range of needs and expectations undreamed of in the non-electronic library.

A quantitative research instrument was mainly used to gather data, together with the results from a user survey. This study is therefore regarded as a quantitative study.

From both the literature survey and research for this study it became clear that postgraduate students in South Africa and throughout the world experience similar e-research needs with regard to primary data sharing, transfer of data and computation, e-access, e-communication, e-training and e-publishing. By taking the specific needs of postgraduate students into account, the library will be able to create an electronic research environment distinguished by ease of use and access - the principal and most valued research partner in a postgraduate students' pursuit of academic distinction and success.

Key words:

Research needs | Information needs | Electronic needs | Postgraduate students | Researchers | Information | Information resources | Internet | Computers | Higher education | Tertiary education | Research | World Wide Web | Library | Information specialist | Librarian | Role | Online needs | Online research environment | Virtual research environment

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List of Abbreviations and Acronyms

Abbreviation / Acronym	Description
AIS	Academic Information Service, or library of the University of Pretoria
CD ROM	Compact Disk Read-Only Memory
COP	Community of Practice
DOAJ	Directory of Open Access Journals
DVD	Digital Video Disc
E-access	Electronic access
E-books	Electronic full text books
E-client	Electronic client
E-communication	Electronic communication
E-databases	Electronic databases (bibliographical or full text)
E-information	Electronic information
E-journals	Electronic full text journals
E-librarian	Electronic librarian
E-mail	Electronic mail
E-newsletter	Electronic newsletter
E-publishing	Electronic publishing
E-research	Electronic research, or research conducted in an electronic way
E-science	Electronic science, or science conducted in an electronic way
E-training	Electronic training, or training conducted in an electronic way
FirstSearch™	An online search service provided by a company called OCLC (Online Computer Library Center) which provides access to indexing, abstracting, and full-text databases covering a wide range of fields.
ILL	Inter-library Loans
IMPS	Information Management and Procurement Services
Internet	Network of computer networks which operates world-wide using a common set of communication protocols.
iPOD	A generic brand which refers to a class of portable digital audio players.
IT	Information Technology
ITC	Information Technology and Communication
OCLC	Online Computer Library Center, Inc., Dublin, Ohio

OPAC	Online Public Access Catalog; a computerised library catalog, or the portion of the catalog available for patron use.
PC	Personal Computer
PDA	Personal Digital Assistant is a term for any small mobile hand held device that provides computing and information storage retrieval capabilities for personal or business use.
PG	Postgraduate students
SAS	A statistical and graphical package that includes modules for several types of specialized analysis.
SMS	Short Message Service. Short text messages that can be sent to a mobile phone.
SPSS	Statistical package for the social sciences: A software system for data management and analysis.
TLEI	Telematic Learning and Education Innovation
Tyds@Tuks	Gateway to the collection of electronic journals to which the library (AIS) subscribes.
UG	Undergraduate students
UP	University of Pretoria
UPeTD	Electronic theses and dissertations
UPSpace	Digital research repository of the University of Pretoria
URL	An acronym for "Uniform Resource Locator". The address of a resource on the Internet.
VIP	Very Important Person
VRE	Virtual Research Environment
WAM	Web Access Management
Wi-Fi	Wireless Fidelity
WorldCat™	The world's largest bibliographic database, representing books, journals, dissertations, audio-visual materials, and manuscripts in repositories worldwide.
WWW	World Wide Web

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Thank you for your love, interest, patience and continuous support throughout my studies!

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Lastly – many thanks to my mother, Anna Viljoen, who introduced me to the world of computers in education.

To God all the honor and glory.

Chapter 1. Background and introduction

1.1 Introduction

In this dissertation I report on the results of a needs assessment conducted to establish the electronic research needs of postgraduate students (our clients) at the University of Pretoria. The ubiquity of the Internet, iPOD, PDA, cell phone technology and other communication tools that are currently used to access the World Wide Web requires librarians and information specialists to re-evaluate the ways in which we address the research needs of postgraduate students. If one also takes into account the fact that more and more research publications such as books and journals are only published online, it becomes clear that the traditional role of the library is changing rapidly. From being places in which information is kept and stored in various ways within a physical library building, libraries are more and more becoming places in which users may access "gateways" to information that exists in a virtual environment. Basefsky (1999) writes in his article, *The library as an agent of change: pushing the client institution forward,* that, while the library "can still be a place to go for information, the emphasis must be placed on disseminating information outside its walls. The library should be going to its patrons, rather than waiting for them to appear."

Not only has the role of the library changed. Innovation and improvements in technology have caused research students to approach the library with a whole range of needs and expectations undreamed of in the non-electronic library. What research students want libraries now has changed. The way in which they communicate their needs to the library has changed. Moreover, the way in which the library addresses those needs has also changed. Such changes have compelled faculties and support services in higher education institutions to adapt themselves to the merging of the physical and the virtual campus, and to develop services that support the changing research needs of students.

Libraries that are effective and efficient are always identifying and incorporating new ways of serving the client community as best they can. A library should have a clear understanding of the needs of each of its client groups because each group has distinctive needs that are different from those of other client groups. Thus, for example, we refer to the needs of undergraduates as "learning" needs and the needs

of postgraduate students as “research” needs. Lynch (2001), Borgman (1999), and Coleman and Sumner (2004) argue that the main task of the digital libraries of the future will not be to support generalized generic access to information in large collections and databases but rather to provide “customization by community” which they define as “the development of services tailored to support the specific, and real, practices of different user constituencies”. In libraries of this kind functionalities will be expressly designed to support the specific needs of particular communities of users. Basefsky (1999) notes that libraries that serve their client groups effectively possess “a detailed understanding of what their clients need”.

By accepting the client-service business model, the Academic Information Service and other academic libraries in South Africa commit themselves to serving their clients in whatever ways they require. It stands to reason that if the services that these libraries offer is not satisfactory, clients will use other methods and find other places in which to pursue their research needs. One trend nowadays is that postgraduate students do not bother to struggle with complex library databases to find relevant information. This has become a source of concern to academic librarians and researchers who question the quality of research conducted in such a way. Some students, for example, would rather use Google™ to search for information because it has a far more user-friendly interface than most academic databases – regardless of whether the information they retrieve from Google™ is of any research value or not. Every year the Academic Information Service pays large amounts of money to obtain the most recent subscriptions to quality databases. But these databases are not being optimally utilized because of various barriers, obstacles and disincentives that I will review and discuss later on in this report.

While this dissertation reports on a needs assessment that was conducted to determine the electronic research needs of postgraduate students (i.e. clients) specifically at the Faculty of Education of the University of Pretoria, it also touches on the generic research needs of postgraduate students from the campus as a whole. The University of Pretoria clients of the Faculty of Education and Academic Information Service (i.e. the Library) at Groenkloof, Pretoria, fall into two categories. The first and largest category comprises the internal market. This consists of students who may be either undergraduates or postgraduates. It includes students from previously disadvantaged communities and distance students, students whose home language is neither Afrikaans nor English. This first category also includes the staff of the University of Pretoria and its centres. The second category comprises the external

market. This means all clients who are neither students nor staff of the University of Pretoria or its centers.

I followed a classical research cycle to obtain the results of the needs analysis. During the proposal phase I selected a focus, identified critical questions, stated a rationale for the study and conducted a preliminary literature review. After I had located a conceptual framework, I prepared a data collection plan, planned ways to analyze data, and considered issues of validity, reliability and ethics.

In Chapter 4, I identify and categorize specific needs in terms of the conceptual model proposed in Chapter 3. I conclude the study by listing the most important needs that clients have and by making recommendations about how the World Wide Web may be utilized within the virtual research environment to provide means of performing traditional tasks better, faster, more effectively and more efficiently.

1.2 Background

This study can be better understood if it is contextualized within the Academic Information Service and the University of Pretoria research environment. This I shall now undertake.

1.2.1 The Academic Information Service, University of Pretoria

The Academic Information Service is regarded as one of the best university libraries in South Africa (AIS Management Team 2004, p. 3). It provides a comprehensive information service for the university's approximately 40 761 undergraduates, 12 674 postgraduates and 1 594 academic staff members (statistics from 2004).

According to the AIS Management Team (2004, p. 5-6) two core services are offered by the library:

- **Information support for research** This includes a suite of services, products and facilities such as, for example, information resources and consultation services, that cater for the particular needs of students and staff who are primarily engaged in research.

- **Online self-help products and services** This includes a suite of online products and services that cater for the needs of clients who need to be in contact with the Internet on a 24/7 basis both on and off campus.

According to the audit report (AIS Management Team 2004) the ability of universities to contribute to international research output and to find solutions to local problems is vital for the prosperity of both university and country, and probably the biggest challenge that universities currently face. Research excellence is one of the primary goals of the University of Pretoria, as it is for the best higher education institutions throughout the world. Our clients need personalized, customized and value-added services that will forestall the ill effects of information overload and that will allow them to position themselves advantageously in the face of international competition.

Online services have become one of the fastest growing services offered by the Academic Information Service – a development that is firmly in line with international trends and with other e-university initiatives on the campus. The Academic Information Service has therefore adopted an e-learning strategy as one of its five main focus areas (AIS Management Team 2004) to address access issues. According to Engelbrecht (2003, p. 45), "[a]n e-learning strategy should maximize technology to enhance the teaching and learning process. As Internet access is becoming a given, competition among universities will be on the quality of the learning experience: quality online learning programs supported by online information, administrative and technical support services." This makes it clear that the Academic Information Service needs to be able to offer quality research support products that enhance the research process because only the best services will be able to increase the output and contribute to the success rate of qualified postgraduate students.

The five strategic focus areas that have been adopted by the Academic Information Service (AIS Management Team 2004), are the following:

- The e-information strategy
- Information for successful teaching and learning
- Information for successful research
- Information for the external market
- Doing more with fewer resources

Because the first and third focus areas are of particular relevance for postgraduate support, I will examine what they mean in more detail below.

Focus 1: The e-information strategy

The e-information environment sub-strategy refers to the following projects: integrated systems, integrated interface, academic tools, digital reference, ITC infrastructure, e-sources, e-dissertations, digital repositories, e-publication and digital preservation (AIS Management Team 2004). Current investigations include the following:

- Federated or metasearch product implementation, including an open link resolver
- Google Scholar™ implementation for easier access to the full text of articles and to references
- Implementation of an institutional research repository for the University of Pretoria
- Re-design of the web-page and services offered through the World Wide Web
- Establishing an internal web for the organization and storage of administrative documents and procedures (knowledge management)

Focus 3: Information for successful research

The increasing pressure that junior undergraduates inadvertently exert on the physical facilities and human resources of the Academic Information Service as a whole has in some instances meant that research information is being pushed into the background (AIS Management Team 2004). The AIS Management Team makes it clear that new information services and products for different categories of clients will have to be created. They envisage that special conditions will also have to be created for postgraduate students. These will include special physical and virtual areas set aside solely for postgraduates. In addition, some information specialists will have to be seconded exclusively to serve the needs of postgraduate students and active researchers.

The e-information strategy was formulated by the Management Team of the Academic Information Service to coordinate a variety of initiatives and to respond to the challenge of integrating these products and services with the university's core processes in order to (AIS Management Team 2004):

- Play an active role in and make a contribution to the international e-information phenomenon by means of, for example, open access, digital preservation, e-science and content management
- Support education innovation and research excellence at the University of Pretoria
- Deliver optimal e-information portal services that support the scientific workflow process to the clients of the Academic Information Service

The following three key sub-strategies were formulated in order to meet the above objectives (AIS Management Team 2004):

- Development of an e-information plan as part of the e-strategy of the University of Pretoria
- The creation of an e-information environment for clients that can also be referred to as a virtual research environment
- The adjustment of the structure, business processes, skills and facilities of the Academic Information Service to support the e-information strategy

According to the report (AIS Management Team 2004), a lack of resources, IT and information or knowledge management skills would severely hamper the implementation of online services. The e-learning strategy is, however, still regarded as one of the keys to sustainable services for a client population that is spread over the globe as well as for a growing proportion of the "growing up digitally" generation (the "Millennial Generation") who routinely expect to find resources and services on the Internet.

The report (AIS Management Team 2004) also makes it clear that clients are "in need of personalized, customized and value added services to overcome information overload and to compete internationally". One of the main areas of concern that the report identifies is the "[f]ocus on post-graduate students in line with campus initiatives resulting from recommendations from the HEQC (Higher Education Quality Committee) pilot audit" (AIS Management Team 2004, p. 10).

The Academic Information Service has already implemented various services, products and facilities that provide for the research needs of postgraduate students. An example of such a product is the "Research Road Map" that was compiled by the Service Unit for Health Sciences in collaboration with the Faculty of Health Sciences at the University of Pretoria. The Academic Information Service, Service Unit

Groenkloof, in collaboration with the Faculty of Education, also compiled a "research support tool" that was made available either online or as a CD ROM to postgraduate students in 2005. The online version of this tool is available at http://www.ais.up.ac.za/edu/research . Since the faculties and the Academic Information Service have been collaborating ever more closely, they no longer regard themselves as entities that function on their own.

The Department of Telematic Learning and Education Innovation also offers support to students by means of a CD ROM. The problem with such services is that because they are not coordinated, support tends to be duplicated and essential tools are not made available and marketed as they should be among academic staff and students. This is confirmed by an observation made by Boon, Bothma and Cronjé (2000): "[v]ery few e-products in libraries are the result of analysis, editing or quality control in response to user's need in terms of high quality information, accuracy, comprehensiveness, currency, reliability, validity etc." The result is that students – and specifically postgraduate students – suffer because of this lack of project coordination and quality control. The overall effect is to harm the professional image and credibility of the university, the faculty concerned and library.

What I have written above should make it obvious that serious libraries that aspire to be of an international standard have no alternative but to meet the needs of these diverse groups of users who have complex needs and special interests and demands. Departments, libraries and other support services within institutions need to cooperate to address the needs of these varied client groups. The situation at present is such that many students lack the experience to manipulate online catalogues, the skills to access specialized databases, the knowledge to find journal articles. Unhappily, they simply lack the expertise that would enable them to navigate around the resources of a modern academic library. According to Mason (2006), "graduate students are better equipped to find their way around the technological maze of today's libraries, but still require assistance from librarians". Because of its unique political history, South Africa has many features of a third-world country. This means that there are students at university (including postgraduates) from previously disadvantaged communities who very often have had no exposure to the computer technology or the Internet. If one adds to this the fact that English is often a second or third language for such students, it becomes clear that many of these students are hampered by serious disadvantages when it comes to communication.

All these difficulties create a major challenge for the staff of an academic library and research facility. The only way forward is to take account of terms of the needs analysis by creating a research environment in which postgraduate students will feel at home at the University of Pretoria because all their needs are being efficiently catered for by a staff who complies with the highest standards and best practice known in the world today.

1.2.2 The University of Pretoria

The University of Pretoria is recognized worldwide as an academic institution that focuses on teaching, scientific research and community service. It is by means of these services that the university aims at fulfilling the educational, cultural, social, economic and technological needs of the South and Southern African communities (Boon, Bothma and Cronjé 2000).

More than 550 different qualifications are offered at the University of Pretoria. It is in pursuance of these qualifications that approximately 30 000 students on the campus and approximately 28 000 off-campus students are enrolled. The student population is multi-racial and multi-cultural in composition and the teaching languages at the university are Afrikaans and English (Boon, Bothma and Cronjé 2000). Only 47% of the students who completed the questionnaire for this study spoke either English or Afrikaans as a first language. The mother tongue of 45% of the students was one of the nine other official South African languages. The mother tongue of the remaining 8% was either an African or European language. These included Fanti, Nsenga, Oshiwanabo, Shona, Ikalanga, Greek, German and Chuabo. Many of the students from previously disadvantaged communities were clients who had not been previously exposed to using computers or libraries.

Many of the university's programmes are offered in an e-learning format. The content of these courses is delivered electronically and interaction among staff and students is managed by the electronic WebCT Learning Management System. Information specialists add value to e-learning modules by contributing some of the most important bibliographical references for the courses. Links for e-learning students to full text articles are also provided. This is a great help to students who is seldom in a position to visit the campus, who cannot attend training sessions on how to search databases, and who do not have access to printed material. In this way the electronic learning management system provides a virtual learning environment for distance students and offers additional support to on-campus students in a flexi-learn

environment (Boon, Bothma and Cronjé 2000). All this is to the obvious benefit of students who are already computer-literate. But students who are not already computer-literate (such students, as was mentioned earlier, are often from previously disadvantaged communities) first need to learn all the computer routines that they need to know if they are to benefit fully from all the tools and services that are offered within a virtual or electronic research environment. While WebCT is an excellent e-learning system for supporting the *learning* needs of undergraduates, it is not necessarily the best e-research system to support the *research* needs of postgraduates and other academic researchers.

1.3 Problem statement and rationale for this study

According to a report by the Institute of Museum and Library Services (2003):

> [t]he application of computer and telecommunications technologies has changed the ways in which museums and libraries interact with their community and users. These technologies have enabled greater access for users to scientific information and resources, and have advanced educational opportunities for students across the globe. In order to measure results – to be able to state that users found what they wanted when using a specific application – one first need to understand the needs of the specific user group.

The purpose of this study is to identify and better understand the electronic research needs of postgraduate students so that the Academic Information Service (Library) can design and implement services that address those needs in a better way than the way in which they are currently being addressed.

It is for this reason that the feedback obtained from clients was more important than feedback obtained from the staff – as was the case with many earlier needs assessment studies that have been conducted. Very little research deals with needs from the clients' point of view. It is indeed true that in some cases clients are ignorant of what they really want or need. In such cases input from staff is useful. But according to Urquhart (2001): It is "only by conducting user studies [that] librarians can understand how the move to electronic resources is affecting the library's users and how the library's services can be modified to have the most positive effects".

In order to obtain a clearer understanding of the electronic needs of postgraduate students, it is helpful first to understand the *feelings* that arise in students as they attempt to utilise the services and interact with the staff of the library. “For too long, librarians have designed services and programs on *their understanding* of what is needed rather than working with academics and students in determining their information and skill needs” (Robertson 2003, p. 124). Boon, Bothma and Cronjé (2000) refer to the shift in the role of the librarian as being a shift from “knowledge of the collection, to knowledge of the users”. This study should therefore be helpful to the Academic Information Service (Groenkloof) and for the other parties listed at the end of this section because it focuses specifically on the needs and feelings of students and users of the library (rather than staff) and offers some valuable insights into these needs and feelings.

According to Styles and Radloff (2000, p. 1) the feelings experienced by postgraduate students “can be characterized by six main themes: uncertainty, anticipation, effort, menace, creativity and orderliness”. The staff of a library can alleviate the feelings of isolation and alienation that frequently afflict individuals engaged in postgraduate studies by offering their support whenever it is needed (J. Nieuwenhuizen, personal communication, 10 February 2005). The ability that librarians possess to eliminate the negative emotions of students as they encounter libraries in the course of their studies should never be underestimated.

This is confirmed by Newbury (1995, p. 58) when he writes:

> An understanding of the day-to-day work of research, and the way in which this articulates with a broader understanding of the place of knowledge in society is absolutely crucial, both to universities and to individual researchers. Those who are involved in funding and coordinating research have a responsibility to understand how the process of research is experienced by project researchers and students alike, and to act on this understanding to create the best possible environment for the production of useful knowledge (Newbury 1995, p. 58).

The very nature of the Academic Information Service at the University of Pretoria as a support service of the university places upon it the responsibility to create the best environment for students in partnership with the rest of the faculty and university that Newbury envisages in the quotation above.

Macauley and McKnight (1998, p. 95) elicit the following quotation in support of the view that libraries are crucial to the success of students and therefore universities themselves:

> Libraries play a key role in ensuring the success of students and, therefore, the success of universities. University libraries are simultaneously collections of books and other information resources for use by students, academics and the wider community; the principal research laboratory for many researchers, and a key locus of training for information literacy as the age of electronic information demands refined skills in seeking, evaluating and managing information resources (Darkin University, as quoted by Macauley & McKnight 1998, p. 95).

If academic libraries wish to remain the "principal research laboratory" in students' lives and justify their existence in an increasingly virtual environment, they will have to be acutely aware of and responsive to the needs of their clients and be able to help them in a world characterized by information explosion and continual technological innovation that cannot be ignored. South African students need to be helped to acquire whatever expertise and skills in research they need in this electronic environment so that they will be able to undertake high-quality research and establish themselves as lifelong researchers in a community still in transition.

In the four to five years since I began to work as an Information Specialist at the Academic Information Service (Library) of the University of Pretoria at the end of 2001, I have noticed an ever increasing demand for research support in the Academic Information Service (Library). Since I myself have been engaged in postgraduate studies in 2004 and 2005 at the University of Pretoria, I had have the opportunity from the point of view of a postgraduate to experience at first hand the kind of support services offered by the Faculty of Education and Academic Information Service. Although current technology offers ways to address client needs more than sufficiently, I noticed during this period that:

- support (especially online support) was not always readily available
- online services were not always accessible
- questions were not always properly and pro-actively addressed by the Academic Information Service (Library) and the Faculty of Education, University of Pretoria

It is because of these experiences that I decided to conduct a needs analysis that I thought might be useful for diagnostic and remedial purposes both to the University of Pretoria and to users outside the university who doubtless experience some of the same problems.

How this study could be useful to the University of Pretoria and Academic Information Service

This study could be useful to:

- The Academic Information Service (Library), University of Pretoria. It could help them in their efforts to align research and e-information services with the online research needs experienced by postgraduate students. It could also help them to identify those services that need additional resources if they are to solve their current problems.
- Information Specialists in the Academic Information Service. It could help them to identify, understand and focus attention on those specific needs that postgraduate students have at the present time. It is such needs after all that pinpoint exactly where a modern library service that supports an electronic environment might be failing its students and researchers.
- The Faculty of Education of the University of Pretoria as well as other faculties of the university. In recent years the large amount of research that the Faculty of Education produces has increased in volume. But not even all postgraduate students successfully complete their studies. This impacts negatively on the university because of the subsidy structure that the government has set for all universities. In years to come, higher education institutions will only receive a subsidy from government for each student who successfully completes his or her studies (J. Van Wyk, personal communication, October 18, 2004). It has therefore become a matter of vital importance for the university (as obviously for each student as well) to render as much support as possible to postgraduate students so that they bring their studies to a successful conclusion. This will go a long way towards addressing the problems of students who do not complete their studies in the required time or who do not complete their studies at all. In passing it should be noted that non-completion (for whatever reason) is a problem not only for the University of Pretoria but also for many other international universities. “A major concern of university administrations in regard to postgraduate research is the completion rates of doctoral students” (Styles and Radloff 2000, p. 1).

- The University of Pretoria as it seeks to make itself more and more attractive as a locus of postgraduate study in a highly competitive tertiary education market.
- Web-development specialists and instructional designers who are responsible for e-learning management systems at the University of Pretoria that offer online research support services.

How this study could be useful to other parties

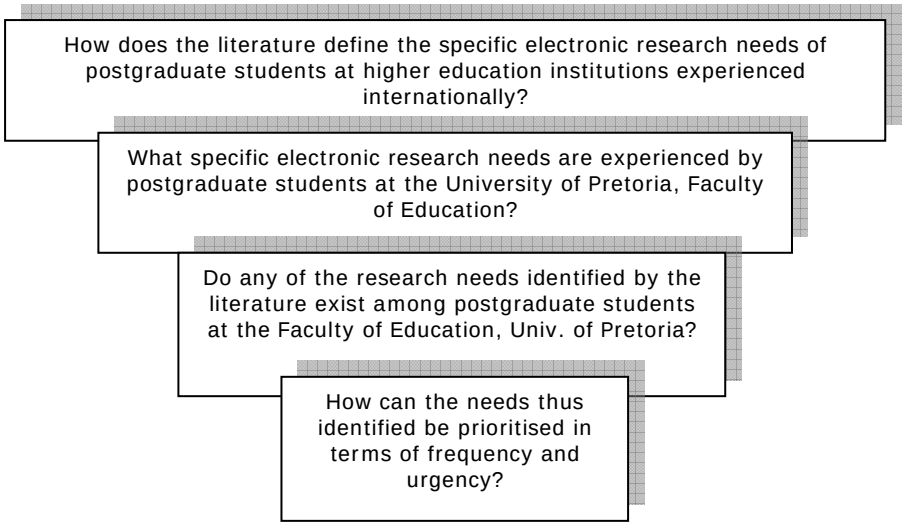
This study could also be useful to:

- National and international support staff at higher education institutions who are responsible for offering research support to postgraduate students.
- National and regional policy makers who design national standards for research in higher education.

1.4 Research questions

This study was guided by the following research questions, and in the following order (*Figure 1*):

Figure 1. Research questions



The research questions were designed firstly to establish the electronic research needs of postgraduate students operating outside South Africa, and then to narrow the study to identify the electronic research needs of students working within South Africa. My intention, once I had established these two sets of needs (i.e. international and national needs), was to ascertain to what extent these two sets of needs were similar. This information would be yielded by answering my third research question which is: "Do any of the needs identified by the literature exist among postgraduate students at the Faculty of Education, University of Pretoria?"

One of my study aims while surveying the electronic research needs of postgraduate students in the Faculty of Education was also to determine the ***frequency*** and ***urgency*** of the needs that these students expressed. Information about the frequency and urgency of their electronic research needs will give the Academic Information Service (Library) a profile of a typical e-researcher that will enable them to develop and implement research support tools that will met the needs of postgraduate students.

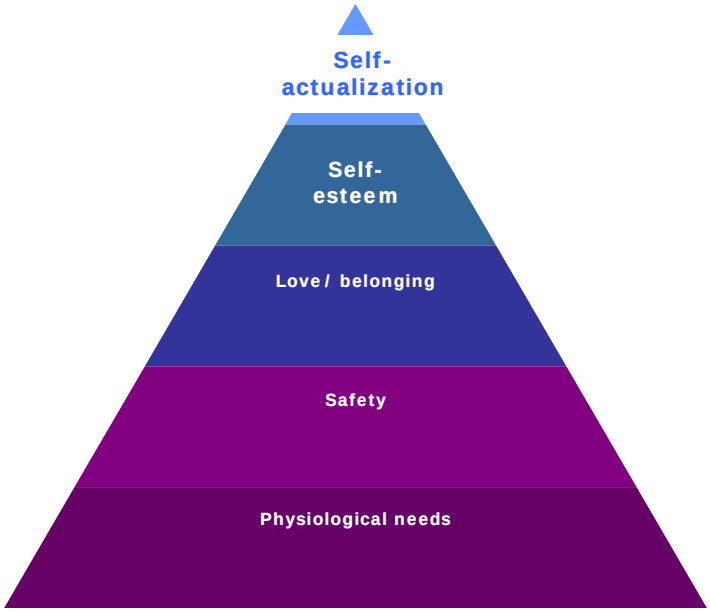
1.5 Terminology

In the following section, I will define my terms so that they will be contextualized within the library and information science and research environments.

1.5.1 Defining a "need"

A "need" may be defined as something someone must have in order to achieve a certain goal. A "need" as applied in information research may therefore be described as something that a student needs to complete his or her research or augment (improve) the quality of such research. These needs may include, for example, the need to communicate, access information, participate in research, be trained, consult with an information specialist (librarian), or to have easy access to online resources to which the library subscribes, as well as to the World Wide Web. In conducting research to improve qualifications, the highest possible level of one's needs is addressed – according to Maslow's hierarchy of human needs. This highest possible level of human need is (according to Maslow) the need for self-actualization (*Figure 2*) (Encyclopaedia Britannica 2006).

Figure 2. Maslow's need hierarchy



1.5.2 Defining "research"

Research may be defined as a scientific investigation into a certain field of study, that is undertaken in a diligent and systematic way in order to discover new facts or revise existing facts, theories or applications. According to Blaxter, Hughes and Tight (2002), all kinds of research share the basic characteristics of being "planned, cautious, systematic and reliable ways of finding out or deepening understanding".

1.5.3 Defining an "information need"

According to Wilson (as quoted by Van Lill 2001, p. 42): "Information needs involve the person in total: his/her cognitive processes, predispositions and socio-economic situation, which together influence his/her needs and information seeking behavior." As a prelude to designing services that will meet the information needs of clients, support staff such as librarians need to study the kind of situations in which their clients find themselves in the library and the kind of activities in which client groups engage so that they (the librarians) can deduce from these typical situations and behaviours what their information seeking behaviours are (Van Lill 2001, p. 43). "A crucial generator or source of information needs is the situation (task, problem) which causes the need" (Van Lill 2001, p. 42). But since all clients have individual needs, it is important first to identify these individual needs, and then to extrapolate

from the individual needs to the generic needs of clients as a class of users. Once this has been done, the librarian will be in a position to design a set of services that will meet the needs of each individual in that class of users (Dervin & Nilan, as quoted by Van Lill 2001, p. 43). Clients create needs as they determine and set academic goals (such as research) for themselves and these are the needs that have to be addressed by university support services such as the library.

1.5.4 Defining "electronic research needs"

"Electronic research needs" refer to the "want", "requirement" or necessity that the quality of research conducted by electronic means should be optimal and that the electronic means used to conduct such research should be (within reason and the constraints of the local situation) comparable to the best in the world. "Electronic research" refers to research conducted within a virtual research environment with the use and assistance of, for example, electronic journals, electronic books and the World Wide Web.

According to Page-Shipp, Hammes, Pienaar, Reagon, Thomas, Van Deventer and Veldsman (2005), electronic research is composed of the following elements:

eScience:

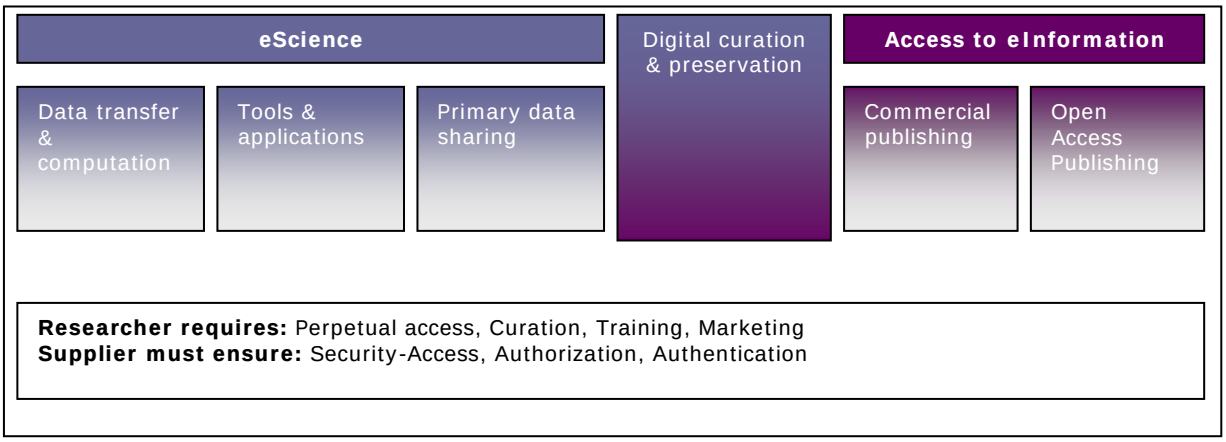
- ❒ Data transfer and computation
- ❒ Tools and applications
- ❒ Primary data sharing
- ❒ Digital curation and preservation

Access to eInformation:

- ❒ Commercial publishing
- ❒ Open access publishing
- ❒ Digital curation and preservation

These elements may be illustrated by the following conceptual model (*Figure 3*) devised by Page-Shipp et al. (2005):

Figure 3. Elements of electronic research (Page-Shipp et al. 2005)



1.5.5 A "virtual research environment" versus a "digital library"

A "virtual" or "digital" library is an extension of the traditional library. It may also sometimes replace the traditional library. According to Leiner (1998), a digital library is an access point for an electronic collection of services and information objects, that is organised in such a way that the electronic organization and presentation of those objects supports the needs of users who deal in information objects so that they can address certain higher level needs that they (these users) experience – such as the self-actualization needs that we see at the apex of Maslow's hierarchy of needs shown earlier in this text (*Figure 2*).

The phrase "virtual research environment" would also include a virtual library or digital library. But it is more than just that. A virtual research environment is mostly a research environment that has no conventional physical existence since it is constructed solely from electronic forms that only become visible through the analogues provided by electronic technology that interprets these forms in presentations that make sense to human beings operating in specific times and places and with specific cultural assumptions. Because of its unique nature, a researcher can at any time or in any place still gain access to an electronic library or virtual research environment by using Wi-Fi or a local Internet connection service provider. Since distance is a barrier to accessing conventional (non-electronic) home research libraries, researchers that are physically distant from the library are dependent on faxes and the kind of slow ("snail") mail that delivers, for example, inter-library loan material to gain access to the resources of such libraries. Because so much more research material is available nowadays in electronic format by means

of the World Wide Web, researchers looking for material in electronic format have a much greater degree of independence. Postgraduate students these days no longer have to travel long distances to access their home library collections. They can simply log on to the World Wide Web from any Internet Café or personal computer and search electronic journals, browse through electronic books or access research tools. From the researcher's point of view, this is clearly a much more cost-effective and timesaving way of conducting research.

1.6 Methodology

I approached this research in the ways described in the sub-headings below.

1.6.1 Literature survey

I approached this research firstly by conducting a literature review of research already conducted in this field. I made extensive searches in the following authoritative databases for information on the research topic:

- Academic Search Premier (EbscoHost)
- ERIC
- ScienceDirect
- Master File Premier (EbscoHost)
- ISAP (Sabinet)
- SACat (Sabinet)
- SAePublications (Sabinet)
- InfoTrac OneFile
- ABI/Infotrac
- UPExplore
- Search engines e.g. Google™, Google Scholar™, Scirus™

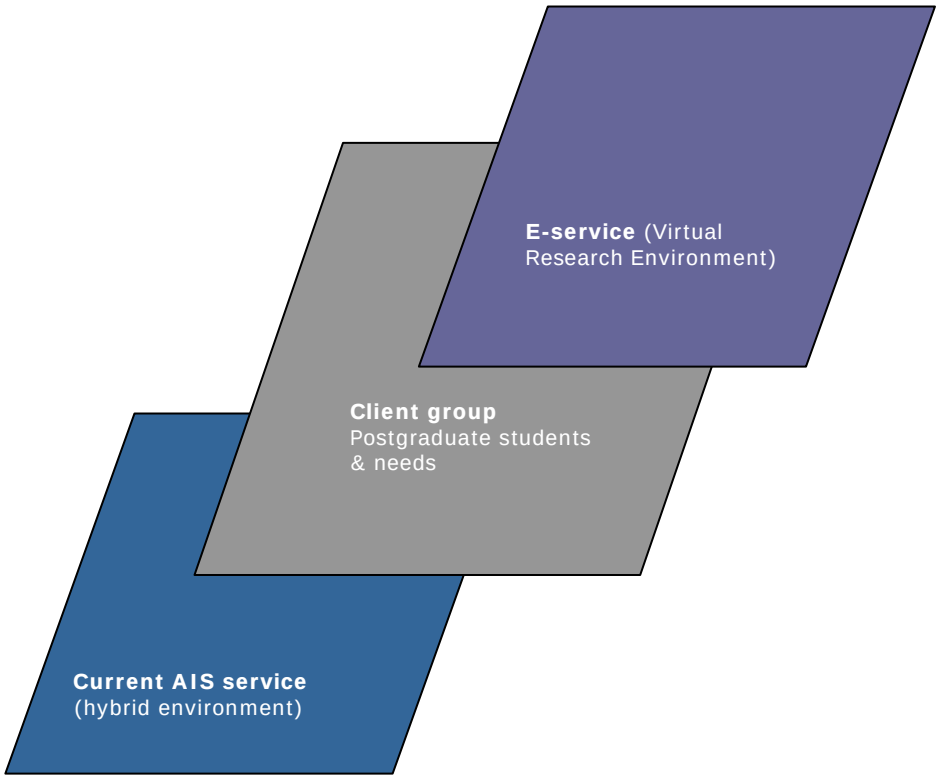
Although the World Wide Web offers large quantities of research material, I consulted mainly authoritative research databases such as EbscoHost (Academic Search Premier).

1.6.2 Conceptual framework

In order to organize and focus the data collection, I derived a conceptual framework (*Figure 5*) from the conceptual framework of Page-Shipp et al. (2005) that appears as

Figure 3 on page 17. The conceptual framework by Page-Shipp et al. (2005) will function in this study as a theoretical framework that conceptualises the need categories that are experienced by postgraduate students. The conceptual framework (*Figure 5*) used in this study has to be viewed within the context of constructing a possible e-service for the Academic Information Service (*Figure 4*). It will be discussed in more detail in chapter 3.

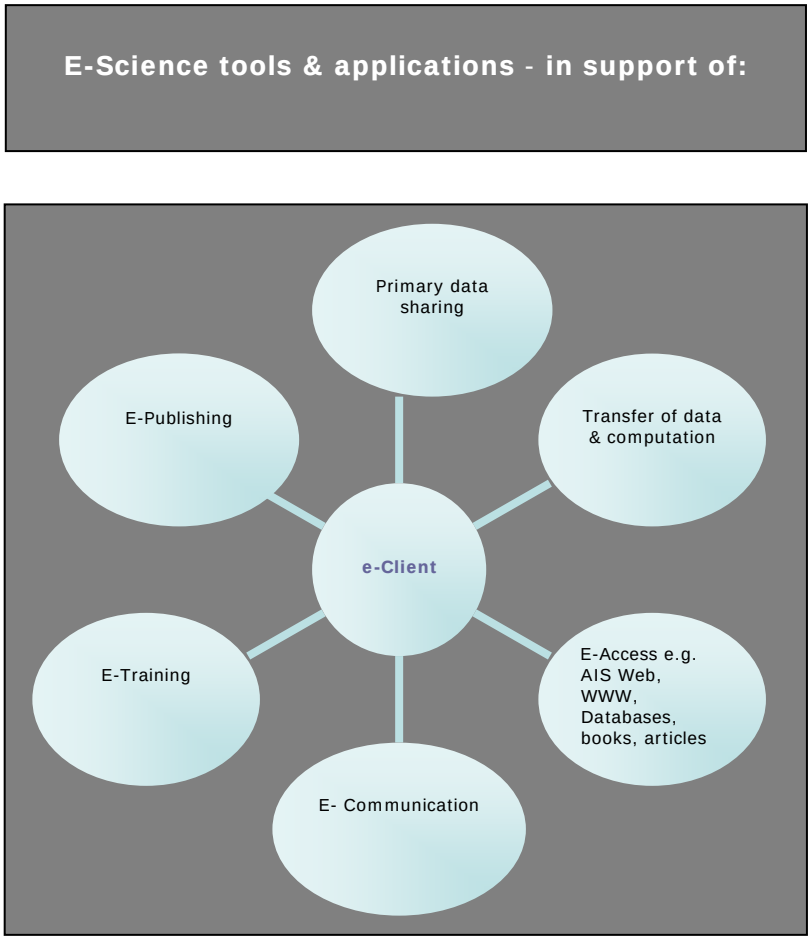
Figure 4. Contextualizing the needs of postgraduate students



The delivery of services by the Academic Information Service currently occurs within a hybrid environment that offers access to traditional print material as well as to electronic research material. It is within this hybrid environment that the Academic Information Service should find ways that best address the research needs of this important user group while simultaneously working towards the establishment of a virtual research environment in which all electronic research needs can be addressed.

An ideal virtual research environment should address the following electronic research needs experienced by postgraduate students. These are presented in the conceptual framework illustrated in Figure 5.

Figure 5. Conceptual framework to address ***e-research needs*** *of postgraduate students within a virtual research environment* [The author acknowledges that she based this conceptual model on the E-Science component of the model devised by Page-Shipp et al. 2005.]



By applying the conceptual model by Page-Shipp et al. (2005) as a theoretical model within this study (as I have done above), I have been able to address the e-research needs through access to certain tools and applications that form part of the "e-Science" component of the model illustrated in *Figure 3.* I have illustrated e-research needs in the conceptual model above by highlighting specific need categories in order to identify the following e-research tools that address those needs:

- ❒ Training
- ❒ Publishing
- ❒ Communication
- ❒ Transfer of data and computation

- Primary data sharing
- Access to commercial and open access scholarly publications

E-tools and e-applications make it possible to construct the e-infrastructure for a new virtual library environment in which an e-client might feel fully at home because all his or her needs are well catered for.

1.6.3 Questionnaire and survey

1.6.3.1 Context

I conducted the research at the Academic Information Service, University of Pretoria. While the medium of instruction at the university is mainly Afrikaans, lectures classes are also given in English if there is a particular need for them.

The Faculty of Education, where I administered the questionnaire, is divided into four departments:

- Department of Curriculum Studies
- Department of Educational Psychology
- School for Teacher Training
- Department of Education Management and Policy Studies

I collected data by means of a questionnaire that I handed out during the first scheduled meeting of the NME 810 Module (Research and Methodology Module, 2005), and during library orientation sessions. The questionnaire comprised 18 questions (see Addendum C). Of these, 16 were multiple-choice questions, and two were open-ended questions.

I used data collected from a survey conducted as part of an international project called LibQUAL+™ Survey (see Addendum F) to verify patterns that I identified in the data obtained by means of the questionnaire. LibQUAL+™ is a suite of services offered by the Association of Research Libraries "that libraries [can] use to solicit, track, understand and act upon users' opinions of service quality" (Association of Research Libraries 2005). Users at the Academic Information Service were requested to complete the online survey over a specified period (between August and September of 2005). Respondents' answers were then sent to a central database. After that the data was analyzed by the Association of Research Libraries. The report on the findings, which reflected users' desired, perceived and minimum expectations

of the service, were made available to the Academic Information Service. The survey consisted of 41 questions.

1.6.3.2 Participants

While 122 postgraduate students from the Faculty of Education completed the questionnaire (a figure that represents 28.3% of all postgraduate students enrolled with the Faculty of Education), 716 postgraduate students from all faculties (including the Faculty of Education) (equivalent to 25.06% of all postgraduate students enrolled at the University of Pretoria in the period during which the survey was conducted) completed the LibQUAL+™ survey.

1.6.3.3 Instrumentation

The instrumentation used in this research is a combination of a needs analysis questionnaire and a user survey.

The needs analysis questionnaire was designed to collect data about the preferences of postgraduate students as they use various forms of technology to further their research. The survey was designed to identify the shortcomings and deficiencies that exist in the current e-service delivery process.

1.6.3.4 Data collection

I based this research on data that I collected from a questionnaire and a user survey conducted at the University of Pretoria.

A trial questionnaire was tested before the formal questionnaire was handed out. I handed out the final questionnaire at a meeting for the Research Methodology (NME 810) Module (February 2005) for postgraduate students at the University of Pretoria as well as at library orientation sessions for postgraduate students. The postgraduate students who participated varied in progression with regard to their studies.

Table 1. Timetable for data collection

Date	Session / Group	# of Questionnaires
22 Jan 2005	Postgraduate Orientation Session (Trial Questionnaire)	45 questionnaires handed out
10 Feb 2005	PhD Educational Management	20 questionnaires handed out
18 Feb 2005	NME 810	79 questionnaires handed out
22 Feb 2005	Library orientation	36 questionnaires handed out
August to September 2005	All postgraduate students	LibQUAL+™ Survey (online survey)

1.6.3.5 Selection of participants

The participants who completed both the questionnaire and survey were not pre-selected. They also participated on a voluntary basis in the sessions in which the questionnaire was handed out.

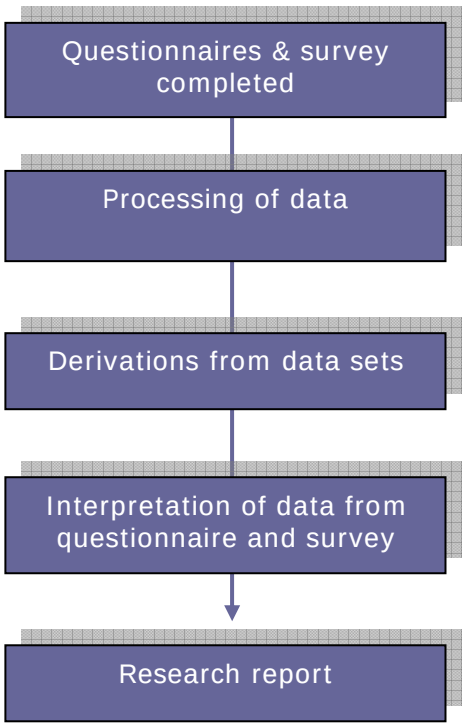
1.6.4 Processing and analysis of data

Data from the questionnaire was processed with the assistance of *Statomet* (Department of Statistics, University of Pretoria). SAS software was used to process the data from the questionnaire. Data from the LibQUAL+™ survey of the Association of Research Libraries was processed by using SPSS software. The results were made available as an online report to the Academic Information Service.

1.6.5 Research report

The process that I followed may be illustrated as follows (*Figure 6*):

Figure 6. An illustration of the research process

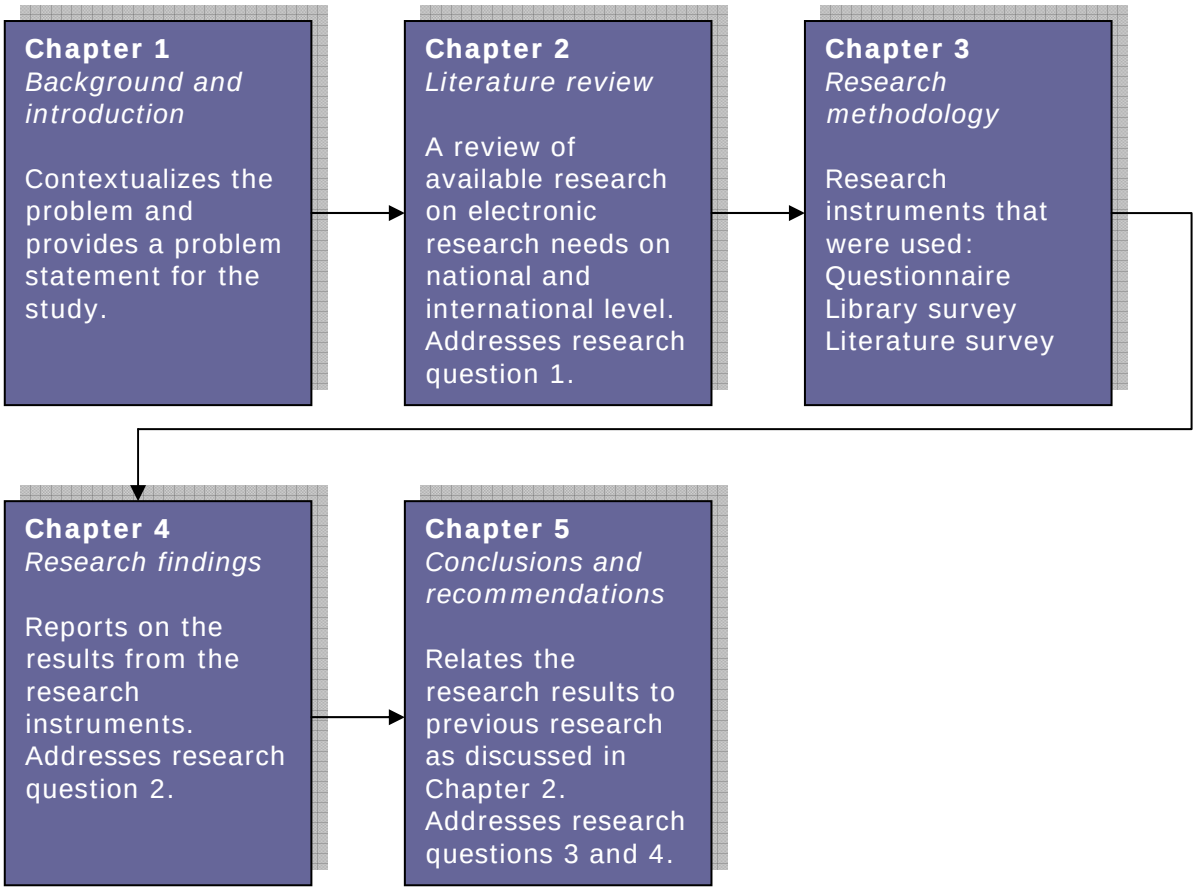


After the questionnaire and survey had been completed by the respondents, the data was processed and derivations were made. The data as interpreted is presented in chapter 4 of this research report.

1.7 Chapter outline

This research is organized into five chapters. The content of each chapter is summarized in Figure 7 on the next page.

Figure 7. Chapter outline and organisation of research



1.8 Research outcomes

The main outcome of this research was a profile of the electronic research needs of postgraduate students in the Faculty of Education of the University of Pretoria. This profile will serve to guide and inform the process of designing services, products and tools that will be made available to support postgraduate students in their research.

1.9 Summary

In this chapter I provided a framework to situate the research problem. I used an adaptation of the theoretical framework of Page-Shipp et al. (2005) to construct the conceptual framework of this study. I have described the context within which the research was conducted and have illustrated the research process. By way of summary, the purpose of this research is to identify and better understand the electronic research needs of postgraduate students so that the Academic Information Service (Library) will be in a position to design products and services that address

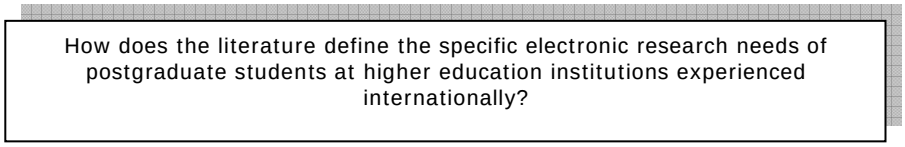
those needs more effectively and comprehensively than they are currently being addressed. The effect of this research and the subsequent design and implementation of a better service for postgraduates may be greater user satisfaction on the part of the postgraduates concerned, a better understanding of the needs and feelings of clients by the librarians (information specialists) concerned, and ultimately a more satisfactory pass rate amongst postgraduate students at the University of Pretoria. This improved pass rate might then be attributable (in part at least) to the more accessible and efficient support services that take care of client needs which shall have been identified by the research undertaken in this study.

Chapter 2. Literature review

2.1 Introduction

This chapter reports on a literature review that describes international and South African research into the research needs (more narrowly defined as the "electronic research needs") of postgraduate adult learners at higher education institutions. The first research question is addressed by this literature survey (Figure 8).

Figure 8: Research question 1



The literature review provided me with the conceptual foundation that I needed for conducting a needs assessment among South African postgraduate students at the University of Pretoria. I used the information that I obtained from the literature review to construct and refine the questionnaire that I designed for the analysis.

A great deal has been written about the information needs of various library client groups and many user studies have also been undertaken in order to determine as accurately as possible what these needs might be. But few of these surveys and studies focus on South African ***postgraduate*** needs and none of the literature refers specifically to "electronic research needs".

In this chapter I will relate what the literature does have to say about the needs of postgraduate students. But before the research needs of postgraduate students can be described, it is necessary first to explain the principles that underlie adult learning.

2.2 Addressing "adult learning principles"

One may describe the postgraduate students who enroll at the University of Pretoria as adult learners because their average age is between 22 and 45. It was therefore important for me while designing the questionnaire and undertaking the research to keep the following assumptions about adult learners in mind (Leonard 2002, p. 7-8):

- Adults need to have good reasons (i.e. a rationale) for learning new information.
- Adults already have an established identity that enables them to be responsible for their own lives, to make decisions and to initiate action.
- Adults bring their own knowledge and life experience to the learning experience.
- Adults are more eager to learn when they see that the content of the learning experience will enhance their current life activities.
- Adults expect learning to be task-oriented and relevant to their jobs.
- Adults are mostly motivated by internal forces and longings such as the desire for better lifestyle, a better work environment, a better job, and so on.

Because postgraduate students are adult learners, their needs are different from the needs of undergraduate students. It is the responsibility of the Academic Information Service to identify and address those needs. The best way to establish such needs is by means of a needs assessment. This assessment can then be used as the basis for implementing the best strategies, products and services for this important client community.

Although adult learners as a group have certain characteristics in common, each adult nevertheless has a different personality type and learning style. Such individual differences and styles need to be taken into account by the researcher when he or she is profiling the needs of the e-researcher as a group. The ***generation theory*** elucidates differences between the various generations that have never previously been addressed and or taken into account by library scholars.

2.3 The Generation theory

According to Graeme Codrington (2006), South Africa's leading generational theorist and author of the book, *Mind the gap*, we view the world only in one way – and that is through our own eyes. If this is true, then the challenge for librarians is to begin to observe the research process and library services through the eyes of students and not only through their own eyes and from the vantage point of their professional preconceptions. This is a necessary procedure because librarians (or any other professional group for that matter) by definition compose a group of people with somewhat restricted views, predictable attitudes and circumscribed values. No circumscribed professional group is in a position to understand the mindset of groups whose group or age profile is very different from theirs. Librarians would be in a better position to understand the needs of postgraduate users if they themselves were to become active postgraduate students. If librarians were to pursue this option, they would acquire a first-hand knowledge and understanding of the needs of postgraduate users. They could then use their newly acquired skills in postgraduate research to benefit the library in general and the library's clients in particular.

Codrington (2006) maintains that the generational trends he describes are caused by the effects of globalisation. According to him, clients from different generations share certain experiences, assumptions and attitudes because they are constantly faced by similar situations. One may say that this is also true of librarians as a group. It is because of these shared experiences and situations that people largely view the world in similar ways. One might thus hypothesise that librarians from the same generation probably share similar views on the way services should be delivered to clients – even if they have been working with staff from other generations for many years. It is sometimes difficult to get librarians to adapt their views, attitudes and routines so that they become more responsive to the constant innovations that are a feature of service delivery in an electronic age.

The same is true of postgraduate students and their research needs. Such students tend to be members of two of the generations identified by Codrington: the "Boomers" and the "Xers". "Understanding that different generations have grown up in different worlds, developing different worldviews and value systems, even if we've been working [for the same institution/library], is a great starting point to bridging the generation gap that threatens so many relationships at the

moment" (Codrington 2006). An example of this might be the relationship between a librarian from the "Boomer" (Baby Boomer) generation and a postgraduate student from "Generation X" – two groups with very different worldviews and experiences.

We should keep the characteristics of "Boomers" and "Xers" that Codrington describes firmly in mind as we identify and address the needs of postgraduate students and also as we introduce new technology and e-developments into libraries for clients and librarians who belong to utterly different generations. Service delivery that focuses on client needs can only be improved if one appreciates that people from different generations have different approaches, needs and assumptions with regard to work, studies, careers, communication and research.

2.3.1 The Silent Generation (1930s and 40s)

"Raised by over-protective parents during the Depression and World War II, they grew up as children who 'should be seen and not heard', and learnt in the midst of failed banks and businesses not to trust others for their security. They are conformist, reasonably aloof and fairly authoritarian" (Codrington 2006). Since these people are currently between 75 and 85 years old, we do not expect them to become postgraduate students in any number (except for a very few individuals).

2.3.2 The Boomers (1950s and 60s)

This generation is perceived by other generations to be loud, brash and highly individualistic. They never stop talking and they are always "in the right". They believe that there's a solution to every problem and that anything is possible. They are happy to conform to authority provided that they themselves possess it. They are obsessed with health and wellness and they are more highly educated than any other generation in history. They are also prepared to pay to get what they want (Codrington 2006). Since people in this group are between 45 and 55 of age, one may expect to find a number of postgraduate students in this generation.

2.3.3 Generation X (1970s and 80s)

This generation is more sceptical of relationships. They were expected to grow up quickly. They tend to take more risks and are of the opinion that long-term commitment won't pay a dividend. Codrington (2006) describes the gap between "Boomers" and "Xers" as the biggest ever. Since they are between approximately 18 and 35 years old, a large percentage of postgraduate students will currently be from this generation. These students find themselves in a phase of their lives where they are now very much focused on further training and career development. "Xers" value diversity, technological literacy, fun, informality, self-reliance and pragmatism.

2.3.4 The Millennial Generation (1990s and 2000s)

This is the first generation not to remember the "old" South Africa. Since they were born between 1990 and 2006, they are still of school-going age. Confidence, assertiveness, optimism, obsessive brand-consciousness and aptitude for handling money are all characteristics of these children. To them style is more important than content. "They play video games, listen to music on digital compact discs, programme the family DVD-player and surf the Net for homework projects. They are smarter than their parents. They're civic minded, practical, get involved" (Codrington 2006). Some literature also refer to this group as the "Net Generation".

Librarians can make allowances for individuals if they learn to appreciate diversity among their clients and staff – especially the important differences between the "Boomers" and "Xers". They can help them to work harmoniously in the virtual research environment. They can also help people from different generations to make their own unique contributions – whether as members of the library staff or as postgraduate researchers.

2.4 The importance of a needs assessment

A "needs assessment" refers to "a structured process of collecting and analyzing users' assumptions, and the necessary or desired services to satisfy specific audiences. A needs assessment justifies the development and provision of services and allows for an effective distribution of resources to support the services" (Institute of Museum and Library Services 2003, p. 3).

A needs assessment can therefore be an important instrument of library policy. It can be used to support projects and to ensure that electronic support tools are responsive to user needs within both a traditional and virtual research environment – while acknowledging that the needs of different generations varies from one generation to another.

We will understand this kind of needs assessment and the potential importance better if we contextualise it within a South African context.

2.5 The South African context

The importance of research is supported by the Constitution of South Africa and has also been emphasized by the South African government in Education White Paper 3 (Dept. of Education 1997).

Academic freedom and scientific inquiry are fundamental rights that are protected by the South African Constitution. “In order to support the Constitution, it is the responsibility of Academic Libraries within Higher Education institutions to support and assist students in conducting the pursuit and practice of academic work” (Dept. of Education 1997, p. 7). The Academic Information Service has to account on a year-by-year basis to the governing bodies of the University of Pretoria for their results and achievements and also for the extent to which they have met their institutional policy goals and priorities. The larger institution (the university) has in turn to account for its actions, decisions and achievements to their own governing bodies as well as to society in general. It also has to demonstrate how it contributed to national policies and goals, how it achieved the results it did with the resources at its disposal, and account in detail for the spending of public funds (Dept. of Education 1997, p. 7). If the Academic Information Service does not achieve its goals and does not meet its goals, it will have a detrimental effect on the faculty and the university and also in the end on the larger South African community outside the university.

The production, advancement and dissemination of knowledge and the development of high-level human resources are core functions of the higher education system. Research plays a key role in all sectors of the higher education industry, and may be regarded as the principal tool for creating new knowledge. “The dissemination of knowledge through teaching and collaboration in research

tasks are the principal tools for developing academic and research staff through postgraduate study and training" (Dept. of Education 1997, p. 20).

On 1 October 2004, Ms Naledi Pandor, the Minister of Education, opened the annual Research Indaba of the University of Pretoria. In her opening speech, she stated that "our students are earning MAs and PhDs abroad because we are not providing them with the requisite environment for research in both the physical and human sciences". She also added that South Africa needed to build:

> [a] new pool of researchers equipped to promote innovation and to pursue new areas of knowledge and investigation. Even more important is the need to ensure adequate research training and support is provided to all postgraduate students. Many institutions churn out postgraduates who never proceed to writing an article or who never participate in collaborative research activity (Pandor 2004).

As one of the key stakeholders in the university, the library plays a vital role in contributing to creating an enabling environment in which postgraduate students can conduct their research so that they will go on to participate on an international level.

2.6 The international context

Research into user studies that examines the needs of postgraduate students has been conducted abroad. I shall review this research in this section. This research identified the specific feelings and needs of postgraduate students who were using a library and explained the kind of skills that are necessary for librarians to cope with those needs and feelings.

2.6.1 Feelings of clients towards the library

The way in which students react emotionally towards the library influence the way in which they approach their research. Negative feelings and emotional stresses (occasioned by, for example, databases that are not easily accessible or that simply do not work, information specialists who are unwilling to help, unfriendly staff, resources that are not accessible online) compel students to use search engines rather than library databases or other online services at the library. "Although dropping out is often caused by financial and work related factors, the emotional stresses involved in completing the dissertation undoubtedly play an important role" (Glatthorn, quoted by Styles and Radloff 2000, p. 1). Since some authors regard the librarian as being a *de facto* co-supervisor (Macauley and McKnight 1998, p. 95), one may argue that a librarian is in a position in which he or she can influence the emotions that students experience when conducting postgraduate research and, by the same token, help to reduce whatever negative affects students may be feeling. This is supported by Macauley and McKnight (1998, p. 95) when they say that "[l]ibraries play a pivotal role in ensuring the success of higher degree research students".

It is not clear from the literature how the emotional needs of students should be addressed, especially within a virtual environment where face-to-face contact with the librarian is limited. New ways will have to be found to deal with the emotional stresses experienced by students and librarians themselves will need to become better equipped with the necessary skills to do so.

2.6.2 Role of the librarian / information specialist

The literature does make it clear that the role of the librarian is changing along with changes in technology. In order to address the specific needs of postgraduate students, librarians will need to develop certain skills that they were not taught in their professional studies.

2.6.2.1 Technological skills

Catalogues, journals, books and other information resources nowadays tend to be more available online than in printed sources. If librarians want to access these resources and so be in a position to offer current services to clients, they need to be skilled in the use of a wide variety of technology that include computers,

scanners and DVD-writers. Librarians not only need to know how to use the technology; they need also to be able to apply the technology. This means being able to design web pages, electronic transfer of information, use blogs and wikis, administer and use listservers, display library material by means of virtual exhibits, use an electronic whiteboard to present training sessions, add quality to modules on learning management systems such as WebCT™, deliver presentations using MSPowerPoint™ or Macromedia Captivate™, and use application software to practise other skills such as marketing and project management. Because IT departments are understaffed, librarians often have to solve problems themselves. Such problems are legion, but may include getting a recalcitrant printer to print, helping to set up an e-mail account for a client on a computer, and assisting a client when the computer will not log on to the network.

In-service training programmes in libraries can to some extent teach such skills. The training courses that an institution provides for its staff should be in line with that institution's skills development policy and should support the institution's e-strategy. Studies are still needed to identify precisely what skills are most needed by librarians if they are to be empowered to optimise service delivery within a virtual research environment.

2.6.2.2 Decision making skills

According to Boon, Bothma and Cronjé (2000), librarians are required more and more to be the providers of "just-in-time information at the time of need". Clients usually do not want everything that is available on a topic. In a time characterized by information overload, librarians need to be highly selective as they collect and collate electronic information for students. Very often they need to be able to decide *on behalf of a student* whether or not any given piece of information is relevant or not to the student's research needs.

Librarians can help students to identify relevant electronic lists, newsgroups, conferences and so on. They can also help students to create alerts for new articles on their topics of research. But it is often difficult for librarians to decide on behalf of students whether an article might be relevant to the student's research or not. Such decisions are often highly subjective, and no clear guidelines exist in the literature about such matters.

2.6.2.3 Supervisory skills

Macauley and McKnight (1998, p. 95) propose a collaborative co-supervisor model for librarians which they believe will result in "more and faster higher degree research completions, higher standards of research, an increase in research students' and supervisors' information literacy skills, improved research collections in university libraries, and reduced isolation for off-campus researchers".

They also propose that not only should academic librarians maintain and increase the efficacy of their traditional services but that a closer collaboration be instituted among librarians, postgraduate research students and their supervisors (Macauley and McKnight 1998, p. 95). "This new model suggests that librarians can assume the role of co-supervisor to ensure that the literature review component of a higher degree thesis is comprehensive and relevant. Librarians can also ensure that postgraduate research students and their supervisors are kept abreast of new information resources in their research disciplines" (Macauley and McKnight 1998, p. 95).

2.6.2.4 Planning skills

Librarians need to be able to plan and educate themselves in new forms of technology if they hope to stay abreast of new products, services, technology and resources. They also need to be able to take care of their time management needs, schedule after-hour appointments to accommodate their working clients, and plan ways to address problems that are being experienced by several students at once.

2.6.2.5 Facilitating skills

Librarians need the skills of teachers and facilitators when they conduct training sessions and compile training material, presentations and brochures. They also need to become familiar with technology such as the electronic whiteboard, e-learning management systems such as WebCT™, e-learning principles, instructional design principles, remote assistance software such as WebEx™ and MSN Messenger™, and electronic support systems such as "Ask a Librarian". "Ask a Librarian" allows the client to interact with the information specialist or librarian through chatting or e-mailing requests.

Librarians also need instructional design skills if they are to compile online tutorials that show users how to utilize some of the databases to which the library offers access. Products such as Macromedia Captivate™ - a software program used to compile animated online tutorials - has yet to be discovered by the library world. Vital research is waiting to be done on how the librarian can offer distance support within a higher education institution – as well as the role that the library and librarian play with regard to e-research in a WebCT™ (e-learning management system) environment.

2.6.2.6 Marketing skills

The web has an enormous potential for being used as a marketing tool for marketing library products, databases, services, etc. within its virtual environment. Librarians need to find ways to utilize the web for this purpose. They might, for example, send electronic newsletters to registered and prospective postgraduate students. They can also send virtual exhibits of library holdings and bibliographic lists on research topics of interest within a specific field to particular clients or utilize the default interfaces of desktop computers in the library to make important announcements such as those that deal with new products or database subscriptions. Since active researchers are always on the lookout for research material that has a bearing on their topic of interest, the library should therefore (as I mentioned in the introductory paragraph in chapter 1, p. 1), be “going to its patrons, rather than waiting for them to appear” (Basefsky 1999). New and effective ways in which the library could “be going” out to meet clients’ needs still need to be identified by studies undertaken in this field.

2.6.2.7 Project management skills

Project management skills include the following activities and responsibilities:

- Planning and managing new projects such as an institutional repository for an institution
- Attending meetings with academic supervisors, students and other role players
- Identifying, together with other supervisors, students who are at risk (of failing) and giving them support and assistance
- Participating in electronic conferencing (such as, for example, WebEx™)

- Managing a project by means of project management phases (analysis, design, development, implementation and evaluation)

Project management skills are often neglected by librarians because they may feel that they lack competence and because they have no time to set aside for the purpose of becoming informed project managers. Because project management skills within a library environment are just as important as project management skills in any other field, they should be treated as such.

2.6.2.8 Communication skills

Librarians often find themselves in a position in which it is appropriate to offer clients various kinds of emotional support. In order to do this effectively, they need to have mastered various interpersonal communication skills. In the course of their work, they need to be able to communicate effectively with individuals and groups. They also need to be able to communicate effectively by fax, telephone and other online facilities, and should be able to communicate in at least two official languages one of which should be English.

2.6.3 Specific needs of students

A study that was conducted to evaluate the information requirements and practices of part-time and distance-learning students in higher education institutions in the United Kingdom revealed that university libraries “often do not cater for the specialized needs of part-time distance learners, which leads to an increasing use of the Internet and employer resources as a substitute for traditional information channels” (Rowland and Rubbert 2001, p. 741). According to Robertson (2003, p. 129), the information needs of students have changed slightly over the past five years. Although he refers specifically to “information needs”, the same is true of all the other needs that students have. Coleman and Sumner (2004) state in an article that within the National Science Digital Library (United States), “a rich array of innovative services not traditionally associated with bricks-and-mortar libraries are being developed to support teaching and learning practices”. These authors are referring not only to information access. The library they mention also offers services such as:

- Personalized content delivery
- Services for creating digital resources

- Communication and collaboration services

Increased international postgraduate enrolment at universities throughout the world is making ever-increasing demands on student support services such as those in academic libraries (Robertson 2003, p. 129). This increased pressure is apparent to the staff who work in the library of the University of Pretoria. Since students from all over the world are encouraged to enrol in the Faculty of Education, the composition and atmosphere of the faculty is becoming ever more self-consciously international in outlook and interests.

A survey of the literature suggest that the specific needs of postgraduate students may be divided into the following categories:

2.6.3.1 Administrative needs

My investigations enabled me to identify the following administrative needs of postgraduate research students:

- How to register as a library user
- How to register as an inter-library loan user
- How to request an inter-library loan (Macauley, as quoted by Macauley and McKnight 1998, p. 99)
- How to obtain a letter of introduction to an academic library other than the home library
- How to request research material online
- How to apply for a postal loan service for distance students (Rowland and Rubbert 2001, p. 757)
- How to lend books, receive photocopies of articles etc. (for distance students) (Macauley, as quoted by Macauley and McKnight 1998 p. 99)
- When to qualify for courier service or postage satchels (Macauley, as quoted by Macauley and McKnight 1998 p. 99)

Although libraries are currently moving towards offering an integrated service by means of OCLC (WorldCat™ and FirstSearch™, the international cataloguing system) and Google Scholar™, these facilities are not yet available and a lot of work needs to be done before they come into general everyday use.

2.6.3.2 Access needs

My investigations enabled me to identify the following access needs:

- A need for extended library hours
- A need for longer opening hours during vacation periods (Rowland and Rubbert 2001, p. 749; University of Massachusetts at Amherst Library Needs Study, n.d.)
- A need for short-loan collections that cannot currently be fully utilized because of a 24-hour return policy
- A need for improvements in the inter-library loan services of some institutions whose services only operate after long delays (Rowland and Rubbert 2001, p. 749)
- A need for easier access to support (Support should be available 24/7)
- A need for easier access to library staff (University of Massachusetts at Amherst Library Needs Study, n.d.)
- A need for special library opening and closing hours for part-time postgraduate research students. Many postgraduate students can only study after hours when librarians have all already left the library for the day. Access to library staff should be easier during such additional opening hours (University of Massachusetts at Amherst Library Needs Study, n.d.; Rowland and Rubbert 2001, p. 757)

2.6.3.3 Database access needs

My investigations enabled me to identify the following database access needs:

- According to members of The Science Advisory Board, limited access to full-text documents is the most annoying aspect of online literature searches (The Science Advisory Board, 2004). This obstacle often emerges with a search engine such as Google™. If a student wants to access an article published by a commercial database, he or she is prompted to enter a subscription password. The study conducted by Macauley and McKnight (1998, p. 97) indicates that students require reliable cost-efficient access to information. They don't want to struggle to access information and they need clearer instructions about when they will be required to use passwords and what passwords they need to use if they are required to do so. Open access to scholarly publications e.g. through DOAJ (*Directory of*

Open Access Journals) nowadays offer a wide variety of authoritative titles which illuminates the frustration of having to use passwords to access scientific articles published in these journals.

- The interfaces of various databases are often far too complicated and are not coordinated with one another (they all differ). Information should be easily accessible by using, for example, user-friendly desktop interfaces that offer trouble-free access to electronic resources (Van den Haak, De Jong and Schellens 2003, p. 344). One solution to this problem would be to use a *federated search engine*, of which many commercial versions are available. Research into the ones that would be best for South African needs still needs to be conducted. The products themselves have also not yet had enough time to mature.

- One frequently mentioned problem in the literature is that postgraduates are often uncertain about when they should use an electronic database (Starkweather and Wallin 1999; Robertson 2003, p. 129). Students are often overwhelmed by the sheer range of databases, e-prints, e-text and e-journals (Robertson 2003; Macauley, as quoted by Macauley and McKnight 1998, p. 99). Other requirements are that the number of specialized indexes available online should be increased (Starkweather and Wallin 1999), that standalone CD-ROM databases should be converted to online, that access should be given to more databases that are easy to use, and that there should be better integration between the original text-based library system and web-based resources.

- Technical library terminology is often very confusing to clients (Van den Haak, De Jong and Schellens 2003, p. 344), and it should be avoided wherever possible.

- Participants are often unsure of how to conduct a search (i.e. they need to be instructed on how to enter a search term, use dropdown windows, or start the actual search) (Van den Haak, De Jong and Schellens 2003, p. 344).

- From the end-user's point of view, catalogues often fail to give the necessary feedback about searches that have been conducted (Van den Haak, De Jong and Schellens 2003, p. 344).

- Utilising abstracting and indexing services should be encouraged amongst postgraduate students (University of Massachusetts at Amherst Library Needs Study, n.d.).

2.6.3.4 Internet search strategy needs

My investigations enabled me to identify the following needs that arise out of the necessity to navigate the World Wide Web:

- Postgraduate research students need to be able to navigate the web for reliable and authoritative web sites, and should be able to use effective search strategies when they do so (Robertson 2003, p. 129). In Malaysian academic libraries there is also a strong need to develop end-user programs to provide an opportunity for all potential end-users to learn basic search concepts and techniques (Majid and Mansor 1996).

- Middleton, McConnell and Davidson (1999, p. 221) list three general types of information needed by internal and external users of a higher education institution when using a World Wide Web site. These are:

  - Promotional information
  - Value-added information that is genuinely useful to people
  - Utility information, services and resources “that will enable an institution to reach its strategic aims more easily, facilitate external and internal communication and enhance education”. The information provided should include content and should be accessible, relevant and current (Middleton, McConnell and Davidson 1999, p. 225)

- Findings by Bruce (as quoted by Macauley and McKnight 1998, p. 102) indicate that “in practice, candidates appear to receive little assistance from their supervisors [in preparing their literature review]”. A lack of assistance from a supervisor means that there will be a greater dependence on librarians or information specialists. Since research is a part of the learning process, students need to be assisted to conduct their own research and acquire the necessary information literacy skills to do so.

- The study by Rowland and Rubbert (2001, p. 750) indicates that one of the main research needs identified among students is still the need for proper information resources, preferably "traditionally published material because of its mobility, flexibility, easy scanning, more comfortable reading position with less constraint on the eyes, and the option of storing texts for a long period of time".

2.6.3.5 The need to make bibliographic research requests in various ways

When it comes to bibliographic research support, postgraduates still mainly need flexible methods of submitting requests such as those made by telephone, facsimile, Internet (incl. e-mail) and ordinary post (Macauley, as quoted by Macauley and McKnight 1998, p. 99). Macauley, (quoted by Macauley and McKnight 1998, p. 99) also mentions the need for an electronic reference desk that makes chatting and e-mail facilities available 24 hours seven days a week.

2.6.3.6 The need for information literacy skills

From the literature it is clear that students need information literacy skills if they are to make sense of the vast quantity of information that is available out there. They also need to be taught how to search for *appropriate* information. "Research candidates probably have the greatest information requirements of all students; consequently they have the greatest need for information literacy skills" (Macauley and McKnight 1998, p. 100). "Normally, academics [or researchers] do not use anywhere near the number (i.e. quantity) of information services available, nor, it is argued, do academics [or researchers] normally have the necessary skills or techniques to use those resources" (Macauley and McKnight 1998, p. 101). Even then, once they have managed to conduct a successful search, they also need to be taught where to locate the physical resources (Robertson 2003, p. 129). Librarians can help to keep postgraduates updated with new services by means of individual consultation sessions (Robertson 2003, p. 129) and by showing them how to utilize electronic communication facilities more effectively.

2.6.3.7 Technological needs

My investigations enabled me to identify the following administrative needs that relate to technology and its uses:

- Postgraduate students need to be able to set up an e-mail account (Robertson 2003, p. 129).
- Postgraduate students need to be able to select an Internet Service Provider (Robertson 2003, p. 129).
- Postgraduate students need to be able to download and install software programs such as Adobe Acrobat Reader™.
- Postgraduate students need to be able to use a word processing program. Students often have doubts about their skills when it comes to word processing and application software packages (Robertson 2003, p. 129).
- Postgraduate students need to be able to deal with technological problems such as trouble with the network connection, the browser or the computer that they are using (Van den Haak, De Jong and Schellens 2003, p. 344).
- Postgraduate students require more public workstations on which to conduct searches and research (Starkweather and Wallin 1999; University of Massachusetts at Amherst Library Needs Study, n.d.). They also need more multimedia workstations.
- Postgraduate students require better and more copying facilities on machines reserved for the use of postgraduates alone.

One need that is not articulated in the literature is the need that postgraduates and researchers have to access Internet hotspots (wireless Internet) from personal laptops or palmtops while they are inside the library building or on the campus.

2.6.3.8 Training needs

Postgraduate students need a specialized training that will refine their search strategies and improve their information literacy skills. One focus group participant in a study from the University of Nevada, Las Vegas, sees the library as "focusing on instruction and orientation for users so that they may do research from home" (Starkweather and Wallin 1999).

Postgraduate students need training so that they will become better able to:

- Find their way around word processing and application software packages (Robertson 2003, p. 129).
- Manipulate bibliographic software packages such as EndNote™ (Robertson 2003, p. 129; Macauley, as quoted by Macauley and McKnight 1998, p. 99).
- Conduct Internet searching (Robertson 2003, p. 129).
- Utilise search strategies (Robertson 2003, p. 129).
- Work in an online environment to access information and participate in discussion forums (Robertson 2003, p. 131).

Suggestions made by distance students include the wish for:

- Special introductory sessions that are subject-related and that focus on the information needs of part-time students (Rowland and Rubbert 2001, p. 757).
- Network end-user support and Communities-of-Practice (CoPs). This would reduce the feelings of isolation that are often experienced by postgraduate students. "Librarians must provide students with access to the information that enables them to have a broad perspective on their field of research" (Macauley and McKnight 1998, p. 97).
- Reader education (Macauley, as quoted by Macauley and McKnight 1998, p. 99).

- One-to-one tutorials (Barry, as quoted by Macauley and McKnight 1998, p. 102).

- Instruction that transcends the "how-to-use systems" approach and that incorporates advanced skills training (Barry, as quoted by Macauley and McKnight 1998, p. 102).

- Training that focuses specifically on the context of academic subjects rather than generic training (Barry, as quoted by Macauley and McKnight 1998, p. 102).

2.6.3.9 The need for additional support

My investigations enabled me to identify the following kinds of additional support required by postgraduate students:

- Information about statistics, data analysis, research funding.

- A dedicated postgraduate liaison librarian (Macauley, as quoted by Macauley and McKnight 1998, p. 99).

- A current awareness service (Macauley, as quoted by Macauley and McKnight 1998, p. 99). The study at the University of Nevada, Las Vegas, noted that the library "services mentioned most frequently were alert services from publishers and access to full text of journals" (Starkweather and Wallin 1999).

- Frequent access to or reception of a list of new publications received by the library (Macauley, as quoted by Macauley and McKnight 1998, p. 99) that would be sent to faculty (Starkweather and Wallin 1999) and to students. Most clients would prefer brief e-mail announcements that would inform them about what is new or available in the library.

2.6.3.10 The need for help when writing a proposal and thesis

Postgraduate students very often regard librarians as *de facto* co-supervisors for their studies. With this in mind, they need assistance and support for:

- Understanding the key stages and distinctive challenges of postgraduate research (Robertson 2003, p. 131)
- Understanding the requirements and elements of a thesis
- Applying bibliographic reference techniques
- Managing information (Robertson 2003, p. 129)
- Manipulating data (Robertson 2003, p. 129)
- Understanding the law of copyright and the meaning of plagiarism

The training of librarians need to be frequently reviewed if they are to keep up with changes and developments in the virtual library environment and become skilled in the use of new techniques, approaches, methods and technology. Librarians need to make an intensive study of the VRE (Virtual Research Environment) so that they can devise comprehensive and effective plans for managing library services and activities within this VRE.

2.6.3.11 The need for networking

Librarians need to establish networks that will reduce the feelings of isolation that are often the bane of postgraduate students' lives. Increased collaborative information networking among students, academic and library staff through Communities-of-Practice would contribute towards the implementation of an institutional information system (Rowland and Rubbert 2001, p. 757; Macauley and McKnight 1998, p. 97). Meetings between subject specialists and departments to discuss new discipline-specific resources (Starkweather and Wallin 1999) could lead to better informed librarians, and that could lead to more effective services and a greater degree of client satisfaction.

2.6.3.12 Resource needs

The following items reflect the information needs of postgraduate students.

- Proper information resources. This means "traditionally published material because of its mobility, flexibility, easy scanning, more comfortable

reading position with less constraint on the eyes, and the option of storing texts for a long period of time" – regardless of what the World Wide Web may offer in this day and age (Rowland and Rubbert 2001, p. 750).

- Advance bookings of online material (Rowland and Rubbert 2001, p. 757).

- Closer liaison between subject librarians and departmental staff so that they can both monitor the availability of reading material (Rowland and Rubbert 2001, p. 757).

- Alternative reading lists that take the pressure off existing resources. There tends to be strong competition for resource materials because part-time and full-time students receive the same reading lists (Rowland and Rubbert 2001, p. 749). Alternative reading lists might serve to lessen the tension.

- The electronic delivery (where possible) of articles and chapters from books to the requestor's workstation (Macauley, as quoted by Macauley and McKnight 1998, p. 99).

- Access to vital sources. The service that is most important to a postgraduate researcher is convenient access to extensive collections of serials and monographs, and special collections (rare books, manuscripts and archives) (University of Massachusetts at Amherst Library Needs Study, n.d.).

2.6.3.13 Personal needs

Not only do postgraduate students have academic research needs. They also often look to the library staff to assist them with a variety of personal problems. Some of these needs are enumerated below.

- Personal advice. Some students ask for advice from library staff about supervision issues and even, at times, family or personal problems (Robertson 2003, p. 129).

- Physical needs. Students with disabilities have special physical needs which obviously need prompt, practical and sympathetic attention (Schmidt and Wilson 1998).

- Personal studying style needs. The library layout and services should make provision for a whole range of very different styles of study. The following list contains only some of the more obvious needs that researchers have when it comes to study environment: group study, noisy study, silent study, individual study, online or virtual study, study with coffee, study at home, study with music. Because some of these environmental styles are obviously at variance with one another, the library staff will need enormous ingenuity, tact and firmness in creating fair and just rules and adjudicating personal space among researchers who find themselves in conflict with other researchers over their personal needs and environmental study styles.

- Personalization of library facilities. Comfortable reading areas are needed because most postgraduate students are also working adults who spend very little time at home and who are often deprived of the comforts and amenities of domestic circumstances. Perhaps librarians can devise ways of making the library as much like a “home away from home” as the exigencies of an academic library permit. What is certain is that the more comfortable researchers are, the more easily will they be able to focus on their research to the exclusion of irritating environmental stimuli.

2.6.3.14 The need for an ideal research environment

The Researchers’ Centre (the VIP lounge at the library) at the Queensland University of Technology Library seems to have arrived at the ideal solution to the needs of postgraduate students even though the services that they offer are far more than only virtual services. This library has gone out of its way to meet the information needs of their research community through a one-stop-shop arrangement that offers a combination of access to electronic products, expert in-house advice, and state-of-the-art study space that is more comfortable than the average university library (Stokker 1998).

This library offers a dedicated area in which research students can study, meet one another and consult library staff. Refreshment facilities are available, as are a

meeting room, a consultation room, and 14 screened ergonomic workstations, each of which is equipped with a fully networked PC. At the time of the writing of this article (Stokker 1998), the consultation room contained a single workstation with modem access to specialist geographical information system products and other information resources. This library also offers full access to the Internet, more than 100 bibliographic databases, indexes, full content databases, and general purpose software including word processing packages. At the time of the writing of the article, the library staff were also considered installing bibliographic management databases such as EndNote™. All workstations have access to networked laser printing. Guaranteed expert assistance is available during business hours from the assigned reference librarian. Clients may visit the library or request a librarian to visit the faculty or school. Other "nice-to-haves" in this library include a whiteboard for library staff to post messages and for clients to leave messages for each other, a mail tray in which clients may deposit requests and other documents for circulation within the internal mail system, and a small supply of stationery for the unprepared client.

2.6.4 Demographic factors

According to New Jersey's *Plan for Higher Education* (1999, p. 1) there are "significant challenges facing higher education as it plans for the future, including the changing mix of students and student needs driven by shifting demographics".

The Academic Orientation Program for International Students (AOPIPS) at the University of Melbourne was established in 1999 because of the various kinds of help that international students needed to adjust to the strange and in many ways alien (to them) local cultural environment. "The program has become an integral part of the academic support skills programs and is designed to assist students with their studies, and to improve their communication skills and their transition to learning at an Australian university. Library staff also plays a role in supporting the program" (Robertson 2003, p. 129).

Since the University of Pretoria, and specifically the Faculty of Education, is attracting more and more interest from African countries in particular, this will definitely impact on service delivery by the library. Students are no longer limited by location – in a virtual world they can study, access web-sites and catalogues and conduct research from libraries outside their home country, regardless of

time and space. The Academic Information Service might contemplate offering (limited) special services to foreign students – and to foreign African students in particular - similar to the Academic Orientation Program for International Students offered by the University of Melbourne. Coming from foreign countries these students offer suffer from various kinds of cultural shock, which also need to be considered when addressing the needs of postgraduate students.

2.7 The conceptual model on which the literature survey was based

I have used the model by Page-Shipp et al. (2005) which I adapted and applied as the theoretical framework of this study to guide and determine the design of the conceptual framework for this study, and that in turn guided and determined the literature review for this chapter.

I identified two components of electronic research from the model by Page-Shipp et al. (2005). These two components are *eScience* and *Access to eInformation*. In order to develop a Virtual Research Environment that contains these components, it is necessary first to identify the specific electronic research needs of postgraduate students and researchers. Once these needs have been identified, the specific tools and applications required for a Virtual Research Environment can be designed, developed and implemented. If these steps are followed, the research needs of postgraduate students and researchers can be optimally addressed.

The conceptual model for this study derived and adapted from the model by Page-Shipp et al. (2005), conceptualises various categories of needs that postgraduate students have. I used these categories to guide and organise the data obtained from the literature survey and to guide and determine the design of the questionnaire.

2.8 Summary

This literature review constructed a firm conceptual foundation from which I could conduct a needs analysis among postgraduate students at the University of Pretoria. The literature makes it clear that the needs experienced by postgraduate students are different from these of other user groups. It also makes it clear that the library needs to accommodate this special category of users by addressing those needs if it hopes to remain relevant in the modern

academic world by refining and perfecting the virtual research environment that it sets aside for postgraduate students. The modern academic librarian needs to have an understanding of adult learning principles, of the critical differences in the characteristics and assumptions of different generations, of learning styles and personality types, and of continuous changes in technology in order to remain competitive in a rapidly modernizing world. The strain of keeping up to date with all important new developments makes huge demands of librarians. But these are demands that will have to be met by any librarian who wishes to provide a world-class service that complies with the best international standards and who desires to give the best possible service to research clients in an increasingly virtual research environment (VRE).

I identified various needs categories in the conceptual framework for this study and these guided the literature survey. The needs identified from the literature survey show definite similarities to the needs conceptualised in the conceptual framework for this study. The categories of need identified in the literature survey are:

- Administrative needs
- Access needs (which include database access needs)
- Internet search strategy needs
- Bibliographic research requests
- Information literacy skills
- Technological needs
- Training needs
- Needs relating to writing a thesis or proposal
- Resource needs
- Need for networking
- Personal needs

Chapter 3. Research methodology

3.1 Introduction

Chapter 2 made it clear that the research in this study has significant implications for a variety of current issues in higher education. I deliberately selected a user-centred approach so that I could achieve a thorough understanding of the real needs of postgraduate students. If one hopes to design and implement products and services that will meet the needs of a specific user group, it is advisable to involve the specific user group concerned and to find out from them exactly what it is that they want. In this study I therefore focused on the actual users and their tasks so that I might acquire a deep understanding of their requirements and so that their genuine needs and wants could be taken into account in the future designs and plans of the support services of the Academic Information Service (Coleman and Sumner 2004).

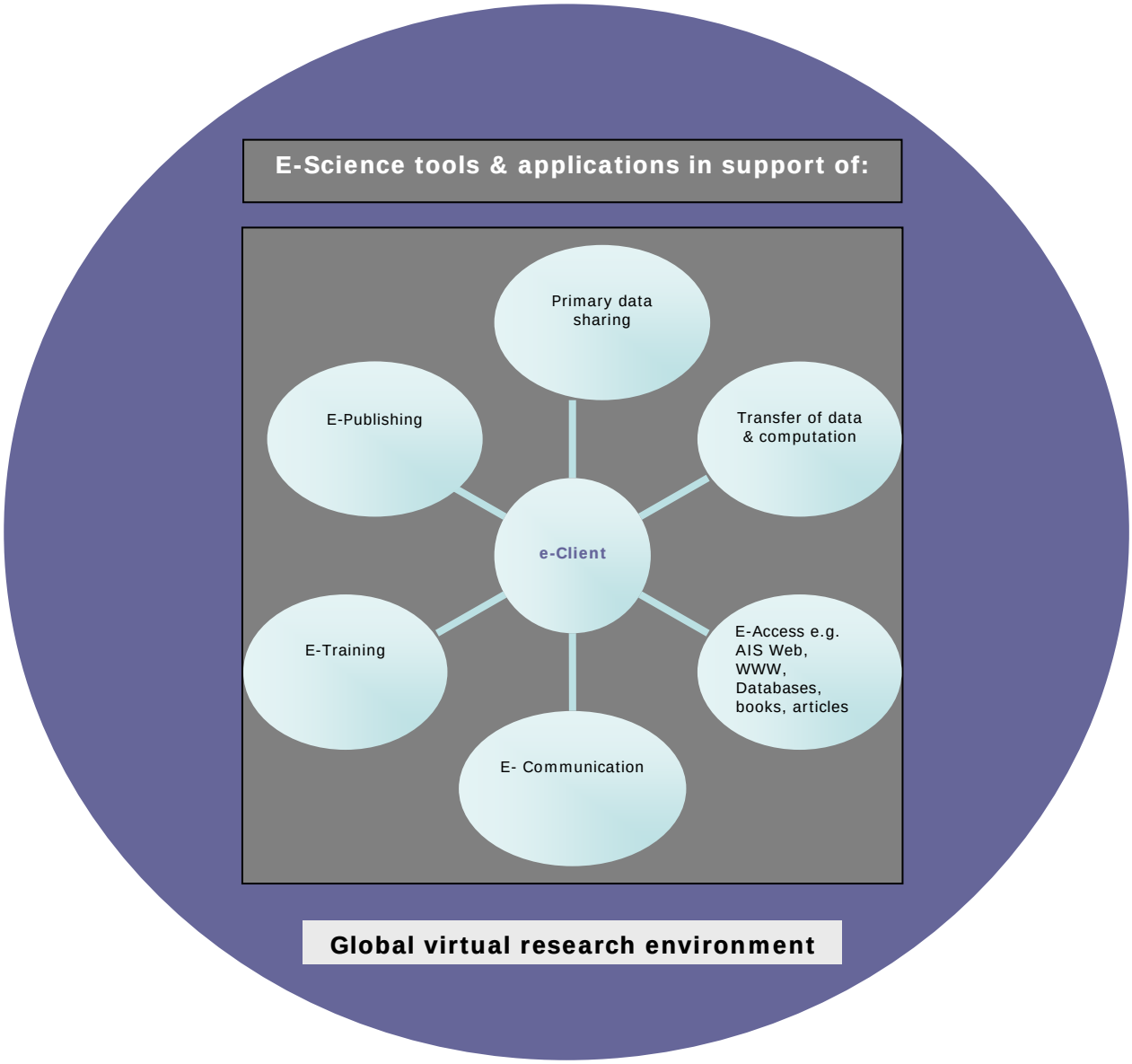
This chapter explains the research methodology that was used and includes a discussion of the conceptual framework by means of which the study was conducted and the data collection plan applied. Issues of validity, reliability, ethical considerations and the limitations of this research are also addressed.

3.2 Conceptual framework for this study

Stone and Harris (quoted by Van Lill 2001, p. 40) distinguish between two fundamentally different kinds of user studies. “On the one hand, the starting point is the existing service and on the other, the starting point is the assessment of people’s needs” (Van Lill 2001, p. 40). Hewins (quoted by Van Lill 2001, p. 40) distinguishes between *information need studies* and *information use studies*. An analysis of the research needs of postgraduate students at higher education institutions may be regarded as an *information need study*. In such studies one investigates the users of the sample and their specific needs, their information-related behaviour, the tasks they perform, the information-need situations in which they find themselves and their general and specific information requirements. “The focus is on the interaction between user and information system, and touches on related aspects such as information habits, preferences, perceptions and information seeking behavior” (Van Lill 2001, p. 40).

Electronic research needs represent only one of the many categories of needs that postgraduate research students experience. Since most postgraduate students are adult learners, they also have careers and many other matters to attend to that are rather different from those experienced by the average undergraduate who has recently left school. Postgraduate research students have different needs with regard to career development, educational planning, intellectual skills development, life skills development, personal development, resources and research information, study facilities, personal needs, health needs, financial needs, social needs and so on. It is against this background that the conceptual framework (see Figure 9 on the next page) should be understood. I used these categories of needs from the conceptual framework to identify the specific needs that postgraduate students experience. Once I had categorised their needs, I engaged in a thorough needs analysis that led in turn to a clear understanding of the kinds of tools and applications that would support the work habits, routines and processes of postgraduate research students who work in the kind of virtual research environment conceptualised by Page-Shipp et al. (2005). The needs analysis that I undertake in this study addresses the eScience component of eResearch in the model by Page-Shipp et al. (2005). It enabled me to identify the specific tools and applications that postgraduate research students need when conducting electronic research (see Figure 3, p. 17).

Figure 9. Conceptual framework within which e-research needs were studied



The figure above shows that *e-science tools and applications* refer to the tools and applications that are needed for conducting research, publishing, sharing data, transfer of data and computation, access, communication and training – all the constituent activities that make for a more effective and efficient global virtual research environment. The e-client occupies a central position in this virtual global research environment model because it is the client who is supported by all these activities as he or she strives to achieve excellence in research and an optimal workflow.

The conceptual model shown in Figure 9 is, as has already been noted above, an adaptation of the original model by Page-Shipp et al. (2005). It supports the proposed e-

research paradigm and identifies the e-research needs of postgraduate students by offering a service that comprises the following elements:

- The willingness of researchers to *share primary data and datasets* and make them available through an open access repository (Page-Shipp et al. 2005).
- The kind of IT infrastructure that is able to *transfer and share large data-streams or datasets* and to share models and even computing capacity (Page-Shipp et al. 2005).
- *Commercial and open access to high quality research.* "Open access is relatively new, and for it to achieve maturity, researchers will have to be both willing and able to use this mode" (Page-Shipp et al. 2005).
- Promoting collaborative research by making *research tools, models and applications* that are held in geographically remote institutions accessible (Page-Shipp et al. 2005).
- The *digital curation and preservation of scientific data and datasets* "for their scientific and scholarly useful lifetimes, including the promotion of effective and widespread use" (Page-Shipp et al. 2005).
- Making provision for *innovation in technologies and applications* that would support all of the processes mentioned above (Page-Shipp et al. 2005).

The application of the conceptual model for the analysis of e-research needs shown in Figure 9 of this study is an attempt to refine the "tools and applications" component of the model by Page-Shipp et al. (2005). This model categorises the needs and tools that support the e-research needs of postgraduate students. Its purpose is to show in graphic form what such postgraduate research students need by way of e-infrastructure if they are to pursue their research unhampered in an environment that is completely supportive because it answers to all their needs. Once these needs have been properly identified, the institution will be in a position to address them.

By using the main conceptual framework, one can illustrate the impact created by sufficient or insufficient service delivery from the library (see Figure 10).

Figure 10. Satisfied e-client within a continuous cycle

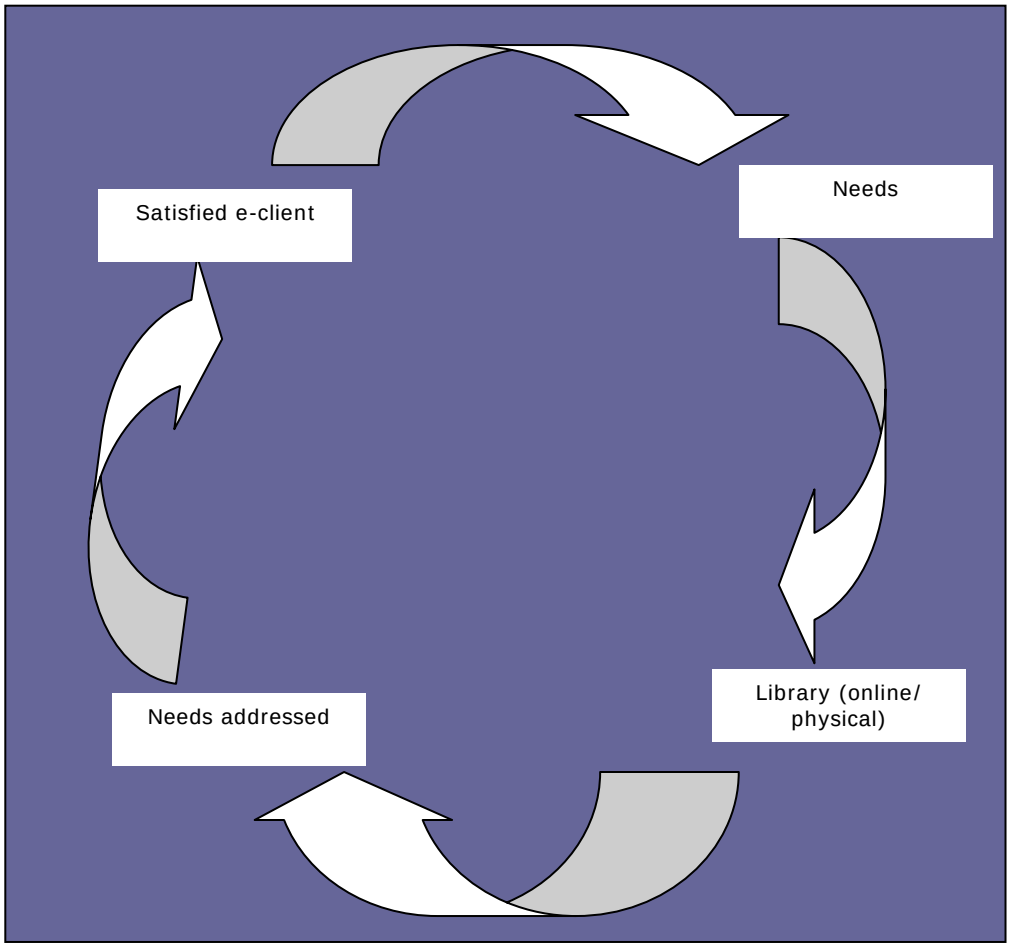
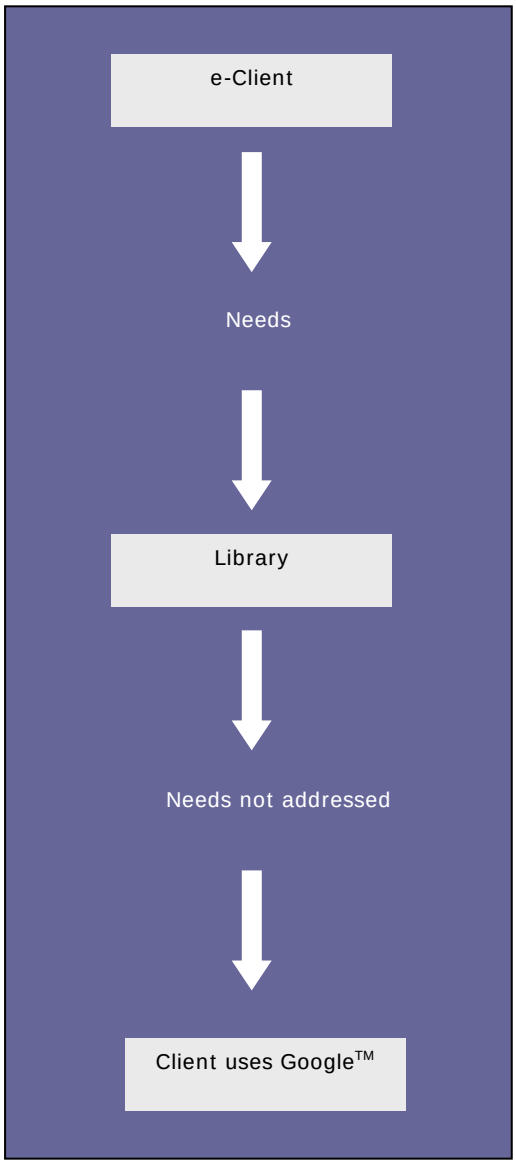


Figure 10 shows how a satisfied e-client fits into a continuous cycle. Because such a client will have had his or her needs addressed in a satisfying and affirmative way by the library, he or she will have no reservations about returning to the library in the future to have his or her needs addressed.

That the opposite is also true is seen in the client model adopted by contemporary libraries. Once a client has had an unsatisfactory experience in a library or once client needs have not been satisfactorily addressed by the library, the library is in danger of losing such a client. The process as depicted diagrammatically (see Figure 11) therefore becomes linear when it illustrates the opposite of what we see in Figure 10 and when it shows how a negative experience impacts on the research environment.

Figure 11. Unsatisfied e-client within a linear process



In the following section I will discuss the methodology that I used to identify specific needs that need to be addressed.

3.3 Research design and methodology (data collection plan)

3.3.1 Research paradigm

According to Blaxter, Hughes and Tight (2002, p. 59), "methodology" usually refers to "the approach or paradigm that underpins the research". In conducting this research I used a positivist approach or paradigm. This means that I as researcher tried to remain objective and detached from the respondents who participated in the research for the duration of the research. I thereafter tried to elucidate the research issues by means of a quantitative research instrument (in this case, the questionnaire).

I mainly used a quantitative research instrument (i.e. a questionnaire), together with the results from a user survey (a qualitative research instrument). Schwandt (2001, p. 215) writes that "qualitative studies can and often do make use of quantitative data". Because of the exploratory nature of the research, I used the data from the qualitative instruments (i.e. the survey) to complement the results of the quantitative instrument (i.e. the questionnaire) and to verify the data that had been collected by means of the questionnaire. The method whereby a combination of research methods is used to cross-check findings (as is the case in this study) is referred to as "triangulation" (Blaxter, Hughes and Tight 2002, p. 84; Rowland and Rubbert 2001, p. 747).

3.3.2 General methodological structure

3.3.2.1 Research problem

The issue that I will address is that although continuous advances in technology are making a radical impact on the way in which postgraduate students conduct their studies, this new technology (that is used throughout the world) is not being utilized to its fullest possible extent by the library and by other academic support services that have to meet the research and study needs of postgraduate students. Libraries specifically are not exploiting the advantages and potential of this range of developing technologies – usually because of limited resources and because of a lack of skills and training among librarians. Page-Shipp et al. (2005) propose that libraries could compensate for deficits in resources if between libraries were to collaborate and share resources through an e-research portal.

My observations of the specific needs of postgraduate students have shown me that they mostly attend to their studies after hours, during weekends and when they take leave for

study purposes – and not (mainly) during the library's opening hours. Because they are so busy and committed to their schedules, they do not have the leisure to wait for the library to open on the following day. They need information to be available at a time when they are ready to receive it and process it. This may be at two o' clock in the morning.

The research problem that arises out of this was tested by the following research questions:

- How does the literature define the specific electronic research needs of postgraduate students at higher education institutions experienced internationally?

- What specific electronic research needs are experienced by postgraduate students at the University of Pretoria, Faculty of Education?

- Do any of the research needs identified by the literature exist among postgraduate students at the Faculty of Education, University of Pretoria?

- How can the needs thus identified be prioritised in terms of frequency and urgency?

3.3.2.2 Research matrix

The following research matrix (see Table 2) illustrates how the research instruments mentioned above were used to answer the research questions. This matrix not only indicates the effectiveness of the research, since more than one instrument were used to arrive to an answer, but it also shows that the research was efficient because each instrument was used for more than one purpose.

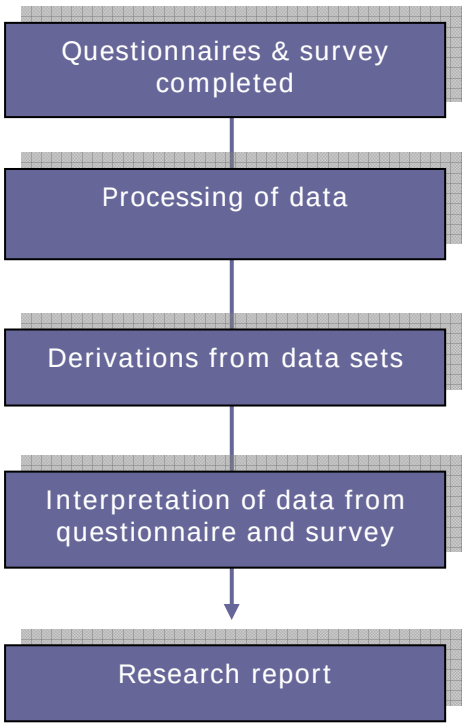
Table 2. Research matrix

Questions	Methods: Literature Review	Questionnaire	Survey
How does the literature define the specific electronic research needs of postgraduate students at higher education institutions experienced internationally?	✔		
What specific electronic research needs are experienced by postgraduate students at the University of Pretoria, Faculty of Education?	✔	✔	✔
Do any of the research needs identified by the literature exist among postgraduate students at the Faculty of Education, University of Pretoria?		✔	✔
How can the needs thus identified be prioritised in terms of frequency and urgency?	✔	✔	✔

3.3.2.3 Research report

The process that was followed to compile the research report can be illustrated as follows (see Figure 12):

Figure 12. An illustration of the research process



3.3.2.4 Research outcomes

The main outcome of this research is a profile of the electronic research needs of a postgraduate student at the Faculty of Education, University of Pretoria. This profile will provide guidelines for anyone who intends to design services, products and tools to support postgraduate students in their research – not only for the Academic Information Service at the University of Pretoria, but also for other higher education institutions in South Africa and abroad.

3.3.3 Data collection instruments

I used a combination of instruments for this research. The instruments were a literature survey/review, a needs analysis questionnaire, and a user survey.

I used the needs analysis questionnaire to collect data about the postgraduate students' preferences and needs when they used technology to conduct their research, and I used the survey to confirm the findings from the questionnaire and to identify whatever shortcomings might exist within the current e-service delivery process.

3.3.3.1 Literature survey / review

I approached the research in the customary way: by first undertaking an in-depth analysis of the literature and research already conducted in this field.

Although one can find a large amount of research material on the World Wide Web, I analysed mainly articles from authoritative research databases such as EbscoHost (Academic Search Premier).

Among the main search terms or keywords that I used were the following: “postgraduate students”, “higher education”, “research needs”, “electronic research needs”, “information needs”, “needs analysis”, “needs assessment”, “virtual research environment” and “user study”. These searches were executed by using the Boolean operators: AND, OR and NOT.

3.3.3.2 Questionnaire

3.3.3.2.1 Rationale for using a questionnaire

Questionnaires are one of the most widely used social research instruments (Blaxter, Hughes and Tight 2002, p. 179), especially when they are used to clarify the needs and reactions of a defined user group to the design and implementation of specific services or products to which that user group is exposed. This is what Reeves (n.d.) is referring to when he writes: “The audiences for the program must be carefully analyzed to assure that all their needs are met and all their preferred modes of learning or accessing information are considered.”

In this study, the questionnaire proved to have a few advantages when compared to the advantages listed by Reeves (n.d.):

- The respondents within this study remained anonymous.
- The questionnaire was brief. The respondents needed a maximum of only ten minutes to complete it.
- It was possible to include different types of questions (namely open-ended and multiple-choice questions) within this specific questionnaire format.

When compared to disadvantages listed by Reeves (n.d.), some disadvantages inherent in this questionnaire were the following:

- ❒ It was not possible to design a flawless questionnaire.
- ❒ The answered questionnaire took a considerable time to process and analyse.
- ❒ The way in which the questionnaire was used did not allow for much flexibility during the data collection process.

3.3.3.2.2 Design of the questionnaire

The literature survey and conceptual framework together guided the design of questions that were included in the closed questionnaire. During the design stage, I sent the first draft of the questionnaire to the Department of Statistics (*Statomet*) of the University of Pretoria, who recommended some modifications. It was particularly difficult to decide how to formulate questions that would elicit data that was both rich and sufficient enough to provide me with information on which to work. Because of the carefully demarcated nature of this study, the questions about the respondents' use of electronic e-services and their electronic needs were of central importance, and I had to take great care not to confuse *electronic* research needs with research or information needs *in general*.

As I mentioned above, I employed a qualitative approach by using quantitative data. Sixteen of the questions required respondents to "select the appropriate box" or "all which apply" (i.e. all the boxes that were applicable). These were multiple choice questions. Two further questions were open ended. I provided clear instructions on how to complete each question by making the instructions very clear, as with, for example, "Choose one only". I included a total of 18 questions in the questionnaire (see Addendum C). I avoided library or information technology jargon where possible, and took care to use what terminology there was consistently throughout the questionnaire. I also avoided leading questions. The questionnaire was available in English only.

I printed the questionnaire in black and white. The questions were ordered in a logical way. The first two questions addressed the current study year for which the respondent was enrolled and asked what the respondent's mother tongue was. I followed these by broad and more detailed questions about the kind of electronic services, support and products postgraduate students expected from their library. These questions were obviously pertinent to the core of the research.

My final version of the questionnaire therefore addressed the following information and issues:

- Characteristics of respondents (study year for which the respondent was enrolled and the mother tongue)

The preferences of the postgraduate respondents with regard to:

- Electronic tools used to conduct research, e.g. Internet search engines and library databases
- Means of communicating with the library
- Electronic searches
- Training
- Sharing scholarly research/publications electronically (This would include networking and electronic publishing)
- Online access

The relation between the conceptual model/framework and the questions included in the questionnaire is illustrated by the table (Table 3) below:

Table 3. Demonstrating how the questionnaire has been based on the conceptual model/framework for this study

Category according to conceptual model	**Questions derived from category**	
E-access needs	**Q4**	Which of the following do you prefer when conducting your research?
	Q12	When using the library web page, which of the following do you prefer?
	Q14	How often do you plan to use the online library services/facilities?
	Q15	When conducting research using the electronic databases and electronic journals, which of the following do you prefer?

Transfer of data and computation	**Q 10**	Which of the following software would you like to be made available on computers inside the library to support your research? You may choose more than one.
	Q 9	How willing are you to make your assignments and research projects available on an institutional database in order to share them with the rest of the research community at UP and worldwide?
Communication needs	**Q3**	What is your mother tongue?
	Q5	When requiring help from an information specialist, I prefer to communicate …
	Q7	When receiving news and updates from the library, which of the following do you prefer?
	Q8	I prefer library training to be conducted …
	Q13	When requesting online assistance from an information specialist, I expect online feedback within …
	Q16	When provided with information on electronic journal articles relating to your research topic, which of the following do you prefer?
Training and support needs	**Q 5**	When requiring help from an information specialist, I prefer to communicate …
	Q 6	When searching for information on my research topic, I prefer to …
	Q 8	I prefer library training to be conducted …
	Q 11	Would you like to receive training from the library on how to use the Internet?
	Q 13	When requesting online assistance from an information specialist, I expect online feedback within …
	Q 16	When provided with information on electronic journal articles relating to your research topic, which of the following do you prefer?
Publishing needs, including primary data sharing needs	**Q 9**	How willing are you to make your assignments and research projects available on an institutional database, in order to share it with the rest of the research community at UP and worldwide?

Since no questionnaire is ever perfect, it was only once I had started the analysis of the data that I noticed the following:

- Some questions didn't really provide enough data to establish *significance* in the statistical relationships between data.

- There were certain omissions or lacunae in the questionnaire. I should have, for example, included a question about the age of the respondents so that I could have linked their responses to the generations from which they came. Perhaps this could be addressed in future studies.

3.3.3.2.3 Pilot questionnaire

I initially compiled sample questions by means of open-ended questions convenience sampling. I approached postgraduate students from the Academic Information Service (Groenkloof) on an ad hoc basis to collect suitable questions.

From the questions that I collected by means of convenience sampling, I compiled a pilot questionnaire. In order to test whether the questions in the initial questionnaire were unambiguous and straightforward, I undertook a pilot survey with 136 students during the general orientation session for postgraduate students on 22 January 2005. Of the questionnaires I handed out, only 45 were completed and returned. This gave a return rate of 33%. After studying the pilot questionnaire and thinking about the responses, I introduced some minor amendments that had the effect of removing ambiguity and formulating the instructions more clearly. I also discarded a few questions from the questionnaire. This pilot survey contributed towards maximizing the response rate of the final questionnaire and minimizing the error rate in the answers.

3.3.3.2.4 Sampling technique

I used a non-probability sampling technique (and specifically non-probability "convenience" sampling) to identify possible respondents from the population. With this method of sampling "there is an assumption that there is an even distribution of characteristics within the population" (*Statistics: power from data!,* n.d.). I did not devise a systematic sampling frame to select a target group of students (elements) who might be fully representative of all the faculties at the university. I simply chose elements in an arbitrary way and had no way of estimating the probability that any one element would be included in the sample. There was therefore no assurance that each item had a chance

of being included. This made it impossible either to estimate sampling variability or to identify possible bias (*Statistics: power from data!*, n.d.). This kind of sampling is also often referred to as “haphazard” or “accidental” sampling because it is not representative of the target population. It is not representative because sample units are only selected if they can be easily and conveniently accessed (*Statistics: power from data!,* n.d.).

3.3.3.2.5 Distribution

I collected data by means of the questionnaire from among postgraduate students in the Faculty of Education at the University of Pretoria. The Faculty of Education is divided into four departments:

- Department of Curriculum Studies
- Department of Educational Psychology
- School for Teacher Training
- Department of Education Management and Policy Studies

Although the medium of instruction at the university is Afrikaans, instruction is also given in English when required.

I personally handed out the individually numbered questionnaires during the first scheduled meeting of the participants in the NME 810 module (Research and methodology module, 2005). I also handed them out at two library orientation sessions which were coordinated by an information specialist from the Academic Information Service (Service Unit Groenkloof). I distributed these questionnaires by hand to respondents during the sessions and asked them to complete them during the sessions listed below (10 minutes were allowed for completion). Although response rates to questionnaires are notoriously low, I obtained a very good response rate for this questionnaire because the questionnaire was distributed in precisely structured circumstances (scheduled meetings) and then collected again after ten minutes.

Table 4. Research population and the sample which completed the questionnaire

	Session	Number of Questionnaires	Return rate
10 Feb 2005	Library Orientation (PhD Educational Management Group)	20 handed out; 20 returned	100% return rate
18 Feb 2005	NME 810 Group (which included MEd & PhD students)	112 handed out; 82 returned	73% return rate
22 Feb 2005	Library Orientation (PhD students)	36 handed out; 20 returned	55% return rate

The questionnaire was completed by 122 postgraduate students in total. This represented 28% of the postgraduate students enrolled at the Faculty of Education on 14 March 2005 (Jeannie Beukes, personal communication, March 14, 2005). The response or return rate for the questionnaires that were handed out was *satisfactory* (72%). The students who participated varied in progression with regard to their studies. They were not pre-selected, and participated on a voluntary basis in the sessions described above. One may therefore say that there was a *good* participant coverage. Although a total of 431 postgraduate students were enrolled at the Faculty of Education at the date of this study, the sessions mentioned above were only attended by 168 students. Attendance at these sessions are not compulsory.

3.3.3.3 Survey

3.3.3.3.1 About the LIBQUAL+™ Survey

The LibQUAL+™ Survey (see Addendum F for the questions in survey) evolved from a conceptual model based on the SERVQUAL instrument which is a popular tool for assessing service quality in the private sector (Association of Research Libraries 2005). It is a suite of services offered by the Association of Research Libraries "that libraries [can] use to solicit, track, understand and act upon users' opinions of service quality" (Association of Research Libraries 2005). This instrument may be used to solicit the minimum and maximum expectations, the perceptions and experiences that clients entertain with regard to their home libraries. The data thus assembled is then be processed and a report of the findings may then be made for the library.

According to the Association of Research Libraries (2005), the goals of LibQUAL+™ are to:

- ❒ Foster a culture of excellence in providing library service
- ❒ Help libraries better to understand user perceptions of library service quality
- ❒ Collect and interpret library user feedback systematically over time
- ❒ Provide libraries with comparable assessment information from peer institutions
- ❒ Identify best practices in library service
- ❒ Improve the analytical skills of library staff members so that they find it easier to interpret and act on data

More than 600 libraries participated in the LibQUAL+™ 2005 survey between August and September 2005. Participant libraries included colleges and universities, community colleges, health sciences and hospital/medical libraries, law libraries and public libraries. Some participated because they were members of some or other group. Others participated as independents. In the purposes of this research I used only the section that was relevant to postgraduate students. I incorporated only data obtained from that section in my final analysis.

3.3.3.3.2 Design of the survey

The survey was available online. Links to the online survey were provided via the Academic Information Service web page at http://www.ais.up.ac.za. The AIS Libqual+™ team sent an invitation to participate in the survey to all registered clients of the Academic Information Service by means of e-mail. Access to the survey was available both on-campus and off-campus. Each library was given a unique URL by means of which it was possible to access customized questionnaires for that individual library that addressed the specific needs and conditions of the library. The Academic Information Service Quality Management Team, under leadership of Monica Hammes, took responsibility for translating the questionnaire into Afrikaans so that an Afrikaans version would be available in all South African libraries.

Twenty-two items were developed through several iterations of quantitative studies involving a larger pool of 56 items. The items were identified in qualitative research interviews with student and faculty library users at several different universities (Association of Research Libraries 2005). The expected time to complete the survey was 10 minutes.

In the final version of the survey, the following issues were addressed:

- Physical library facilities (5 questions)
- Library staff competence and attitude (9 questions)
- Availability and accessibility of information resources (6 questions)

The responses of postgraduate clients to questions about the availability and accessibility of specific online resources are of particular interest to this study and I shall address them in chapter 4.

3.3.3.3.3 Sampling technique

All clients of the Academic Information Service were invited to participate in the survey. A non-probability "volunteer" sampling technique was used to reach respondents in the population. To encourage clients to participate, the Libqual+™ organisers offered a "prize" of an iPOD as an incentive to one lucky participant whose name was selected by means of an independent drawing process.

One disadvantage of volunteer sampling is that voluntary participants (as opposed to the general population) may introduce strong biases (*Statistics: power from data!* n.d.). It stands to reason that it is usually only people who care strongly enough about a subject who will tend to respond. And if no limit is imposed on the number of calls that one respondent can make, any person might, for example, be able to vote repeatedly if there is no way of recognizing the respondent and limiting repeat calls. Repeat voting is also more likely to happen if there is a prize to be won.

3.3.3.3.4 Distribution

Clients from the Academic Information Service were requested to complete the online survey over a given period (August to September 2005). The survey was administered by Monica Hammes and Gerda Beukes from the Academic Information Quality Management Team.

The LibQUAL+™ survey was completed by 716 postgraduate students across faculties. This figure (716) represents 25.06% of all postgraduate students enrolled at the University of Pretoria at the time of the survey. As I mentioned above, an URL gave potential respondents access to the survey through the library web page of the University

of Pretoria. The same URL was e-mailed to all registered clients of the Academic Information Service.

3.3.4 Processing and analysis of data

The data collected through the research instruments was analysed according to the procedure proposed by Vithal and Jansen (2003, p. 27). This involved the following steps:

1. Scanning and cleaning
   - ❒ The data was read
   - ❒ Incomplete, inaccurate, inconsistent or irrelevant data was checked
   - ❒ Preliminary trends were identified "to facilitate the organization of the data into meaningful 'chunks'" (Vithal and Jansen 2003, p. 27)

2. Organizing

   The data was then:
   - ❒ Counted
   - ❒ Coded
   - ❒ Entered
   - ❒ Checked
   - ❒ Compared
   - ❒ Categorized

3. Re-presenting

   The results were re-presented as:
   - ❒ Tables
   - ❒ Graphs
   - ❒ Statistical summaries

The data from the questionnaires was processed by *Statomet* (Department of Statistics, University of Pretoria). Data was manually entered by a data typist from the Department of Statistics (*Statomet*). It was then coded, entered and checked according to a statistical analysis package called SAS. Charts were extracted from SAS, and the data was cross-tabulated to see if there were any statistically significant relationships between the different variables.

Respondents' answers from the LibQUAL+™ survey were electronically forwarded to a central database. There it was analysed by the SPSS statistical software of the

Association of Research Libraries. A report in which users' desired, perceived and minimum expectations of the service were reported was then made available to the Academic Information Service. Feedback on this survey was given to staff members and clients of the Academic Information Service by means of an electronic newsletter. The winner of the iPOD was also announced electronically.

3.4 Validity and reliability issues

3.4.1 Validity

Validity refers to how well (if at all) the methods, approaches and techniques used actually relate to, or measure, the issues that have been explored (Blaxter, Hughes and Tight 2002, p. 221). The validity of these research findings were checked by:

- Comparing findings of the pilot questionnaire with findings from the final questionnaire
- Comparing findings from the questionnaire with findings from the literature survey and user survey (triangulation)
- Observing the validity of statistical relationships between variables within the questionnaire by means of the Chi-Square (see Addendum G) (Vithal and Jansen 2003, p. 33).

3.4.2 Reliability

Reliability refers to how well the research project has been carried out, and whether it has been carried out in such a way that, if another researcher were to look into the same questions, he/she would arrive at essentially the same results even though the actual circumstances of such an iteration would obviously be very different (Blaxter, Hughes and Tight 2002, p. 221).

According to *Statistics: Power from data!* (n.d.), reliability cannot be measured in non-probability sampling. The only way to ensure data quality is by comparing some of the survey results with available information about the population. Since the sampling techniques used for both the questionnaire and the survey were non-probability sampling techniques, it was not possible to measure reliability. The quality of the data was tested against what was found in the literature, and by comparing the results of the questionnaire and the survey with each other (triangulation). This comparison proved

that the study is reliable since major similarities were observed in the data results. I shall discuss this further in chapter 5.

3.5 Ethical issues

Prior to the launch of both the pilot questionnaire and the final questionnaire, the informed consent of both Dr Jan Nieuwenhuizen, Co-coordinator of Postgraduate Students of the Faculty of Education, and Professor Jonathan Jansen, Dean of the Faculty of Education, University of Pretoria, were obtained (see Addendum B). I also obtained the informed consent of the Academic Information Service to use the data from the LibQUAL+™ survey for this study (see Addendum E).

Other ethical issues in administering and processing the questionnaire and survey were dealt with in the following ways.

- There were no participation criteria for age, gender, or race.
- Participation in the survey was completely voluntary for students.
- Respondents were fully briefed about the purpose of the research.
- Sensitive or controversial issues were treated with the necessary discretion and without sacrificing the validity or reliability of data obtained during the study. No question that could possibly offend students was asked, and anonymity was completely guaranteed. All responses were treated with confidence. Throughout the report, data were presented in such a way that no meaningful connection could possibly be made between the identity of respondents and the published data.
- Data generated through this research becomes the property of the University of Pretoria.

3.6 Limitations of the research

Any examination of this study needs to be understood in the context of the results and analysis of the data. Since the data represented in this study is from a survey conducted among postgraduate students at the Faculty of Education alone, the danger exists that the data may be one-sided. I shall therefore claim no generalisability for these research results. The limited scope of this study made it impossible for me to conduct this study among all postgraduate students enrolled at the University of Pretoria.

And since a large proportion of the sample who participated in the questionnaire were first year postgraduate students, their needs were perhaps not yet necessarily very clearly established.

Another limitation of this study is that it was not possible to involve all postgraduate students enrolled in the Faculty of Education at the time of this study. The alternative was to use those who were available. This was a smaller group who represented 28% of all the postgraduate students in the Faculty of Education. The respondents who did participate represented only 25% of all postgraduate students in the field of Education and 6.16% of all postgraduate students across disciplines enrolled at the University of Pretoria. This response rate falls within the expected response rate of 25 to 33% as indicated in the LibQUAL+™ 2005 Survey report.

Because students' needs change rapidly, not only from one generation to another, but nowadays from one intake to another, each group of postgraduate researchers begins to study with a different set of needs and expectations. It is highly likely that the results of this same survey would produce rather different results even one or two years from now. This kind of survey should therefore be conducted frequently by the Academic Information Service so that they can keep in touch from year to year with the changing needs of its dynamically changing client base.

In future surveys, however, the questions will have to be expanded and made specific to each possible need that the students might have because it only became clear to me afterwards that students are not always aware of what they need until they are specifically asked about the need in question. Many students are also not aware of what tools, support and forms of technology are available in the rest of the world but they are yet catered for in their own library. It is therefore impossible for them in most cases to be aware of a need to which they have never before been exposed. It would also be illogical to expect them to be able to make comparisons between what they have access to and what other tools and services might address their needs in a more effective and efficient way – if the latter are as yet unknown to them.

3.7 Summary

In this chapter the study was contextualized. A conceptual framework was provided within which the research problems were addressed, and the data collection instruments and procedures were discussed. Data obtained from both the survey and the

questionnaire proved to be valid. Ethical issues were discussed and the limitations of this research were analysed.

Various categories of needs were identified by means of a conceptual model for this study that provided a framework for the identification of specific eScience tools and applications that support:

- Primary data sharing
- Transfer of data and computation
- E-Access
- E-Communication
- E-Training
- E-Publishing by research/postgraduate students

Chapter 4. Research findings

4.1 Introduction

Postgraduate students experience needs that are different from the needs of other client groups at higher education institutions. The purpose of this chapter is to describe the electronic research needs of postgraduate students at the Faculty of Education of the University of Pretoria from the results of research survey that I carried out at the university. The format and conditions of the research survey have been discussed in detail in previous chapters.

In this chapter I shall describe the demographic background against which the study was conducted. I shall also identify the electronic research needs experienced by postgraduate students, establish relationships between variables and analyse statistically significant relationships. Where no relationships exist, I shall present the data and analyse each variable in turn. I shall also present the data according to various categories of needs that are implicit in the research questions in chapter 1, the categories that emerged from the literature survey in chapter 2, and the conceptual model that I proposed in chapter 3.

I analysed data from the questionnaire where applicable and supplemented it with data from the survey. In this chapter, the main focus is on addressing the second research question 2 (see Figure 13).

Figure 13. Research question 2

What *specific* electronic research needs are experienced by postgraduate students at the University of Pretoria, Faculty of Education?

4.2 Demographic background against which the research was conducted

4.2.1 The context of the Service Unit Groenkloof, Academic Information Service, University of Pretoria

The Academic Information Service (Library) consists of ten service units that are divided on the basis of the faculty that they serve at the university. The Groenkloof Service Unit, which I also refer to as “the Education Library”, had never previously, at the time when I commenced this research, conducted any kind of formal and comprehensive needs assessment to identify the needs of client groups working specifically within the field of education. Because of a lack of resources, needs are currently addressed as they occur rather than proactively (which is obviously the ideal). Computer facilities at the library are limited. Library facilities and services at the time of writing consist of the following facilities and services.

Facilities

- A training venue with one computer for the instructor, and one data-projector.

- Ten computers that are used by library clients for conducting their research. One of the computers has a DVD player. The computers all share one laser network printer.

- Internet access to library subscription sites (such as electronic databases and electronic journals to which the library subscribes) are available free of charge. The library offers unrestricted access for registered users to the following information resources across disciplines:

Table 5. Access to information resources offered by the Academic Information Service (AIS Management Team 2005)

Information Resource	Number of titles available through this resource
Full text Databases (Online)	16
Bibliographic Databases (CD ROM)	39
Bibliographic Databases (Online)	120
E-books	467
Monograph Titles (OPAC)	578 512
Print Journal Titles (OPAC)	3 791
E-journal titles	25 000
E-reserves articles	20 121
E-exam papers	2 000
Audio-visual media	20 914
E-theses	366
E-learning course pages	987
World Wide Web	Restricted to academic and scholarly web pages accessible through Google Scholar™

Over recent years there has been a dramatic increase in subscriptions to electronic journal titles. These today in fact far exceed the number of print journal title subscriptions that the library buys each year. Online information is in many ways far more convenient for clients. One advantage is that titles can, for example, be accessed independently of time and location. Because the transition from print to electronic format is taking place by degrees, we, the librarians of the Academic Information Service, find ourselves in an environment that supports both print and electronic formats. It is enormously challenging for one thing to serve clients who entertain vastly different approaches to and expectations of how they should conduct research. Such clients also present with different learning styles and expectations as well as radically personal needs, attitudes and assumptions. All these factors contribute to making service provision in a library such as the Academic Information Service a challenge that changes literally from day to day and client to client.

If one also takes into account the fact that many of our postgraduate students in the Faculty of Education are from previously disadvantaged communities, the challenge for us as professional academic librarians becomes one of meeting each

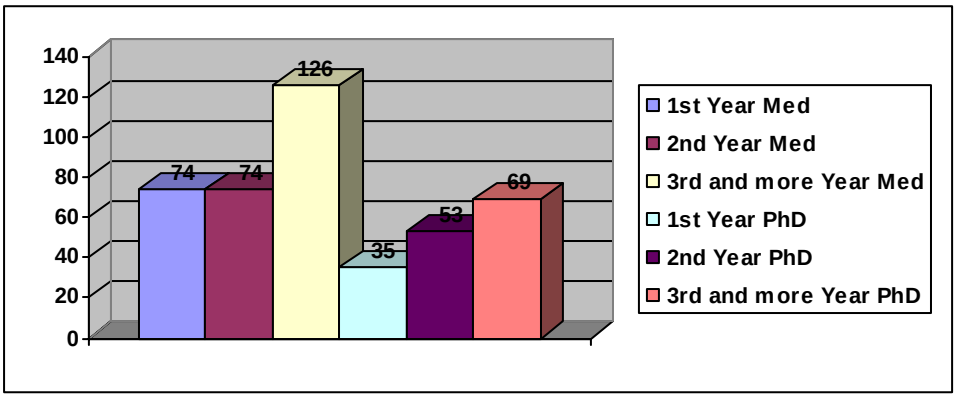
new client on the basis of his or her expectations of what a library such as ours can deliver. Once we have addressed the client's minimal expectations, we can then attempt to lead each client gradually to embrace whatever other services may contribute to a quality research experience. Many of the best facilities that the library has to offer need to be introduced to clients from all demographic profiles. It is these facilities that can make all the difference between a merely satisfactory (but perhaps tiresome) research experience – and one that is of exceptional quality and deeply satisfying to the client. Librarians are often presented with opportunities to take clients to new levels of competence and satisfaction in their research and study. These opportunities often arise spontaneously during the course of interaction between researchers and staff. The challenge to academic librarians such as ourselves is to identify the client's need or deficiency in such circumstances, and then to offer the kind of service that would help the client to be a more efficient and satisfied researcher.

Students who want to access web sites such as Google™ that are outside the Web Access Management Table (WAM table) need first to open an Internet account with the faculty administration. Each student receives a certain allocation of megabytes per year free of charge. After they have used those, they have to pay to access web sites outside the Web Access Management Table. Access to scholarly and academic web sites through Google Scholar™ is free of charge. Each student receives an e-mail address (including limited server space) when registering with the university.

The web service offered by the Service Unit (Education Library) is managed in the following way. Information specialists at the service unit manage the library web site and address the electronic learning and research needs of undergraduates and postgraduates simultaneously. Students may also voluntarily subscribe to an electronic library newsletter that is currently issued on an irregular basis.

Table 6 (next page) shows that the following postgraduate students were registered at the Faculty of Education of the University of Pretoria on 14 March 2005 (Jeannie Beukes, personal communication, March 14, 2006). We make a distinction in the data between postgraduate students who are progressing as expected – i.e. 1st and 2nd year students – and students who are already taking longer than the expected minimum time to complete their studies.

Table 6. Postgraduate students enrolled at the Faculty of Education on 14 March 2005 according to their level of progress



Postgraduate students who are not completing their studies in the expected minimum time of two years exceed the second year numbers. This increases the possibility that some of them will not complete their studies at all. Not shown here are those students who decided to end their studies by the above date (14 March 2005) because of a lack of support on the part of the faculty and other role players such as the Academic Information Service (AIS).

Provision also needs to be made for an additional 8 839 distance students in Education who visit the campus during contact sessions.

It is against this background that I analysed the data received from respondents. The respondents who participated in the questionnaire and survey respectively (these were discussed in chapter 3) are divided as shown in Table 7 on the next page.

Table 7. Postgraduate students enrolled at the Faculty of Education of the University of Pretoria who participated in the questionnaire and survey

Research Instrument	Number of respondents (n)	Respondent %
Questionnaire	122	28.3%
Survey	44	6.16%

28.3% of all postgraduate students at the Faculty of Education participated in the *questionnaire*, while 6.16% of all postgraduate students at the Faculty of Education participated in the *survey*. Since the data represented in this study is mainly from the questionnaire administered to postgraduate students in Education, the data may be one-sided. I shall not therefore claim generalisability for the research results. Data from the survey which was conducted across faculties was adduced in support of findings from the questionnaire. In total, only 9.6% of postgraduate students across various disciplines participated in the survey (Association of Research Libraries 2005, p. 50).

49.7% of postgraduate students who participated in the survey fell in the age group 23-30, while 35.3% fell in the age group 31-45.

Services

The staff allocated to assist postgraduate students consists of three information specialists and a service unit leader. These are assisted by three administrative staff members and four evening staff members. Postgraduate students enrolled with the four departments are divided amongst the three information specialists according to the department with which they are enrolled.

The following services are offered by the three information specialists:

- Bibliographic searches and references for postgraduate students from databases to which the library subscribes
- Assistance with inter-library loans
- Training on an individual basis or within a group. Students are taught referencing techniques and are trained to use the various educational databases.

- Provision of letters of reference for registration with other academic libraries apart from the Academic Information Service of the University of Pretoria

I analysed the research questions and the data from the questionnaire in the context of all facts and information set out above.

4.3 Electronic research needs of postgraduate students in the Faculty of Education of the University of Pretoria

The report of data obtained from the questionnaire below is supplemented by results from the survey where applicable. It focuses on the ways in which postgraduate students prefer to conduct their research, on the tools and applications they prefer, and what they expect and need in order to conduct their research. Once again it should be emphasised that because this report focuses on the response from postgraduate students in Education only, the data is limited in scope and application and cannot be generalised across disciplines or faculties. And since the greater proportion of the sample who participated in the questionnaire were first year postgraduate students, it is probable that their needs had not yet become fully evident either to themselves or to the library staff.

For a discussion of the research methodology (including the research instruments), please refer to chapter 3.

The *Chi-Square test for independence* was used to test the validity of the relationships between the variables. In some cases warnings were issued by SPSS (data computation software) as a result of low frequency counts in certain tables (see Addendum G). In those cases I did not use the test because it is not possible to establish statistical significance. Certain interpretations were, however, still possible.

I identified the following categories of needs from data in the context of the conceptual model in chapter 2.

4.3.1 Electronic access needs

Electronic access needs refer to the various ways in which students prefer to access research material and online content that supports their research. It also refers to the accession of information of an administrative nature and to the frequency with which someone accesses online material, virtual products and resources from the Internet and a library.

While some students still prefer traditional paper-based information, the LibQUAL+™ Survey makes it clear that postgraduate students care less and less about the physical building and tend to rely more and more on electronically available resources and information. Their responses indicated that they find the library a far too noisy locale in which to work (M. Hammes, personal communication, November 9, 2005), and that they would rather therefore access library services electronically from a place that is less stressful to them.

The need most frequently expressed by postgraduate students in the LibQUAL+™ Survey relates to the electronic access of research information. Postgraduate students feel that they are not well informed about the information resources that the library offers. They also regard library resources as being too few and too old, and they are of the opinion that they cannot access them adequately (M. Hammes, personal communication, November 21, 2005). Researchers have a high regard for electronic journals because they know that they are (by their very nature) up to date and that there are no restrictions on their availability (as there are with print journals). Text from such journals is also more easily manipulable. Researchers therefore naturally prefer such electronic journal resources to print journals. It is hardly surprising therefore that electronic journals are the most important resource for researchers and postgraduate students (M. Hammes, personal communication, November 21, 2005), and that their expectations with regard to these (electronic) journals are very high indeed. When they find it difficult to access e-journals because of inadequate bandwidth at home or accessing password-protected and subscription-based databases and journals, postgraduate researchers experience very high levels of frustration and discouragement. It is worth mentioning at this point that the difficulties that researchers experience when trying to access the library's electronic resources is nearly always caused by the fact that such researchers are ignorant of the correct procedures for accessing the electronic journals, databases and e-journals to which the library subscribes. Thus, for example, when the client is using Google™

to search from home, the database vendor or journal platform doesn't recognise the client automatically as being a client from the University of Pretoria. Deep frustration is caused by the client being unable to gain access to a full text password protected article.

The respondents in the survey also expressed a definite need for a Google-like search interface to make the search process more user friendly. This is an issue that is currently being addressed by the Academic Information Service as it investigates ways of working with Google Scholar™. The proposal is to use Google Scholar™ as a federated search engine that will search across all databases and e-journal platforms (including open access scholarly publications) simultaneously after a single authentication of the user. In this scenario, once the user has been authenticated, the client will be allowed access to full text articles in all databases and e-journal platforms to which the library subscribes.

Other access needs that were expressed in response to the open-ended question "Please enter any comments about library services in the box below" from the survey (see Question 40, Addendum F), included the following:

- Unlimited free Internet access from within the library to academic/research web sites
- Full text online access to earlier versions of journals – from 1995 and earlier
- Access to more e-books
- More user-friendly interfaces. The library web page is very confusing at the moment and it is deeply daunting to users who frequently find themselves overwhelmed as they try to navigate their way through various databases and platforms.
- A secure physical area for students who are using laptops
- One username and password for accessing all applications in the university
- A rationalised and simplified library web page. Researchers feel that the information on the library web page is too deeply linked.
- Extended access to the library. The present library opening times prevent postgraduates from working as much as they would like to. Postgraduate researchers (as was noted earlier) tend to have day jobs and to conduct their research at unconventional hours during the night.
- More online study material. Online study material for postgraduates is very limited.

- The need for access to embargoed e-journals. Embargoes (i.e. a holding period put on the journal by the publisher, restricting access to the most recent issues) on e-journals can hamper research.

The electronic access needs of postgraduate students were addressed through the following questions from the questionnaire (Table 8) – see also Addendum C:

Table 8. Questions from questionnaire that addressed the e-access needs of students

Q4	Which of the following do you prefer when conducting your research?
Q12	When using the library web page, which of the following do you prefer?
Q14	How often do you plan to use the online library services/facilities?
Q15	When conducting research using the electronic databases and electronic journals, which of the following do you prefer?

The following questions from the survey tried to establish the frequency of access of online resources (library usage patterns):

Table 9. Questions from survey that tried to establish online library usage patterns

Q31	How often do you use resources within the library?
Q32	How often do you access library resources through a library web page?
Q33	How often do you use Yahoo ™, Google ™, or non-library gateways for information?
Q40	Please enter any comments about library services in the box below.

4.3.1.1 Most respondents expect to use *both* library databases and Internet search engines when conducting their research

In the conduct of research, 21% of the respondents prefer to only use Internet search engines such as Google™; 14% prefer to use the authoritative databases to which the library subscribes (see Table 10). The majority (64%) indicated that they use both library databases and Internet search engines when conducting their research. 78% of all the respondents will therefore make use of subscription databases while 85% expect to make use of Internet search engines. This makes it clear that the Internet is slightly more preferred by postgraduate students for

purpose of research. More therefore will make use of the Internet or of the Internet and library databases.

Table 10. Preferences of students with regard to the use of online resources

	Number of respondents (n=118)	Respondent %
Internet Search Engines	25	21%
Library databases	17	14%
Both of the above	75	64%
I don't use any of the above	1	1%
Total	118	100%

The results of the survey also indicated that a greater number of researchers prefer to access Internet resources on a daily basis while accessing library resources only once a week (see Table 11). While only 25% of postgraduate students access library databases on a daily basis, 47.4% access other Internet resources on a daily basis. 4.5% of students indicated that they never access library resources through the library web page, thereby implying that they never utilise library databases and e-journals at all.

Table 11. Results from the survey indicating preference with regard to online resources

	Daily	Weekly	Monthly	Quarterly	Never	Total
How often do you access library resources through a library Web page?	179 25%	302 42%	129 18%	74 10%	32 5%	716 100%
How often do you use Yahoo™, Google™, or non-library gateways for information?	339 47%	191 27%	87 12%	38 5%	61 9%	716 100%

4.3.1.2 Most respondents prefer a *separate* postgraduate web page

Table 12 shows that when they make use of the online library web page, the majority of students (78%) prefer a web page that addresses the specific needs of postgraduate students only. This suggests that they prefer not to have struggle with information on web pages that has no relevance for them. 19% of the respondents don't mind to share a web page that simultaneously addresses the needs of the various user groups at the University of Pretoria. They would not therefore mind sharing a web page with academics, undergraduates and external users.

Table 12. Preference with regard to a separate web page addressing needs of postgraduate students only

	Number of respondents (n=120)	**Respondent %**
A web page addressing the specific needs of postgraduate students	93	78%
A general web page addressing the needs of undergraduate and postgraduate students simultaneously	23	19%
I don't expect to use the library web page	4	3%
Total	120	100%

Table 13 shows that when one compares the frequency of access with the preference for a separate postgraduate web page, all students very definitely prefer a separate postgraduate web page – whether they access it on a daily, weekly or monthly basis.

Table 13. Relationship between frequency of access and preference with regard to a need for a specific web page for postgraduate students only

	Online daily	Online 1x per week	Online 1x per month
PG web page	32 76%	52 84%	6 75%
PG & UG web-page	10 24%	10 16%	2 25%
Total	42 37.5%	62 55.4%	8 7%

4.3.1.3 Most respondents expect to access the library web page at least once a week

Because the library web page is a support page that is constantly in demand, it needs to be accessible at all times. Table 14 shows that the majority of students (53%) expect to access the library web page at least once a week and that 36% expect to access it on a daily basis. 7% expect to access it once a month, and only 4% expect to seldom or never use the online facilities at all. 89% of the respondents will therefore frequently access the web page which offers access to online databases and full text electronic journal articles. The Internet seems to be easily accessible and available to the majority of postgraduate students. This indicates that they will rely very much on updated information on the library web page to support their research and on the web as a communication tool. The library might consider exploiting the high frequency of Internet use among postgraduates by actively promoting library support on its web page. The present web page is very static.

Table 14. Frequency of accessing the online library services

	Number of respondents (n=121)	Respondent %
Daily	43	36%
Once a week	64	53%
Once a month	9	7%
Seldom	3	3%
I don't plan to use any online services	2	1%
Total	121	100%

The above online library usage pattern is confirmed by the results of the LibQUAL+™ Survey (see Table 15):

Table 15. Library usage patterns of postgraduate students

	Daily	Weekly	Monthly	Quarterly	Never	Total
How often do you use resources within the library?	97 13.6%	259 36.2%	222 31%	117 16.3%	21 2.9%	716 100%
How often do you access library resources through a library web page?	179 25%	302 42%	129 18%	74 10%	32 4.5%	716 100%
How often do you use Yahoo™, Google™, or non-library gateways for information?	339 47.4%	191 26.7%	87 12.2%	38 5.3%	61 8.5%	716 100%

Table 15 shows that most postgraduate students (42%) access the library web page on a weekly basis. More students (25%) access the online library resources on a daily basis than those who physically use library resources on a daily basis (13.6%). 47.4% of postgraduate students who participated in the survey indicated that they use non-library gateways such as Google™ and Yahoo™ on a daily basis to search for information. Once again this is an indication that non-library search engines and web sites are preferred: 47.4% use non-library search

engines and web sites on a daily basis while only 25% use online library resources on a daily basis.

A comparison of the study year/group with the frequency of accessing the online services (see Table 16) shows that there is a statistically significant relationship between the study year for which students are enrolled and the frequency with which they access online services. Most 1st and 2nd year MEd students (59.5%) and 1st and 2nd year PhD students (47.6%) expect to access online services at least once a week. 50% of MEd students who are not completing their studies in the minimum required time of two years expect to access online services more often (i.e. on a daily basis), while 80% of PhD students who are not completing their studies in the minimum required time of two years expect to access the online services only once a week. It therefore seems that as PhD students make more progress with their studies, they will rely less on online services. The opposite is true of advanced MEd students who will rely more heavily on online services in their 3rd+ years of studies.

Table 16. Comparison of year of study groups with frequency of access

	Daily	**Online 1x week**	**Online 1x month**	**Total**
1st & 2nd Year MEd	22 34.4%	38 59.5%	4 6.3%	64 100%
1st & 2nd Year PhD	18 42.9%	20 47.6%	4 9.5%	42 100%
3+ Year MEd	2 50%	1 25%	1 25%	4 100%
3+ Year PhD	1 20%	4 80%	0 0%	5 100%

A comparison of the language group to the frequency of accessing online library services (see Table 17) suggests that the majority of first language English or Afrikaans students (71%) expect to access online services only once a week. Students with mother tongue other than Afrikaans or English expect to access online services almost daily (48.4%) or weekly (42.2%). There is not a significant difference between the latter with regard to frequency of access. In both cases – i.e. the Afrikaans and English group, and the “Other” group – there is a small percentage of students who only expect to access the online services once a

month. More students (9.4%) who speak a mother tongue other than Afrikaans or English expect to access online services only once a month.

Table 17. Comparison of language groups regarding frequency of accessing online library services

	Online daily	Online 1x per week	Online 1x per month	Total
Afr & Eng	12 23%	37 71%	3 6%	52 100%
Other	31 48.4%	27 42.2%	6 9.4%	64 100%

Table 18 shows that of all the respondents who indicated an expectation of daily or monthly access, the majority are from the "other" languages group (72% and 67%).

Table 18. Comparison of language groups with regard to frequency of accessing online library services

	Online daily	Online 1x per week	Online 1x per month
Afr & Eng	12 28%	37 58%	3 33%
Other	31 72%	27 42%	6 67%
Total	43 100%	64 100%	9 100%

A comparison of preference for only using search engines or databases or both for conducting research, and the frequency of access (see Table 19), shows no significant difference. The number of students who access the Internet or library databases, whether on a daily basis or only once a week, seems to be almost equal. Since there is a high demand for online resources, both the Internet and databases need to be accessible at all times. This is a strong indication that the library should rethink the accessibility of the 39 databases that are only available from standalone computers within the library. Students obviously prefer not to be dependent on resources that they cannot access via the Internet.

Table 19. Comparison of students who prefer the Internet or library databases and frequency of accessing online services

	Online daily	Online 1x week	Online 1x month	Total
Search using Internet	10 41.7%	11 45.8%	3 12.5%	24 100%
Library databases	7 43.8%	7 43.8%	2 12.5%	16 100%
Both	25 35%	42 59%	4 6%	71 100%

The majority of students plan to access both Internet search engines and library databases (see Table 20), whether on a daily or weekly basis. This once again indicates the high demand for online library resources.

Table 20. Comparison of students who use Internet search engines, library databases or both with frequency of access

	Online daily	Online 1x per week	Online 1x per month
Search using Internet	10 23.8%	11 18.3%	3 33.3%
Library databases	7 16.7%	7 11.7%	2 22.2%
Both	25 59.5%	42 70%	4 44.4%
Total	42 100%	60 100%	9 100%

Table 21 shows that most postgraduate students (42%) in the survey indicated that they access the library web page on a weekly basis. This is supported by results from the questionnaire which showed that most students (52.9%) plan to access library resources on a weekly basis alone (see Table 22). More students (25%) (Table 21) access the online library resources on a daily basis than those who physically use library resources on a daily basis (13.6%). According to the survey, students prefer non-library search engines and web sites (used by 47.4% on a daily basis). This pattern is confirmed by the questionnaire which shows that

most postgraduate students expect to use at least the Internet on a daily basis (23.8%) (see Table 20).

Table 21. Library usage patterns of postgraduate students

	Daily	Weekly	Monthly	Quarterly	Never	Total
How often do you use resources within the library?	97 13.6%	259 36.2%	222 31%	117 16.3%	21 2.9%	716 100%
How often do you access library resources through a library web page?	179 25%	302 42%	129 18%	74 10%	32 4.5%	716 100%
How often do you use Yahoo™, Google™, or non-library gateways for information?	339 47.4%	191 26.7%	87 12.2%	38 5.3%	61 8.5%	716 100%

Table 22. Frequency of accessing online library services

	Number of respondents (n=121)	Respondent %
Daily	43	35.5%
Once a week	64	52.9%
Once a month	9	7.4%
Seldom	3	2.5%
I don't plan to use any online services	2	1.7%
Total	121	100%

4.3.1.4 Most respondents prefer a *single access point* for all electronic research material

55% of the respondents would prefer to search all electronic material (i.e. the Internet, electronic databases and full text journal platforms) simultaneously by one entered search command alone, while 42% would prefer to search through the databases separately (i.e. one at a time) (see Table 23). If one compares this to the preference that the majority of students have for conducting their research

over the Internet (see 4.3.1.1), it once again becomes clear that students prefer a simple interface such as that of Google™ which contains only one search box that has to be filled in. A federated solution for searching has to be found by the library – one that will (1) make it easier for students to conduct their research and one that will (2) permit maximum usage of the very expensive databases to which the library subscribes.

Table 23. Search preferences with regard to search engines and databases

	Number of respondents (n=120)	**Respondent %**
Searching through all electronic material simultaneously	66	55%
Searching each database separately	50	42%
I won't be using electronic databases and electronic journals	4	3%
Total	120	100%

The need for a single search box is a need that was also frequently expressed by respondents who participated in the survey. These respondents also specifically prefer a **Google-like** interface because they find it very difficult to access databases and e-journals by using the current web page.

4.3.2 Transfer of data and computation

Transfer of data and computation refers to the need to access electronic tools in order to transfer data and to compute data from quantitative and qualitative research that has been conducted. Page-Shipp et al. (2005) are of the opinion that "the infrastructure should make it possible to transfer and otherwise share, between geographically distributed researchers or groups, large data-streams or datasets, including digital objects, and [to] share models and even computing capacity". Transfer of data can take place in a virtual environment onto or from a personal computer, laptop, palmtop or cell phone or onto or from a research network or secure server. From there it can be accessed from anywhere in the world or within a secure environment. Provision should be made for the

protection of such data. Others should only be able to access it by using a username and password.

The transfer of data and data computation needs of postgraduate students were addressed by means of the following questions from the questionnaire (see Addendum C).

Table 24. Questions addressing the data transfer and computation needs of students

Q 10	Which of the following software would you like to be made available on computers inside the library to support your research? You can choose more than one.
Q 9	How willing are you to make your assignments and research projects available on an institutional database so that they can be shared with the rest of the research community at UP and worldwide?

4.3.2.1 Most respondents require access to software to conduct word processing, compile spreadsheets or make presentations

At present students have no access to any word processing, referencing, statistical, plagiarism detection software within or through the library. I used this question to try to establish what software postgraduate students need to support the transfer of data and data computation.

69.7% of the students would like to have access to MSOffice™ for word processing, spreadsheets and presentations. 39.3% need access to statistical software tools. 47.5% need access to software (such as End Note™) that will help them to compile bibliographies and apply referencing techniques (see Table 25). 13.1% indicated that they need access to web design software. Such software might help them to satisfy their need to create a virtual research environment of their own. Respondents were allowed to select more than one option.

Respondents didn't indicate any other software needs such as plagiarism software that verifies that research is free from plagiarism and copyright infringements.

They might simply be unaware that plagiarism software such as *My Dropbox*™ and *TurnItIn*™ exists because it has only been marketed to a few select lecturers and departments at the University of Pretoria. Plagiarism software is currently unavailable to students at the University of Pretoria.

Table 25. Software needs experienced by students

	Number of Respondents (n)	Respondent %
MSOffice etc.	85	69.7%
Statistical software tools	48	39.3%
Bibliographical software	58	47.5%
Web-design software	16	13.1%

4.3.2.2 Most respondents indicated that they are willing to share their data and research

63% of students reported that they are “most willing” to make their assignments and research projects available on an institutional database so that it can be shared with the research community at the University of Pretoria and the rest of the world (see Table 26). 33% of the students are willing to make *some* of their research available, and only 3% are unwilling to make it available at all. This desire to share one’s research with anyone who is interested rather than only a few select subscribers to some database exemplifies the mindset of those who support the growing open-access movement in scholarly publications throughout the world. This additional free-access visibility and exposure for researchers and their work positions researchers more favourably in the international research arena.

Table 26. Willingness of students to share data and research

	Number of respondents (n=120)	Respondent %
Most willing to make all available	76	63%
Willing to make some available	39	33%
Unwilling, but open for discussion	4	3%
I am not prepared to make my intellectual material available on such a database	1	1%
Total	120	100%

4.3.3 Communication needs of students

Communication needs refer to the way in which students prefer to interact with the library and the staff within the library. Typical examples of such interaction would be a request for support from the library staff for help in addressing a specific research question or need, or a request to receive some kind of general library-related training that is relevant to their immediate research needs. Effective communication is two-way communication. The client needs to communicate with the library, and the library needs to communicate certain information to the client. Sometimes students don't know that they lack certain information and the library has to tell them what they need to know. The fact that the student population is multi-racial and multi-cultural and that the teaching languages of the university are Afrikaans and English are possible obstacles in the way of effective communication. One of the library's many responsibilities is to be always on the lookout for new ways of improving their communication with their multi-cultural and widely distributed client base at the university.

The LibQUAL+™ Survey makes it clear that the experience that postgraduate students have of the library is not as positive as that enjoyed by the academic staff and undergraduates (M. Hammes, personal communication, November 9, 2005). Students would like online services to be more user friendly. They want to be able to complete the whole registration process online and have immediate access to all library services. They also want information (such as the upcoming expiry dates of materials on loan) to be sent to them well in advance.

The data also shows that some students still prefer the old, more traditional methods of support and training to current innovative systems of electronic support. This shows that not all students are comfortable with an electronic or virtual research environment.

The communication needs of students were solicited in the following questions from the questionnaire (see Addendum C):

Table 27. Questions addressing the communication needs of students

Q3	What is your mother tongue?
Q5	When requiring help from an information specialist, I prefer to communicate …
Q7	When receiving news and updates from the library, which of the following do you prefer?
Q8	I prefer library training to be conducted …
Q13	When requesting online assistance from an information specialist, I expect online feedback within …
Q16	When provided with information on electronic journal articles relating to your research topic, which of the following do you prefer?

4.3.3.1 The majority of students don't use Afrikaans or English as a first language

Only 47% of the students who completed the questionnaire spoke English or Afrikaans as a first language. The mother tongue of 45% of respondents was one of the nine other official South African languages. The mother tongue of the remainder (8%) was an African or a European language. In total therefore: 53% of the postgraduate students enrolled at the Faculty of Education speak a mother tongue other than Afrikaans or English. The library needs therefore to find ways better to support and accommodate second-language Afrikaans or English speakers. They might do this by, for example, providing online tools and services such as tutorials that are supported by a text or voice in the language of a student's choice.

4.3.3.2 Most students prefer face-to-face communication with the library

58% of respondents prefer to put a face to a voice when they communicate with the library. This is significant in an increasingly online virtual research environment where communication occurs (as it does today) more frequently in an electronic mode. The electronic helpdesk called “Ask a Librarian” offered by the Academic Information Service offers an e-mail and online chat facility through which students can post questions to the library or even “chat” to a librarian by means of e-mail. This chat facility is only available during library opening hours. The response time limit permitted by the library for questions that are posted via e-mail is 48 hours.

The survey indicates that 50% of students require online feedback within 24 hours, and that 10% require feedback “as soon as possible”. The “Ask a librarian” support service does not therefore comply with the expectations of postgraduate students at the Faculty of Education. Further evaluation of this service needs to be conducted to establish its overall effectiveness.

The questionnaire data shows that only 28% of postgraduate students prefer to communicate via e-mail when help is needed and that they utilise the service that provides for posting questions and requests independently of the library’s opening hours or location. 8% of the respondents indicated that they want to be able to communicate by telephone. The remainder (6%) prefer other means of communication such as SMSs, a bulletin board and facsimiles. Part of this 6% don’t expect to communicate with the library at all.

The implication of this for the library is that it will have to find ways of offering a *personalised* service to postgraduate students. This could take the form of information specialists introducing themselves to their virtual clients by means of e-mail that includes a photograph with the first e-mail sent to the client.

4.3.3.3 Students prefer receiving an e-mail newsletter

Although the Education Library of the Academic Information Service (Service Unit Groenkloof) has experimented with electronic newsletters before, limited resources did not permit the continuation of this service on a regular basis. The questionnaire made it clear that students have a definite need for receiving

updates from the library. The data shows that 57% want to receive library news and updates through an electronic e-mail newsletter, 35% prefer a printed newsletter, and 8% would like to access a newsletter from the library's web page – in other words, on demand.

Students especially prefer the e-mail newsletter – no matter whether they plan to access online library services on a daily, weekly or monthly basis (see Table 28).

Table 28. Format of the newsletter compared with the frequency of accessing online library services

	Online daily	**Online 1x week**	**Online 1x per month**
E-newsletter	29 69%	33 52%	4 50%
Web-newsletter	5 12%	3 5%	1 13%
Printed newsletter	8 19%	27 43%	3 38%
Total	42 37%	63 56%	8 7%

4.3.3.4 Students prefer face-to-face training

81% of all respondents indicated that they would like to receive face-to-face library training. 41% prefer face-to-face *group* training, and 40% prefer face-to-face training on an *individual* basis. A small percentage (10%) still want to be trained by printed manuals or pamphlets. Only 7% want to receive online training by means of a web page, a tutorial, a chat-facility or an e-mail-facility. None indicated that they wanted to receive training over the telephone.

4.3.3.5 Students want *feedback within 24 hours* or less

Because the average postgraduate student is in fulltime employment, he or she has to manage his or her limited time very carefully indeed merely to accommodate the multiple demands of work, family and study. 50% of postgraduate students expect online feedback within 24 hours or less, and 10%

want feedback as soon as possible. The majority of students therefore (60%) don't want to wait too long to receive feedback or a response from the library. 33% of the respondents expect online feedback within 1 to 3 days, and 7% within a week. Nobody indicated that they were prepared to wait up to one month.

4.3.3.6 Students prefer to receive *full text* electronic information about their research

The current practice amongst information specialists is to train students to undertake their own research. If the student still needs help after that kind of training, the information specialist will conduct a search on behalf of the student client and compile a bibliographical list of items that relate to the research topic. Very occasionally, full text articles will be forwarded to clients. Instead of forwarding full text articles to clients, information specialists prefer rather to forward the URL that will enable clients themselves to access a specific article. If clients access articles *themselves*, they will not end up possessing illegal copies of password-protected articles and databases.

The majority of respondents (47%) would like to receive full text journal articles when they access electronic journal articles for their research. Only 29% are satisfied with receiving a list of references with abstracts. 23% on the other hand want only the references to the articles, without the full text or abstracts.

When the nature of feedback on the research topic is compared with the expected time limit allowed for feedback, what emerges is that the majority of students (42%) who want to receive feedback within 24 hours or less also expect to receive the full text from the library (see Table 29). Where students indicated that they want the feedback as soon as possible, 75% of the students also want to receive the full text. What is obvious from this is that there is a very great demand for information specialists/librarians to provide as complete (full text) information as quickly as possible.

Table 29. Comparing the nature of feedback with the time allowed for feedback

	List of references	References & abstract	Full text	Total
24 hours and less	12 23%	18 35%	22 42%	52 100%
1-3 days	10 25.6%	10 25.6%	19 48.7%	39 100%
1 week	2 25%	4 50%	2 25%	8 100%
ASAP	2 16.7%	1 8.3%	9 75%	12 100%

4.3.4 Training and support needs

Training and support needs refer to training clients in how to use the library, in how to locate information on a research topic, in when to use a database, in which database to use, in where to find information on the web page of the Academic Information Service, in how to access information listed on the web page of the Academic Information Service, and in knowing when they should ask for help with their literature surveys and other needs.

The LibQUAL+™Survey (M. Hammes, personal communication, November 9, 2005) showed that postgraduate students feel they are not adequately trained to use library databases and e-journal platforms.

The training and support needs of students were established by means of the following questions from the questionnaire (see Addendum C):

Table 30. Questions addressing the training and support needs of students

Q 5	When requiring help from an information specialist, I prefer to communicate …
Q 6	When searching for information on my research topic, I prefer to …
Q 8	I prefer library training to be conducted …
Q 11	Would you like to receive training from the library on how to use the Internet?
Q 13	When requesting online assistance from an information specialist, I expect online feedback within …
Q 16	When provided with information on electronic journal articles relating to your research topic, which of the following do you prefer?

4.3.4.1 Respondents prefer face-to-face communication

As I indicated in section 4.3.3.2 entitled "Communication needs", most students (58%) prefer to communicate face to face with the library staff. The library training that students receive provides them with the information literacy skills they need to conduct their own research. Students prefer this training to be undertaken in a face-to-face (live) format – perhaps because they need or value the possibility of immediate interaction and response from the librarian involved. Although the Internet offers a huge range of highly professional methods and formats for e-learning library content, students do not yet seem ready for this mode of training. Their current need is for the *physical* presence of the librarian/information specialist during their training in new skills.

4.3.4.2 Most respondents prefer to conduct their *own* research after being trained

The majority of students (43%) display a decided preference for conducting their *own* research by using bibliographic databases and the Internet *after they have been trained* by the library. Since the students themselves know their own information needs and preferences best, the library supports this (and their other) preferences. 25% of the respondents prefer to search for information themselves, but would like to be assisted by the library when they need assistance. Only 15% are prepared to conduct their own research *supported **only** by online help tools*. 10% of the respondents indicated that they expect to be able

to rely fully on information specialists (librarians) to conduct their research on their behalf. This percentage might be reduced if the respondents concerned were to be given a comprehensive training. 6% of the respondents indicated that they wouldn't need any assistance when searching for information. This seems to imply that they have sufficient confidence in their own skills to help themselves. To summarise: the majority of students (90%) are prepared to conduct their own research if they have the option of asking for help or skills training. It seems as though respondents tend to become independent library users once they have acquired the skills they need to conduct their own online research.

When the study year and group, and the preferences that students have with regard to the kind of support they need when they conduct their research (see Table 31) are compared, what becomes clear is that the majority of students from all groups once again prefer to conduct their own research after they have been trained or if additional assistance remains available. The kind of high quality training that clients expect will not only benefit themselves; it will also take the pressure off the university's librarians who, because the library is so chronically understaffed, often have difficulty in addressing individual client needs.

Table 31. Comparison of study year and group with the support preferences of students

	Librarian must find references for me	**Search for info myself – after I have been trained**	**Search for info myself – using online help**	**Search for info myself – with assistance from librarian**	**Search for info myself – without any assistance**	**Total**
1st & 2nd Year MEd	9 14%	26 40%	9 14%	15 23%	6 9%	65 100%
1st & 2nd Year PhD	1 2.4%	20 48.8%	9 22%	10 24.4%	1 2.4%	41 100%
3+ MEd	1 25%	1 25%	0 0%	2 50%	0 0%	4 100%
3+ PhD	1 17%	3 50%	0 0%	2 33%	0 0%	6 100%

The relational table on the next page (Table 32) seems to show that the majority of students who would require librarians to find references and information for them (75%) are from the 1st and 2nd year MEd study group. The reason for this expectation might be explained by the fact that 1st and 2nd year MEd students are engaging in formal research for the first time. They might therefore feel that they need as much security and support as possible. This would include offers of support and help from the library. My conclusion is that this group of students need to be well looked after by the library if they are to have a positive research experience in their postgraduate studies and so become lifelong researchers.

Table 32. Comparing study year and group with student support preferences

	Librarian must find references for me	**Search for info myself – after I have been trained**	**Search for info myself – using online help**	**Search for info myself – with assistance from the librarian**	**Search for info myself – without any assistance**
1st & 2nd Year MEd	9 75%	26 52%	9 50%	15 52%	6 86%
1st & 2nd Year PhD	1 8%	20 40%	9 50%	10 35%	1 14%
3+ MEd	1 8%	1 2%	0 0%	2 7%	0 0%
3+ PhD	1 8%	3 6%	0 0%	2 7%	0 0%
Total	12 10%	50 43%	18 16%	29 25%	7 6%

A comparison of language group with the search preferences of postgraduate students shows that both Afrikaans and English mother tongue speakers (38%) and other mother tongue speakers (48%) would prefer to conduct their own research after they have been trained (see Table 33).

Table 33. Comparison between study year and group and student support preferences

	Librarian must find references for me	Search for info myself – after I have been trained	Search for info myself – using online help	Search for info myself – with assistance from the librarian	Search for info myself – without any assistance	Total
Afr & Eng	8 15%	20 38%	7 13%	13 25%	5 9%	53 100%
Other	4 6.3%	31 48.4%	11 17.2%	16 25%	2 3.1%	64 100%

4.3.4.3 Respondents preference for face-to-face training

I discussed the preference that students have to communicate face to face in section 4.3.3.2 (Communication needs). This has been confirmed by the responses of students with regard to training. As in communication, students (41%) prefer to receive face-to-face training within a group, or face-to-face training on an individual basis (40%). 10% would like to get their training from printed manuals, pamphlets, etc., and only 7% prefer online training that uses the web page, tutorials, an online chat facility, e-mail, etc. None indicated that they want to receive any kind of training over the telephone.

Most Afrikaans and English mother tongue speakers prefer face to face training (65%) (see Table 34). This is also true of other mother tongue language speakers: most (58%) prefer face-to-face training as well.

Table 34. Comparison of language groups with regard to training preferences

	Face-to-face training	Telephone training	E-mail training	Total
Afrikaans and English	34 65%	6 12%	12 23%	52 100%
Other languages	33 58%	3 5%	21 37%	57 100%

What is evident is that there is no significant difference between the language groups when it comes to face-to-face training. More Afrikaans/English mother tongue speakers prefer telephone training (67%) than do other mother tongue speakers (33%) (see Table 35). When it comes to e-mail training, more **Other language** mother tongue speakers (64%) prefer e-mail training than do respondents from the Afrikaans/English mother tongue group.

Table 35. Language groups compared with training preferences

	Face-to-face training	Telephone training	E-mail training
Afrikaans and English	34 51%	6 67%	12 36%
Other languages	33 49%	3 33%	21 64%
Total	67 100%	9 100%	33 100%

4.3.4.4 Respondents want to receive Internet training

At present clients in the Education Library are only trained in how to utilise the most important databases that might contain education-related research material. From the results of this questionnaire it has become clear that students prefer to use Internet search engines or Internet search engines as well as library databases when they conduct their research rather than use databases only (see section 4.3.1.1). If students are going to retrieve authoritative research material that may be of crucial value to them, they need to be urgently trained in how to use the Internet with a commensurate degree of skill. 62% of the respondents indicated that they would like to receive training on how to use the Internet for conducting their research. Only 38% indicated that they wouldn't require any training in how to use the Internet.

A comparison of study year/group with the stated need for Internet training shows that the majority of respondents from all study year groups indicated that they need Internet training (see Table 36).

Table 36. Comparing the study year/group with the need for Internet training

	Want Internet training	Don't want Internet training	Total
1st & 2nd Year MEd	36 54%	31 46%	67 100%
1st & 2nd Year PhD	31 72%	12 28%	43 100%
3+ Year MEd	3 75%	1 25%	4 100%
3+ Year PhD	4 67%	2 33%	6 100%

The majority of respondents who indicated that they need Internet training come from 1st & 2nd year PhD and 3rd+ year MEd students (see Table 36). 3rd year (or more) PhD students were also interested in Internet training. There was less interest among 1st and 2nd year MEd students. More **Other** mother tongue language speakers (65%) than Afrikaans/English mother tongue speakers (35%) expect that they will need Internet training (see Table 37). Since English is the language that is most widely used on the Internet, this is not unexpected.

Table 37. Comparison between language groups

	Want Internet training
Afrikaans and English	26 35%
Other	49 65%
Total	75 100%

44% of students who plan to use only the Internet for conducting their research stated their need for Internet training (see Table 38). It seems as though the majority (56%) are adequately equipped to help themselves in this regard. But students who plan to use *only* library databases indicate an overwhelmingly high need for Internet training (82%). Perhaps it is their lack of expertise in using the

Internet that prompts them to state that they expect to use library databases only.

Table 38. Search preferences compared to Internet training needs

	Want Internet training	Don't want Internet training	Total
Internet only	11 44%	14 56%	25 100%
Library databases	14 82%	3 18%	17 100%
Both	45 61%	29 39%	74 100%

A comparison of the postgraduates' preferred mode of communication (face-to-face, telephonic, e-mail) with student preferences with regard to Internet training, shows that students who want Internet training prefer it to be conducted face to face. The fact that most students prefer face-to-face contact in support and training situations or when they communicate with staff in the library, seems to suggest that they are not yet ready to function in a virtual research environment only. Most of those who want Internet training also prefer face-to-face communication (63%) (see Table 39).

Table 39. Preferred mode of communication when receiving Internet training

	Want Internet training
Face-to-face communication	43 63%
Telephone communication	8 12%
E-mail communication	17 25%
Total	68 100%

Students who won't need Internet training will also rely more on the librarian to help them to find research material (17%) in comparison to students who are

prepared to receive Internet training (7%) (see Table 40). Since it is the policy of the library to encourage students to conduct their own research, the library will have to find ways of decreasing the percentage of postgraduate students who prefer not to receive any Internet training but prefer rather to rely on the librarian to find their references for them. The percentage of students (93%) who are prepared to conduct their own research after being trained is encouraging. This kind of labour-saving self-reliance needs to be promoted both by the library staff and by supervisors.

Table 40. Comparison between the need for Internet training and the search preferences of students

	Want Internet training	**Don't want Internet training**
Librarian must find references for students	5 6.8%	7 16.7%
Search by students themselves after training	35 47.3%	15 35.7%
Search by students themselves using online help	8 10.8%	10 23.8%
Search by students themselves with assistance from librarian	22 29.7%	7 16.7%
Search by students themselves without other assistance	4 5.4%	3 7.1%
Total	74 100%	42 100%

The students who want Internet training become more independent of assistance from the library (see Table 41). Only 6.8% of students, after they have been trained, will need assistance from a librarian. The remainder (93.2%) are happy to conduct searches themselves.

Table 41. A comparison of the percentage of students who want to receive Internet training with their search preferences

	Want Internet training
Librarian must find references for students	5 6.8%
Search by students themselves after training	35 47.3%
Search by students themselves using online help	8 10.8%
Search by students themselves with assistance from librarian	22 29.7%
Search by students themselves without other assistance	4 5.4%
Total	74 100%

This data shows that Internet training needs to be urgently addressed by the library. This aspect of e-research has thus far been neglected by the library. A possible reason for this neglect could be that some information specialists themselves do not feel properly equipped to conduct effective searches by means of Internet search engines.

4.3.4.5 Respondents require help within 24 hours or less

The urgency with which postgraduate students require feedback is once again confirmed when one views the kind of response time that they feel is acceptable: 60% of all respondents expect online feedback within 24 hours or less, or as soon as possible. 33% expect online feedback within 1 to 3 days, and 7% feel that it is acceptable to wait for up to one week. Nobody is prepared to wait one month.

4.3.4.6 Students prefer to receive full text electronic information for their research

When they get their feedback from the library, respondents indicated that they want such feedback to be as complete as possible. Most respondents (47%) would like to receive full text journal articles when they are sent information about electronic journal articles that are pertinent to their research. 29% want to

receive at least a list of references with abstracts, and 23% prefer only references to articles without any accompanying full text or abstracts.

4.3.5 Publishing needs (including primary data sharing needs)

Publishing needs refer to the extent to which students are prepared to make their research publicly available. Thus, for example, research may be deposited on an electronic database (UPeTD for electronic theses and dissertations), on an institutional research repository (UPSpace), or may simply be published for open access on the World Wide Web.

The following question tried to establish the willingness of students to share their final research publications and maybe primary data within an open access environment:

Table 42. Question that refers to the publishing preferences of students

Q 9	How willing are you to make your assignments and research projects available on an institutional database, in order to share it with the rest of the research community at UP and worldwide?

4.3.5.1 Most respondents indicated that they are willing to make their research available within an open access environment

63% of students are “most willing” to make assignments, datasets and research projects available on an institutional database so that they can be shared with the rest of the research community at UP and throughout the world. 33% of the students are willing to make *some* of their research available, and only 3% are unwilling to make it available at all (but they would not mind discussing it). This willingness to share research products should be regarded by the university as an opportunity to help novice researchers to position themselves within the national and international research community. Through exposure of this kind, researchers makes themselves and their research more visible. By opening their research in this way they could open themselves to the possibility of national and international dialogue on their research interests.

4.3.6 Other (the open question)

In the questionnaire there was an open question that gave respondents the opportunity to indicate whether there are any other electronic needs they had of which the library should take note (Question 18).

In response to this question, 7% of the respondents indicated that they did not have any immediate needs; 7% indicated that they needed more training – specifically in how to use software such as Reference Manager™, Atlas.ti™, etc. 1 respondent wanted access to other academic South African libraries. Since this service is already offered by the library, it is obviously being unsuccessfully promoted. 3 respondents wanted to have access to full text e-journals/databases off campus. Since this possibility is also already available to all students off campus if they use the correct protocols, it becomes clear that students need to be properly trained and supported so that they can use library facilities more effectively. 1 respondent asked for friendlier service from library staff.

Because I wanted some degree of understanding of how well or otherwise respondents understood abbreviations that are used within the library environment, I asked respondents whether they knew what the abbreviation "UPeTD" stood for.

8% (6 out of the 122 respondents) knew that it stands for *UP Electronic Theses and Dissertations*, (the correct answer). The remainder (92%) made various guesses and some did not answer the question at all. This makes it clear that the library should rethink its use of abbreviations and acronyms. What these abbreviations and acronyms mean is not as obvious to clients as it should be. Having to conduct research in an environment can be very discouraging when one is confronted by a welter of abbreviations and acronyms such as UPSpace, UPeTD, Tyds@Tuks, ILL, IMPS, AIS, etc.

4.4 Summary

Postgraduate students at the Faculty of Education of the University of Pretoria expressed very clear needs with regard to the following:

- Electronic access: Students are becoming more and more dependent on electronic information and support that can be accessed independently of

time and space. The process of accessing information resources and library services should be made less complicated.

- Transfer of data and data computation: Students indicated that they need certain software if they are to conduct research. They are also prepared to share their data and to make it available to other researchers.

- Electronic communication: Students still prefer face-to-face communication and expect feedback to be as complete as possible. On the whole, they expect feedback to be sent to them within a very short space of time.

- Electronic training and support: Most students prefer to conduct their own research after they have been trained. They also need proper Internet training.

- Electronic publishing (this includes primary data sharing): Most students are in favour of sharing their primary data and other research on an institutional research database.

Research needs can develop or evolve over time. Such development and evolution depends to some extent on how well the researcher is able to conduct his or her own research. No matter how promising the topic or inspired the student, a researcher who is functionally inept in the mechanics of research will make little progress. The converse is also true. The more experienced, the more computer literate and the better trained a researcher is, the less he or she will require support from the library. The ideal is firstly that online library services should serve only as a portal that offers access to online research tools and material and secondly that library staff should never have to conduct research on behalf of clients. Since most students who participated in the questionnaire were first-time researchers, it is probable that their research needs had not yet crystallised at the time when they were asked to complete the questionnaire. If this is the case, asking them to express their needs and preferences accurately might have been premature (although not entirely unfruitful).

As I pointed out, I related the results of the data analysis to what I found in the literature survey (chapter 2). This I will address in chapter 5. The data analysis in this chapter provided a necessary foundation on which I could:

- profile current e-clients within a virtual research environment
- clearly establish and describe the role of the information specialist (librarian) within a virtual research environment
- recommend ways in which the needs of postgraduate students might be addressed

Chapter 5. Conclusions and recommendations

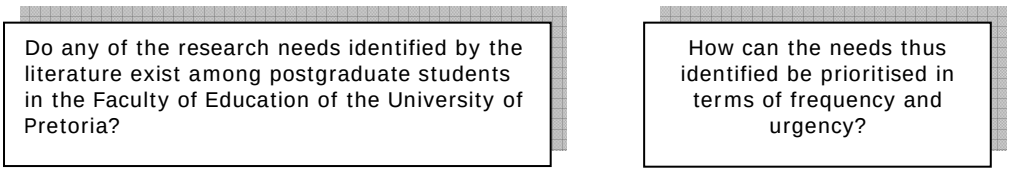
5.1 Introduction

This chapter provides a summary of the research that I undertook for this study. It also contains an overview of the problem statement and rationale, the research questions and the results of the research.

I shall also in this chapter discuss the lessons that may be learned from this research through reflection on the needs that I have identified, by comparing this research with other research that has been carried out in this area (see chapter 2), and by describing the scientific contribution that this research makes to the field of information and library science. I conclude the chapter with recommendations for policy and practice, and possible further research in this field of study.

I shall now use information and data from previous chapters to answer the third and fourth research questions.

Figure 14. Research questions 3 and 4



5.2 Summary and conclusions

The rationale for this study was to identify and better understand the electronic research needs of postgraduate students so that the Academic Information Service (Library) would be in a position to design and implement services that will address those needs in a better way than the way in which they are currently being addressed (see chapter 1). The study was guided by the following research questions in the following order:

- How does the literature define the specific electronic research needs of postgraduate students at higher education institutions throughout the world?
- What are the specific electronic research needs of postgraduate students at the University of Pretoria's Faculty of Education?
- Do any of the research needs identified by the literature exist among postgraduate students at the Faculty of Education of the University of Pretoria?
- How can the needs thus identified be prioritised in terms of frequency and urgency?

The conceptual model for this study was derived and adapted from the model by Page-Shipp et al. (2005). Their model conceptualised the various categories of postgraduate students needs. I have used the categories devised by Page-Shipp et al. (2005) to guide and organise the data that I obtained from the literature survey (see chapter 2) and to guide and determine the research methodology and the design of the questionnaire (see chapter 3). The needs identified in the literature survey are distinctly similar to the needs categories that I conceptualised in the conceptual framework for this study. The needs categories that guided this study were:

- Primary data sharing
- Transfer of data and computation
- E-Access
- E-Communication
- E-Training
- E-Publishing by postgraduate research students

The needs (described in chapter 4) that I identified through the research component of this study are also distinctly similar to the needs that I identified in the literature survey (see Research Question 3). From both the literature survey and research for this study it therefore became clear that postgraduate students in South Africa and throughout the world experience similar needs. Such needs include the following:

- Administrative needs: All administrative services, processes and support should (wherever possible) be made available online, and the processes involved should be designed so that they are seamless, user-friendly and automated.
- Access needs: Students want to have access to administrative and research support and services any time of the day or night.
- Database access needs: Students prefer simple user interfaces. This would preclude the use of library or other specialist jargon and acronyms on such interfaces. Students need to be trained to conduct effective searches in databases (this training is a form of student support).
- Internet search strategy needs: Students need to be trained to navigate the web so that they can find the best, most reliable and most authoritative web sites and scholarly publications (this training is a form of student support).
- The need for information literacy skills: Students need to be taught how to search for appropriate information and how to discriminate between different kinds of databases.
- Technological needs: Students need help and a certain amount of IT training. They need, for example, to know how to install or download software and how to use application software programs.
- Training needs: Training should be subject-related (i.e. contextualised) at the time when the need occurs.
- The need for additional support: Students often need additional information such as where they might go for statistical support or where they might find someone who offers editorial services such as text editing or proofreading for their theses or dissertations.
- The need for training: Students need help and training in the mechanics and methods of research reporting and thesis writing. They often need help in understanding how to write a proposal or even the text itself. They also often need to be coached on how to manage information, manipulate data, and assemble and organise the elements of a thesis.
- Networking needs: Students need to know how to network effectively so that they can become less isolated and vulnerable. Networking can also lead to the exchange of valuable information and know-how among researchers.
- Resource needs: Students still need access to print resources. They need *convenient* and ready access to the extensive collections offered by the library.

- Personal needs: The most obvious personal needs refer to the needs experienced by physically disabled students or students with other kinds of special needs. Other personal needs are discouragement, loneliness, and so on.
- The need for an optimal, dedicated or exclusive research environment: This means that postgraduate students not only need a dedicated virtual area on the World Wide Web, but also a physical area within the library to which only postgraduate students have access.

The most frequent and urgent needs that postgraduate students have are described in chapter 4. These needs – which contribute towards the profile of the e-researcher – may be summarised as follows (see research question 4):

- Electronic access: Students are becoming more and more dependent on electronic information and support that can be accessed independently of time and space. Such information and support may be either administrative or academic. Both the literature survey and the research data from this study make it plain that students need less complicated and trouble-free ways of accessing information and support.

  Students in South Africa and throughout the world share the following similarities and preferences:

  - Both groups prefer a user-friendly, Google-like interface that is accessed at only *one* point to gain entry to research databases.
  - Postgraduate students greatly prefer to use Internet search engines rather than library databases to conduct their research.
  - Most postgraduate students would prefer a separate web page that addresses only their specific needs.
  - Most respondents expect to access the library web page fairly frequently (which means at least once a week).

- Transfer of data and data computation: Students indicated that they need to have access to certain kinds of software and tools in order to conduct their research. They are also prepared to share their data by making it available to other researchers.

- Electronic communication: Students still prefer face-to-face communication and expect feedback to be as complete as possible within the shortest possible return time. They also want to receive more communications from the library specifically in the form of e-mail newsletters.

  - Students prefer their initial training to be face to face.
  - Students want feedback within 24 hours or less.
  - Students prefer to receive full text electronic research information.

- Electronic training and support: Most students prefer to conduct their own research after they have been trained. They therefore need the kind of Internet training that will allow them to do this.
  Students would also like to have face-to-face *individual training*. The need for Internet training was also frequently expressed by students in other countries. Once students are properly trained, they will be able to access e-journals and e-databases quickly and accurately by themselves. This would mean that pressure on the library staff to conduct research on behalf of students would be greatly reduced. Once postgraduate students have been trained to carry out their own research operations, librarians (who currently work in an understaffed library) will be freed to direct their energy to whatever else might need priority in development, research and support.

- Electronic publishing (which includes primary data sharing): Most students are in favour of sharing their primary data and other research on an institutional research database. This would greatly help to position the University of Pretoria in the international research arena as a world-class research institution. It would also encourage individual researchers to compete and contribute internationally by giving them the kind of exposure and publicity that lead to the making of new contacts and to stimulating exchanges of ideas and opinions.

If they want to offer effective support services to postgraduate researchers operating in a virtual research environment, librarians will have to work hard at attaining a high degree of mastery in the following skills:

- Technological skills

- Decision making skills
- Supervisory skills
- Planning skills
- Facilitating skills
- Marketing skills
- Project management skills
- Communication skills

The research confirmed that the needs of adult learners are indeed different from those of undergraduates who have recently left school. That postgraduate students have definite preferences is plainly indicated by the data that I obtained from the survey.

5.3 The contribution that this research makes to the field of library and information science

In general, this study has contributed to a better understanding of the needs of the e-researcher and the expected responsibilities of the e-librarian.

This user study places librarians in a better position to understand how the increasing prevalence of electronic resources and technology affects library users and how current library services and approaches need to be modified for the benefit of both staff and users. This study contributes to a clearer understanding of the current electronic research needs of postgraduate students. Librarians concerned with planning will be able to use this research to make the best use of their services and resources for the benefit of their postgraduate research students working in higher education institutions. At the same time this research will enable planners to utilise their limited human resources (the library staff) and physical resources (such as computer facilities), as well as the World Wide Web in a more effective and efficient way.

The very nature of a librarian's occupation requires that a librarian be able to make allowances for the cultural, personal, occupational and generational diversity that characterises clients and staff. This same diversity is to be found among postgraduate research students. This study should enable librarians better to understand what the role or occupational profile of an e-librarian should be in a virtual research environment. It could also help academic librarians to understand the different ways in which postgraduates approach their research. Postgraduate

researchers, like all adult learners, come from different generations and therefore have learning and research styles that differ significantly from one another.

5.4 Recommendations

I make the following recommendations for research on the basis of the findings of this study.

5.4.1 Recommendations about the implementation and development of e-products, e-services and e-support

If the Academic Information Service of the University of Pretoria is to meet the electronic research needs of its postgraduate students, it will have to develop and implement certain products, tools, services and forms of support. The following items focus on what needs have to be addressed by means of formal implementation and better utilisation.

- **A *federated search engine*** This will offer a single-search interface that provides access to all open-access and subscription-based information resources *simultaneously*. This would function somewhat like the present Google™ interface.
- **A *postgraduate web page*** This would address the research needs of postgraduate students separately from those of undergraduates. The library's web page is a vital gateway to support and services that should not be underestimated by the library. It should ideally be a multi-purpose gateway or portal into a fully integrated environment in which postgraduate students can register, conduct their research, access and download full text articles, pay for services by means of a secure e-money processing system, receive e-support via e-mail or the web from an information specialist, have access to e-books, and access software such as EndNote™ through the university server.
- ***An institutional research repository*** This will allow postgraduate students to submit and post their research material so that it becomes available in the official repository of the University of Pretoria.
- ***High-quality self-help products*** Many postgraduate students continue – sometimes in isolation – to conduct their own research in the years after they have received in-house training. If the university offers unlimited online tools to postgraduates as a follow-up service that they can access in

times of need, it will be offering them an important lifelong means of support and practical assistance to graduates who might by then be physically far removed from the university's facilities. Such a service could also help to maintain a link of mutual support and loyalty between the university and its graduate staff – thus adding value to the in-house postgraduate experience long after the student has graduated.

- ***E-newsletter*** Students indicated that they want to stay in touch with the library electronically and receive updates from the library. An electronic newsletter sent by e-mail will provide ideal opportunities for the library to communicate important information to students at any time of day or night and even when the university is in recess.
- ***Internet training*** Internet training should be scheduled as part of the orientation sessions of postgraduate students. Postgraduate students should be taught how to critically evaluate the authority and authenticity of research material obtained from the World Wide Web. The library should also cater for students from previously disadvantaged communities and students who completed their undergraduate studies in the era before computers and the Internet. The library should assist students who lack computer skills and whatever other skills are needed to conduct online research, and they should collaborate with all faculties in this regard. All students need to be able to search effectively for information without assistance. This would make postgraduate students responsible for their own research. It would also relieve librarians of many hours of tediously repetitive and basically unnecessary work (helping people to conduct online searches or other procedures). It is obvious that librarians themselves need to have an in-depth understanding of Internet search strategies, Internet tools, online resources, and other tools and services that support research.
- ***E-mail communication*** Hulshof (1999) identifies three issues that are pertinent to the use of electronic communication in the service of virtual patrons (e-researchers). These are *immediacy*, *intricacy* and *interaction*. Because it is so easy for a researcher to send a request by means of e-mail and know that it is arriving almost simultaneously at the library, some students believe that the librarian's response should be immediate (Johnson, Trabelsi and Tin 2004, p. 356). This erroneous perception (that a librarian has only the immediate task before him or her to attend to) could be challenged by the use of automated replies to e-mails that reassure e-researchers that their messages have been received and that

explain to them that what they might expect in terms of service and response (i.e. that they might have to wait in line for a reply and/or for service).

- ***Virtual research environment*** The library, in collaboration with the rest of the university, needs to devise an integrated approach that supports the workflow processes that are involved in scientific research. Students prefer to conduct their research in a seamless (i.e. non-interrupted) environment. They might, for example, want to cite references in EndNote™ from an electronic journal they are consulting while typing text in MSWord™. The library could investigate the feasibility of implementing open access software such as *Open Office*. Open access software (unlike proprietary software) does not need a licence.
- ***Expansion of the role of the librarian*** Librarians need to become better informed about the whole research process and not just about literature reviews. Once they have experienced the difficulties of the process themselves, they will be in a better position to offer informed support to students and researchers alike. Academic librarians need to have an in-depth (and preferably first-hand) understanding of all the tools, services and support that a researcher needs during the research process.
- ***Collaboration between faculty and library*** The literature seems to indicate that the partnership between the librarian and the academic is becoming more and more crucial. The basis for a productive working partnership between librarian and academic depends on four key elements: *shared common goals*, *commitment*, *enthusiasm* and *innovation* (Robertson 2003, p. 123). If both faculty and library were to make an equally passionate commitment to these four ideals, great progress could be made in integrating services and support to address the needs of postgraduate researchers.

5.4.2 Recommendations about further research

The research in this study has opened up the way for opportunities to research other topics. Here is a selection of research topics that could be of value to libraries and the academic research community.

- Research into e-research needs of students after they have completed their postgraduate studies. Such research might establish exactly how the e-research needs of postgraduate students change over time.

- Research into how non-traditional forms of training (such as e-learning or distance learning and video-conferencing) are supplementing and in some cases replacing traditional training methods.
- Research into how the e-research needs of postgraduate students might be addressed through WebCT™ as opposed to a research portal.
- Research into students who decide to end their studies. This could help to establish why some students do not complete their studies in the minimum required time of two years and why others do not complete it at all. Research is also needed to determine the extent to which the Academic Information Service might have contributed to this such non-completion. Once the Academic Information Service's shortcomings in service delivery have been identified, the Academic Information Service should be able to take steps to remedy whatever deficiencies are identified.
- An evaluation of existing tools and services (such as "Ask a librarian", the Infoportal and the current library web page) with the purpose of establishing whether they are adequately addressing the needs of postgraduate students.
- Investigations into the feasibility of providing a Virtual Research Environment (VRE) for postgraduate students. A VRE would offer postgraduates a set of integrated e-tools and e-services that support and simplify research.
- Research into how the Academic Information Service could use their knowledge of user needs and behaviour to design digital library interactions and interfaces.
- Research into how the needs of disabled postgraduate students could be addressed electronically.
- Research into the kind of support and assistance that is needed by non-South African students and how the needs of such students are different from the needs of South African students. The Academic Information Service could use the data from such research to design and establish a cultural support centre inside the library.

5.4.3 Recommendations for further development work

Since more postgraduate students who enrol in the Faculty of Education speak a mother tongue other than Afrikaans or English, the library needs to study ways and means to support and accommodate students who only understand Afrikaans or English as a second or third language – if at all. The library could, for example,

provide online tools and services such as tutorials that are supported by a text or voice-over in the language of a student's choice.

The library should also identify ways of offering support to postgraduate students during each separate *phase* of the researcher's process – beginning with the proposal and ending with the final product.

The library should provide services in conjunction with other concerned parties. What the student really needs is a customised set of products and product and service information that address the specific and varied needs of postgraduate students. The library should be regarded as but one partner in a team that offers students services and support. Other kinds of information that a student needs might include, for example, information about a statistical advisory service, information about editing, proofreading and binding, information about bursaries and other kinds of financial resources such as student loans. The library could cooperate with the Department of Telematic Learning and Education Innovation (TLEI) and other concerned faculties to develop and produce a high quality research support tool in the form of (say) a CD ROM that postgraduate students could use offline to access vital supportive and navigational information.

Librarians need to accept the existence of Google™ and Google Scholar™ as incontrovertible facts and learn from them what it can about their operational success in matters such as interface design and ease of access. The library should also not regard itself as the exclusive repository or guardian of information resources. Students should be encouraged to use whatever scholarly publications they can access on the World Wide Web to complement whatever information is available in library databases.

5.5 Conclusion

This research has made it clear that postgraduate students in the Faculty of Education have needs that are similar to those experienced by postgraduate students throughout the world. It has also made it clear that students from the Faculty of Education need better-quality services than those currently at their disposal – services that are at the same time more simplified in format and faster than those they presently enjoy. Postgraduate student support services should add definite and measurable value to any research and scholarly activity. Should this be done, one may hypothesise that *more* postgraduate students would

complete their studies *within the minimum required time* for the degree concerned, and that researchers in the university would produce *a greater research output*. Addressing such needs pro-actively before the postgraduates themselves become aware of them would demonstrate a laudable degree of commitment on the part of the library to its postgraduate users.

This study gives clear pointers for strategic planning about e-service delivery within a virtual research environment to the Academic Information Service – especially with regard to its future role as a provider of e-services for postgraduate students.

The Academic Information Service needs to make much greater use of e-services. It urgently needs to address the e-research needs of postgraduate students together with their non-electronic information needs from the point of view of *one* explanatory paradigm. What is evident from this research is that postgraduate students of the Faculty of Education are ready to function within an e-environment. Nearly all the needs that I have identified through the needs analysis can be addressed electronically and can contribute towards affirmative research experiences. (Some needs – such as that for unlimited Internet access – are currently unrealistic because of constraints within the library system itself and because of limitations in the technical evolution of the technology itself at the time of writing.)

But by utilising what technology *is* available – technology such as that which supports Internet and cellular phones – the library can even now offer support and services customised to suit the electronic research needs of postgraduate researchers. It is through such customised services that the library could improve access to its excellent information resources while at the same time creating an environment that is conducive to lifelong research experiences by researchers who have come to regard the library itself as an indispensable partner in the quest for high-quality research and academic achievement. By utilising technology to disseminate services and support outside the library walls, the library will be able to show that it really cares about its postgraduate students. This in turn should encourage them to rely on the library and its first-rate resources rather than on any short cuts (such as Google™) to which they might have become accustomed. By taking such needs into account, the library will create a virtual research environment distinguished by ease of use and access.

This will enable postgraduate students to feel that the library is their principal and most valued research partner in their pursuit of academic distinction and success.

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ACADEMIC INFORMATION SERVICE

Service Unit Groenkloof
Faculty of Education
University of Pretoria
PRETORIA
0001

2005-02-10

Prof Jonathan Jansen
Dean
Faculty of Education
University of Pretoria
PRETORIA
0001

Dear Sir

APPLICATION FOR CONDUCTING RESEARCH AT THE FACULTY OF EDUCATION, UNIVERSITY OF PRETORIA

I hereby wish to apply for permission to conduct research at abovementioned faculty. The purpose of my research is to conduct an analysis of e-research needs experienced by postgraduate students, in order for the library to better support them.

The research will imply the following:

1. A questionnaire will need to be distributed amongst postgraduate students at the Faculty of Education during the first NME 810 meeting on Friday 18 February 2005, 16:00 – 20:00. The questionnaire will take approximately 10 minutes to complete.

2. Interviews will have to be conducted with previously identified postgraduate students during February 2005.

3. Questionnaires will have to be distributed amongst PhD students during the library orientation sessions in February 2005.

Attached please find the questionnaire that has been approved by *Statumet, University of Pretoria.*

Thank you for your attention. Your approval will be highly appreciated.

Yours sincerely,

Ina Smith
Student no.: 86385276
M.Ed. (CIE), University of Pretoria

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ACADEMIC INFORMATION SERVICE

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Service Unit Groenkloof
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2005-01-20

Dr J Nieuwenhuis
Co-ordinator: Postgraduate Students
Faculty of Education
University of Pretoria
PRETORIA
0001

Dear Sir

APPLICATION FOR CONDUCTING RESEARCH AT THE FACULTY OF EDUCATION, UNIVERSITY OF PRETORIA

I hereby wish to apply for permission to conduct research at abovementioned faculty. The purpose of my research is to conduct an analysis of research needs experienced by postgraduate students, in order for the library to better support them. Details of the survey are attached (Addendum 1).

Furthermore I request your permission to distribute a questionnaire amongst postgraduate students on Saturday 22 January 2005, and to conduct interviews during February 2005. Attached please find the questionnaire (Addendum 2).

Thank you for your attention. Your approval will be highly appreciated.

Yours sincerely,

Ina Smith
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2005-02-14

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Academic Information Specialist
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Mrs Smith

RE: APPLICATION FOR CONDUCTING RESEARCH AT THE FACULTY OF EDUCATION, UNIVERSITY OF PRETORIA

I hereby grant you permission to conduct research at abovementioned faculty. You may distribute questionnaires amongst postgraduate students, and you may conduct interviews with postgraduate students, provided that students participate on a voluntary basis.

Yours sincerely,

Prof Jonathan Jansen
Dean
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AKADEMIESE INLIGTINGSDIENS
Faculty of Education
University of Pretoria
PRETORIA
0001

2005-01-20

Mrs CC Smith
Academic Information Service
Service Unit Groenkloof
Faculty of Education
University of Pretoria
PRETORIA
0001

Mrs Smith

RE: APPLICATION FOR CONDUCTING RESEARCH AT THE FACULTY OF EDUCATION, UNIVERSITY OF PRETORIA

I hereby grant you permission to conduct research at abovementioned faculty. You may distribute questionnaires amongst postgraduate students at the Faculty of Education on 22 January 2005 during the orientation programme, and you may conduct interviews during the month of February, provided that students participate on a voluntary basis.

Yours sincerely,

Dr Jan Nieuwenhuis
Co-ordinator: Postgraduate Students
Faculty of Education, University of Pretoria

UNIVERSITY OF PRETORIA
FACULTY OF EDUCATION
ACADEMIC INFORMATION SERVICE

For office use only

1. **Respondent number** — V1 [ ][ ][ ][ ] 1-4

2. What study year are you currently enrolled for?

1st year Masters	1
2nd year Masters	2
3rd or more year Masters	3
1st year PhD	4
2nd year PhD	5
3rd or more year PhD	6

V2 [ ] 5

3. What is your mother-tongue?

English	1
Afrikaans	2
Northern Sotho	3
Sesotho	4
Tswana	5
Zulu	6
Xhosa	7
Ndebele	8
Swazi	9
Tsonga	10
Venda	11
Other Please specify:	

V3 [ ][ ] 6-7

4. Which of the following do you prefer when conducting your research? (Choose one only)

Internet Search Engines	1
Library databases	2
Both of the above	3
I don't use any of the above	4

V4 [ ] 8

5. When requiring help from an information specialist, I prefer to communicate..... (choose one only)

face-to-face	1
telephonically	2
by e-mail	3
using a chat facility	4
by SMS	5
using a bulletin board	6
by fax	7
I don't expect to communicate with the library staff at all	8

V5 ☐ 9

6. When searching for information on my research topic, I prefer to .... (choose one only)

request a librarian to find references for me	1
search for information myself, after being trained	2
search for information, using the available online help tools	3
search for information myself, with assistance from the librarian	4
search for information myself, without any assistance	5
other Please specify:	

V6 ☐ 10

7. When receiving news and updates from the library, which of the following do you prefer? (Choose one only)

Electronic newsletter via e-mail	1
Web page newsletter	2
Printed newsletter	3
I don't want to receive any of the above	4

V7 ☐ 11

8. I prefer library training to be conducted..... (Choose one only)

V8 ☐ 12

face-to-face, on an individual basis	1
face-to-face, within a group	2
online via a web page, PPT, chat, e-mail, etc.	3
escorted training, telephonically	4
printed material e.g. manuals, pamphlets	5
media e.g. video, tv, radio	6
I don't need training	7

9. How willing are you to make your assignments and research projects available on an institutional database, in order to share them with the rest of the research community at UP and worldwide? (Choose one only)

V9 ☐ 13

Most willing to make all available	1
Willing to make some available	2
Unwilling, but open for discussion	3
I am not prepared to make my intellectual material available on such a database	4

10. Which of the following software would you like to be made available on computers inside the library to support your research? You can choose more than one.

V10 ☐ 14
V11 ☐ 15
V12 ☐ 16
V13 ☐ 17
V14 ☐ 18

MS Office for word processing, spreadsheets, presentations	1
Statistical software tools	2
Software to assist with compiling bibliographies & applying referencing techniques, e.g. EndNote	3
Software to compile my own academic website	4
Other Please specify:	

11. Would you like to receive training from the library on how to use the Internet? (Choose one only)

Yes	1
No	2

V15 ☐ 19

12. When using the library web page, which of the following do you prefer? (Choose one only)

A web page addressing the specific needs of postgraduate students	1
A general web page addressing the needs of undergraduate and postgraduate students simultaneously	2
I don't expect to use the library web page	3

V16 ☐ 20

13. When requesting online assistance from an information specialist, I expect online feedback within ... (choose one only)

24 hours or less	1
1 - 3 days	2
1 week	3
1 month	4
As soon as possible	5
I won't need any assistance	6

V17 ☐ 21

14. How often do you plan to use the online library services/facilities? (Choose one only)

Daily	1
Once a week	2
Once a month	3
Seldom	4
I don't plan to use any online services	5

V18 ☐ 22

15. When conducting research using the electronic databases and electronic journals, which of the following do you prefer? (Choose one only)

Searching through all the electronic material simultaneously	1
Searching each database separately	2
I won't be using electronic databases and electronic journals	3

V19 ☐ 23

16. When provided with information on electronic journal articles relating to your research topic, which of the following do you prefer? (Choose one only)

List of references of journal articles	1
List of references with abstracts of journal articles	2
Full text journal articles	3
I won't need any assistance	4

V20 ☐ 24

17. What is the meaning of the following abbreviation: UPeTD?

_____

V21 ☐ 25

18. Are there any other electronic needs you have that the library should take note of?

_____

_____

V22 ☐ 26

12 November 2005

Mr Robert Moropa
Director: Academic Information Service
University of Pretoria
PRETORIA
0001

Dear Sir

Permission to use data from the AIS Libqual+™ Survey from 2005

I hereby wish to apply for permission to use data and results obtained through the data survey above, as applied to the needs of postgraduate students at the Academic Information Service, University of Pretoria. I would like to obtain your permission to integrate the data related to postgraduate students in my mini-dissertation “An analysis of the e-research needs of postgraduate students at higher education institutions”.

Yours sincerely,

_____

CC Smith
Student no.: 86385276
M.Ed. (CIE), University of Pretoria

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Pretoria 0002 Republiek van Suid-Afrika Tel (012) 420-4111
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AKADEMIESE INLIGTINGSDIENS

16 March 2006

Mrs CC Smith

Re Permission to use data from the AIS Libqual+™ Survey from 2005

We hereby grant you the necessary permission to use data and results obtained through the data survey referred to above, as applied to the needs of postgraduate students at the Academic Information Service, University of Pretoria. You have the necessary permission to integrate the data related to postgraduate students in your mini-dissertation titled "An analysis of the e-research needs of postgraduate students at higher education institutions".

Mr Robert Moropa
Director AIS

Universiteit van Pretoria
University of Pretoria

University of Pretoria, Academic Information Service

Welcome!

We are committed to improving your library services. Better understanding your expectations will help us tailor those services to your needs.

We are conducting this survey to measure library service quality and identify best practices through the Association of Research Libraries' LibQUAL+(TM) program.

Please answer all items. The survey will take about **10 minutes** to complete. Thank you for your participation!

Information supplied on this form will be processed in the United States. Data protection legislation requires us to make clear that supplying information on the form is entirely voluntary.

Please rate the following statements (1 is lowest, 9 is highest) by indicating:

Minimum -- the number that represents the *minimum* level of service that you would find acceptable

Desired -- the number that represents the level of service that *you personally want*

Perceived -- the number that represents the level of service that *you believe* our library currently provides

For each item, you must EITHER rate the item in all three columns OR identify the item as "N/A" (not applicable). Selecting "N/A" will override all other answers for that item.

	When it comes to...	**My Minimum Service Level Is** *Low* *High*	**My Desired Service Level Is** *Low* *High*	**Perceived Service Performance Is** *Low* *High*	**N/A**
1)	Library staff who instill confidence in users	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
2)	Making electronic resources accessible from my home or office	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
3)	Library space that inspires study and learning	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
4)	Giving users individual attention	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
5)	A library Web site enabling me to locate information on my own	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
6)	Library staff who are consistently courteous	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
7)	The printed library materials I need for my work	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
8)	Quiet space for individual work	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
9)	Readiness to respond to users' enquiries	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
10)	The electronic information resources I need	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
11)	Library staff who have the knowledge to answer user questions	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
12)	A comfortable and inviting location	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
13)	Library staff who deal with users in a caring fashion	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
14)	Modern equipment that lets me easily access needed information	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
15)	Library staff who understand the needs of their users	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
16)	Easy-to-use access tools that allow me to find things on my own	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
17)	A haven for study, learning, or research	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
18)	Willingness to help users	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
19)	Making information easily accessible for independent use	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
20)	Print and/or electronic journal collections I require for my work	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
21)	Space for group learning and group study	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A
22)	Dependability in handling users' service problems	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	N/A

Please indicate the degree to which you agree with the following statements:		
23)	The library helps me stay abreast of developments in my field(s) of interest.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
24)	The library aids my advancement in my academic discipline.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
25)	The library enables me to be more efficient in my academic pursuits.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
26)	The library helps me distinguish between trustworthy and untrustworthy information.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
27)	The library provides me with the information skills I need in my work or study.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
28)	In general, I am satisfied with the way in which I am treated at the library.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
29)	In general, I am satisfied with library support for my learning, research, and/or teaching needs.	1 2 3 4 5 6 7 8 9 *Strongly Disagree* *Strongly Agree*
30)	How would you rate the overall quality of the service provided by the library?	1 2 3 4 5 6 7 8 9 *Extremely Poor* *Extremely Good*

Please indicate your library usage patterns:		
31)	How often do you use resources within the library?	___ Daily ___ Weekly ___ Monthly ___ Quarterly ___ Never
32)	How often do you access library resources through a library Web page?	___ Daily ___ Weekly ___ Monthly ___ Quarterly ___ Never
33)	How often do you use Yahoo(TM), Google(TM), or non-library gateways for information?	___ Daily ___ Weekly ___ Monthly ___ Quarterly ___ Never

Please answer a few questions about yourself:		
34)	The library that you use most often:	___ Main Library ___ Music Library ___ Oliver R Tambo Law Library ___ Groenkloof Library ___ Veterinary Science Library ___ Medical Library ___ Pre-Clinical Library ___ Klinikala Library ___ Witbank Health Library ___ Public Health Library (SHSPH) ___ Mamelodi Library ___ GIBS Information Service
35)	Age:	___ Under 18 ___ 18 - 22 ___ 23 - 30 ___ 31 - 45 ___ 46 - 65 ___ Over 65
36)	Sex:	___ Male ___ Female
37)	Full or part-time student?	___ Full-time ___ Part-time ___ Does not apply / NA

38) Discipline:

___ Agricultural Sciences
___ Arts
___ Biological Sciences
___ Built Environment
___ Economic and Management Sciences
___ Education
___ Engineering
___ Health Sciences
___ Information Technology
___ Languages
___ Law
___ Mathematical Sciences
___ Physical Sciences
___ Social Studies
___ Theology
___ Veterinary Science

39) Position:
(Select the ONE option that best describes you.)

Undergraduate:
___ First year
___ Second year
___ Third year
___ Fourth year
___ Fifth year and above
___ Non-degree

Postgraduate:
___ Taught Masters degree
___ Research Masters degree
___ Doctoral Research degree
___ Non-degree
___ Undecided

Academic Staff:
___ Professor
___ Reader
___ Senior / Principal Lecturer
___ Lecturer
___ Research Staff
___ Other Academic Status

Library Staff:
___ Senior Management
___ Department Head / Team Leader
___ Professional Staff
___ Support Staff
___ Other

Staff:
___ Administrative or Academic Related Staff
___ Other staff positions

40) Please enter any comments about library services in the box below:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

41) Enter your e-mail address in the box below if you would like to enter an optional drawing for a prize.
Your e-mail address will be kept confidential and will not be linked to your survey responses. (Not required)

_____

Thank you for participating in this library service quality survey!

The FREQ Procedure

Table of VV2 by VV6

VV2	VV6					
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	4	5	Total
1+2	9 6.7241 0.7703 7.76 13.85 75.00	26 28.017 0.1452 22.41 40.00 52.00	9 10.086 0.117 7.76 13.85 50.00	15 16.25 0.0962 12.93 23.08 51.72	6 3.9224 1.1004 5.17 9.23 85.71	65 56.03
4+5	1 4.2414 2.4772 0.86 2.44 8.33	20 17.672 0.3066 17.24 48.78 40.00	9 6.3621 1.0938 7.76 21.95 50.00	10 10.25 0.0061 8.62 24.39 34.48	1 2.4741 0.8783 0.86 2.44 14.29	41 35.34
3	1 0.4138 0.8305 0.86 25.00 8.33	1 1.7241 0.3041 0.86 25.00 2.00	0 0.6207 0.6207 0.00 0.00 0.00	2 1 1 1.72 50.00 6.90	0 0.2414 0.2414 0.00 0.00 0.00	4 3.45
6	1 0.6207 0.2318 0.86 16.67 8.33	3 2.5862 0.0662 2.59 50.00 6.00	0 0.931 0.931 0.00 0.00 0.00	2 1.5 0.1667 1.72 33.33 6.90	0 0.3621 0.3621 0.00 0.00 0.00	6 5.17
Total	12 10.34	50 43.10	18 15.52	29 25.00	7 6.03	116 100.00

Frequency Missing = 6

The FREQ Procedure

Statistics for Table of VV2 by VV6

Statistic	DF	Value	Prob
Chi-Square	12	11.7454	0.4663
Likelihood Ratio Chi-Square	12	14.4505	0.2729
Mantel-Haenszel Chi-Square	1	0.1774	0.6736
Phi Coefficient		0.3182	
Contingency Coefficient		0.3032	
Cramer's V		0.1837	

WARNING: 65% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV2 by V15

VV2	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1+2	36 41.317 0.6842 30.00 53.73 48.65	31 25.683 1.1006 25.83 46.27 67.39	67 55.83
4+5	31 26.517 0.758 25.83 72.09 41.89	12 16.483 1.2194 10.00 27.91 26.09	43 35.83
3	3 2.4667 0.1153 2.50 75.00 4.05	1 1.5333 0.1855 0.83 25.00 2.17	4 3.33
6	4 3.7 0.0243 3.33 66.67 5.41	2 2.3 0.0391 1.67 33.33 4.35	6 5.00
Total	74 61.67	46 38.33	120 100.00

Frequency Missing = 2

The FREQ Procedure

Statistics for Table of VV2 by V15

Statistic	DF	Value	Prob
Chi-Square	3	4.1265	0.2481
Likelihood Ratio Chi-Square	3	4.1980	0.2409
Mantel-Haenszel Chi-Square	1	1.3511	0.2451
Phi Coefficient		0.1854	
Contingency Coefficient		0.1823	
Cramer's V		0.1854	

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 120
Frequency Missing = 2

The FREQ Procedure

Table of VV2 by VV18

VV2	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1+2	22 23.93 0.1557 19.13 34.38 51.16	38 35.061 0.2464 33.04 59.38 60.32	4 5.0087 0.2031 3.48 6.25 44.44	64 55.65
4+5	18 15.704 0.3356 15.65 42.86 41.86	20 23.009 0.3934 17.39 47.62 31.75	4 3.287 0.1547 3.48 9.52 44.44	42 36.52
3	2 1.4957 0.1701 1.74 50.00 4.65	1 2.1913 0.6477 0.87 25.00 1.59	1 0.313 1.5075 0.87 25.00 11.11	4 3.48
6	1 1.8696 0.4044 0.87 20.00 2.33	4 2.7391 0.5804 3.48 80.00 6.35	0 0.3913 0.3913 0.00 0.00 0.00	5 4.35
Total	43 37.39	63 54.78	9 7.83	115 100.00

Frequency Missing = 7

The FREQ Procedure

Statistics for Table of VV2 by VV18

Statistic	DF	Value	Prob
Chi-Square	6	5.1903	0.5196
Likelihood Ratio Chi-Square	6	5.1889	0.5198
Mantel-Haenszel Chi-Square	1	0.0279	0.8673
Phi Coefficient		0.2124	
Contingency Coefficient		0.2078	
Cramer's V		0.1502	

WARNING: 58% of the cells have expected counts less
than 5. Chi-Square may not be a valid test.

Effective Sample Size = 115
Frequency Missing = 7

The FREQ Procedure

Table of VV3 by VV5

VV3	VV5			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1+2	34 31.963 0.1298 31.19 65.38 50.75	6 4.2936 0.6782 5.50 11.54 66.67	12 15.743 0.89 11.01 23.08 36.36	52 47.71
Rest	33 35.037 0.1184 30.28 57.89 49.25	3 4.7064 0.6187 2.75 5.26 33.33	21 17.257 0.8119 19.27 36.84 63.64	57 52.29
Total	67 61.47	9 8.26	33 30.28	109 100.00

Frequency Missing = 13

Statistics for Table of VV3 by VV5

Statistic	DF	Value	Prob
Chi-Square	2	3.2469	0.1972
Likelihood Ratio Chi-Square	2	3.2908	0.1929
Mantel-Haenszel Chi-Square	1	1.4842	0.2231
Phi Coefficient		0.1726	
Contingency Coefficient		0.1701	
Cramer's V		0.1726	

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 109
Frequency Missing = 13

WARNING: 11% of the data are missing.

The FREQ Procedure

Table of VV3 by VV6

VV3	VV6					
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	4	5	Total
1+2	8 5.4359 1.2095 6.84 15.09 66.67	20 23.103 0.4167 17.09 37.74 39.22	7 8.1538 0.1633 5.98 13.21 38.89	13 13.137 0.0014 11.11 24.53 44.83	5 3.1709 1.055 4.27 9.43 71.43	53 45.30
Rest	4 6.5641 1.0016 3.42 6.25 33.33	31 27.897 0.345 26.50 48.44 60.78	11 9.8462 0.1352 9.40 17.19 61.11	16 15.863 0.0012 13.68 25.00 55.17	2 3.8291 0.8737 1.71 3.13 28.57	64 54.70
Total	12 10.26	51 43.59	18 15.38	29 24.79	7 5.98	117 100.00

Frequency Missing = 5

Statistics for Table of VV3 by VV6

Statistic	DF	Value	Prob
Chi-Square	4	5.2026	0.2671
Likelihood Ratio Chi-Square	4	5.2503	0.2626
Mantel-Haenszel Chi-Square	1	0.0608	0.8052
Phi Coefficient		0.2109	
Contingency Coefficient		0.2063	
Cramer's V		0.2109	

Effective Sample Size = 117
Frequency Missing = 5

The FREQ Procedure

Table of VV3 by VV8

VV3	VV8				
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	5	Total
1+2	20 22.78 0.3392 16.95 35.71 41.67	25 23.729 0.0681 21.19 44.64 50.00	5 3.7966 0.3814 4.24 8.93 62.50	6 5.6949 0.0163 5.08 10.71 50.00	56 47.46
Rest	28 25.22 0.3064 23.73 45.16 58.33	25 26.271 0.0615 21.19 40.32 50.00	3 4.2034 0.3445 2.54 4.84 37.50	6 6.3051 0.0148 5.08 9.68 50.00	62 52.54
Total	48 40.68	50 42.37	8 6.78	12 10.17	118 100.00

Frequency Missing = 4

Statistics for Table of VV3 by VV8

Statistic	DF	Value	Prob
Chi-Square	3	1.5322	0.6749
Likelihood Ratio Chi-Square	3	1.5397	0.6731
Mantel-Haenszel Chi-Square	1	0.5822	0.4454
Phi Coefficient		0.1140	
Contingency Coefficient		0.1132	
Cramer's V		0.1140	

WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 118
Frequency Missing = 4

The FREQ Procedure

Table of VV3 by V15

VV3	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1+2	26 35.331 2.4641 21.49 45.61 34.67	31 21.669 4.0176 25.62 54.39 67.39	57 47.11
Rest	49 39.669 2.1946 40.50 76.56 65.33	15 24.331 3.5782 12.40 23.44 32.61	64 52.89
Total	75 61.98	46 38.02	121 100.00

Frequency Missing = 1

The FREQ Procedure

Statistics for Table of VV3 by V15

Statistic	DF	Value	Prob
Chi-Square	1	12.2546	0.0005
Likelihood Ratio Chi-Square	1	12.4463	0.0004
Continuity Adj. Chi-Square	1	10.9764	0.0009
Mantel-Haenszel Chi-Square	1	12.1533	0.0005
Phi Coefficient		-0.3182	
Contingency Coefficient		0.3033	
Cramer's V		-0.3182	

Fisher's Exact Test

Cell (1,1) Frequency (F)	26
Left-sided Pr <= F	4.290E-04
Right-sided Pr >= F	0.9999
Table Probability (P)	3.288E-04
Two-sided Pr <= P	6.752E-04

Effective Sample Size = 121
Frequency Missing = 1

The FREQ Procedure

Table of VV3 by VV18

VV3	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1+2	12 19.276 2.7463 10.34 23.08 27.91	37 28.69 2.4072 31.90 71.15 57.81	3 4.0345 0.2653 2.59 5.77 33.33	52 44.83
Rest	31 23.724 2.2314 26.72 48.44 72.09	27 35.31 1.9559 23.28 42.19 42.19	6 4.9655 0.2155 5.17 9.38 66.67	64 55.17
Total	43 37.07	64 55.17	9 7.76	116 100.00

Frequency Missing = 6

Statistics for Table of VV3 by VV18

Statistic	DF	Value	Prob
Chi-Square	2	9.8216	0.0074
Likelihood Ratio Chi-Square	2	10.0371	0.0066
Mantel-Haenszel Chi-Square	1	3.7147	0.0539
Phi Coefficient		0.2910	
Contingency Coefficient		0.2794	
Cramer's V		0.2910	

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV4 by VV6

VV4	VV6					
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	4	5	Total
1	3 2.5714 0.0714 2.68 12.50 25.00	11 10.5 0.0238 9.82 45.83 22.45	6 3.8571 1.1905 5.36 25.00 33.33	2 5.7857 2.4771 1.79 8.33 7.41	2 1.2857 0.3968 1.79 8.33 33.33	24 21.43
2	1 1.7143 0.2976 0.89 6.25 8.33	8 7 0.1429 7.14 50.00 16.33	2 2.5714 0.127 1.79 12.50 11.11	5 3.8571 0.3386 4.46 31.25 18.52	0 0.8571 0.8571 0.00 0.00 0.00	16 14.29
3	8 7.7143 0.0106 7.14 11.11 66.67	30 31.5 0.0714 26.79 41.67 61.22	10 11.571 0.2134 8.93 13.89 55.56	20 17.357 0.4024 17.86 27.78 74.07	4 3.8571 0.0053 3.57 5.56 66.67	72 64.29
Total	12 10.71	49 43.75	18 16.07	27 24.11	6 5.36	112 100.00

Frequency Missing = 10

Statistics for Table of VV4 by VV6

Statistic	DF	Value	Prob
Chi-Square	8	6.6260	0.5775
Likelihood Ratio Chi-Square	8	8.1125	0.4226
Mantel-Haenszel Chi-Square	1	0.6127	0.4338
Phi Coefficient		0.2432	
Contingency Coefficient		0.2363	
Cramer's V		0.1720	

WARNING: 53% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 112
Frequency Missing = 10

The FREQ Procedure

Table of VV4 by V15

VV4	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	11 15.086 1.1068 9.48 44.00 15.71	14 9.9138 1.6842 12.07 56.00 30.43	25 21.55
2	14 10.259 1.3645 12.07 82.35 20.00	3 6.7414 2.0764 2.59 17.65 6.52	17 14.66
3	45 44.655 0.0027 38.79 60.81 64.29	29 29.345 0.0041 25.00 39.19 63.04	74 63.79
Total	70 60.34	46 39.66	116 100.00

Frequency Missing = 6

Statistics for Table of VV4 by V15

Statistic	DF	Value	Prob
Chi-Square	2	6.2386	0.0442
Likelihood Ratio Chi-Square	2	6.5693	0.0375
Mantel-Haenszel Chi-Square	1	1.0388	0.3081
Phi Coefficient		0.2319	
Contingency Coefficient		0.2259	
Cramer's V		0.2319	

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV4 by VV18

VV4	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	10 9.0811 0.093 9.01 41.67 23.81	11 12.973 0.3001 9.91 45.83 18.33	3 1.9459 0.5709 2.70 12.50 33.33	24 21.62
2	7 6.0541 0.1478 6.31 43.75 16.67	7 8.6486 0.3143 6.31 43.75 11.67	2 1.2973 0.3806 1.80 12.50 22.22	16 14.41
3	25 26.865 0.1295 22.52 35.21 59.52	42 38.378 0.3418 37.84 59.15 70.00	4 5.7568 0.5361 3.60 5.63 44.44	71 63.96
Total	42 37.84	60 54.05	9 8.11	111 100.00

Frequency Missing = 11

Statistics for Table of VV4 by VV18

Statistic	DF	Value	Prob
Chi-Square	4	2.8140	0.5894
Likelihood Ratio Chi-Square	4	2.7636	0.5981
Mantel-Haenszel Chi-Square	1	0.0000	0.9959
Phi Coefficient		0.1592	
Contingency Coefficient		0.1572	
Cramer's V		0.1126	

WARNING: 22% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 111
Frequency Missing = 11

The FREQ Procedure

Table of VV4 by VV19

VV4	VV19		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	14 13.468 0.021 12.61 60.87 21.54	9 9.5315 0.0296 8.11 39.13 19.57	23 20.72
2	7 8.7838 0.3622 6.31 46.67 10.77	8 6.2162 0.5119 7.21 53.33 17.39	15 13.51
3	44 42.748 0.0367 39.64 60.27 67.69	29 30.252 0.0518 26.13 39.73 63.04	73 65.77
Total	65 58.56	46 41.44	111 100.00

Frequency Missing = 11

Statistics for Table of VV4 by VV19

Statistic	DF	Value	Prob
Chi-Square	2	1.0133	0.6025
Likelihood Ratio Chi-Square	2	0.9983	0.6070
Mantel-Haenszel Chi-Square	1	0.0289	0.8651
Phi Coefficient		0.0955	
Contingency Coefficient		0.0951	
Cramer's V		0.0955	

Effective Sample Size = 111
Frequency Missing = 11

The FREQ Procedure

Table of VV5 by V15

VV5	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	43 41.798 0.0346 39.45 64.18 63.24	24 25.202 0.0573 22.02 35.82 58.54	67 61.47
2	8 5.6147 1.0134 7.34 88.89 11.76	1 3.3853 1.6807 0.92 11.11 2.44	9 8.26
3	17 20.587 0.625 15.60 51.52 25.00	16 12.413 1.0366 14.68 48.48 39.02	33 30.28
Total	68 62.39	41 37.61	109 100.00

Frequency Missing = 13

The FREQ Procedure

Statistics for Table of VV5 by V15

Statistic	DF	Value	Prob
Chi-Square	2	4.4476	0.1082
Likelihood Ratio Chi-Square	2	4.9325	0.0849
Mantel-Haenszel Chi-Square	1	1.0833	0.2980
Phi Coefficient		0.2020	
Contingency Coefficient		0.1980	
Cramer's V		0.2020	

Effective Sample Size = 109
Frequency Missing = 13

WARNING: 11% of the data are missing.

Table of VV5 by V17

VV5 / V17	1	2	3	5	Total
1	36	21	3	6	66
Expected	33	22	4.8889	6.1111	
Cell Chi-Square	0.2727	0.0455	0.7298	0.002	
Percent	33.33	19.44	2.78	5.56	61.11
Row Pct	54.55	31.82	4.55	9.09	
Col Pct	66.67	58.33	37.50	60.00	
2	4	5	0	0	9
Expected	4.5	3	0.6667	0.8333	
Cell Chi-Square	0.0556	1.3333	0.6667	0.8333	
Percent	3.70	4.63	0.00	0.00	8.33
Row Pct	44.44	55.56	0.00	0.00	
Col Pct	7.41	13.89	0.00	0.00	
3	14	10	5	4	33
Expected	16.5	11	2.4444	3.0556	
Cell Chi-Square	0.3788	0.0909	2.6717	0.2919	
Percent	12.96	9.26	4.63	3.70	30.56
Row Pct	42.42	30.30	15.15	12.12	
Col Pct	25.93	27.78	62.50	40.00	
Total	54	36	8	10	108
	50.00	33.33	7.41	9.26	100.00

Frequency Missing = 14

The FREQ Procedure

Statistics for Table of VV5 by V17

Statistic	DF	Value	Prob
Chi-Square	6	7.3722	0.2878
Likelihood Ratio Chi-Square	6	8.1308	0.2287
Mantel-Haenszel Chi-Square	1	1.3825	0.2397
Phi Coefficient		0.2613	
Contingency Coefficient		0.2528	
Cramer's V		0.1847	

WARNING: 58% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 108
Frequency Missing = 14

WARNING: 11% of the data are missing.

The FREQ Procedure

Table of VV6 by VV8

VV6	VV8				
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	5	Total
1	8 4.7368 2.248 7.02 66.67 17.78	3 5.1579 0.9028 2.63 25.00 6.12	0 0.8421 0.8421 0.00 0.00 0.00	1 1.2632 0.0548 0.88 8.33 8.33	12 10.53
2	19 20.132 0.0636 16.67 37.25 42.22	25 21.921 0.4325 21.93 49.02 51.02	3 3.5789 0.0937 2.63 5.88 37.50	4 5.3684 0.3488 3.51 7.84 33.33	51 44.74
3	2 5.9211 2.5966 1.75 13.33 4.44	7 6.4474 0.0474 6.14 46.67 14.29	4 1.0526 8.2526 3.51 26.67 50.00	2 1.5789 0.1123 1.75 13.33 16.67	15 13.16
4	15 11.447 1.1025 13.16 51.72 33.33	9 12.465 0.9632 7.89 31.03 18.37	1 2.0351 0.5265 0.88 3.45 12.50	4 3.0526 0.294 3.51 13.79 33.33	29 25.44
5	1 2.7632 1.1251 0.88 14.29 2.22	5 3.0088 1.3178 4.39 71.43 10.20	0 0.4912 0.4912 0.00 0.00 0.00	1 0.7368 0.094 0.88 14.29 8.33	7 6.14
Total	45 39.47	49 42.98	8 7.02	12 10.53	114 100.00

Frequency Missing = 8

The FREQ Procedure

Statistics for Table of VV6 by VV8

Statistic	DF	Value	Prob
Chi-Square	12	21.9094	0.0385
Likelihood Ratio Chi-Square	12	20.7068	0.0548
Mantel-Haenszel Chi-Square	1	1.1797	0.2774
Phi Coefficient		0.4384	
Contingency Coefficient		0.4015	
Cramer's V		0.2531	

WARNING: 60% of the cells have expected counts less
than 5. Chi-Square may not be a valid test.

Effective Sample Size = 114
Frequency Missing = 8

The FREQ Procedure

Table of VV6 by V15

VV6	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	5 7.6552 0.9209 4.31 41.67 6.76	7 4.3448 1.6226 6.03 58.33 16.67	12 10.34
2	35 31.897 0.302 30.17 70.00 47.30	15 18.103 0.532 12.93 30.00 35.71	50 43.10
3	8 11.483 1.0563 6.90 44.44 10.81	10 6.5172 1.8612 8.62 55.56 23.81	18 15.52
4	22 18.5 0.6622 18.97 75.86 29.73	7 10.5 1.1667 6.03 24.14 16.67	29 25.00
5	4 4.4655 0.0485 3.45 57.14 5.41	3 2.5345 0.0855 2.59 42.86 7.14	7 6.03
Total	74 63.79	42 36.21	116 100.00

Frequency Missing = 6

The FREQ Procedure

Statistics for Table of VV6 by V15

Statistic	DF	Value	Prob
Chi-Square	4	8.2579	0.0826
Likelihood Ratio Chi-Square	4	8.1341	0.0868
Mantel-Haenszel Chi-Square	1	0.6673	0.4140
Phi Coefficient		0.2668	
Contingency Coefficient		0.2578	
Cramer's V		0.2668	

WARNING: 30% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV6 by V17

VV6	V17				
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	5	Total
1	4 5.4052 0.3653 3.45 36.36 7.02	4 3.6034 0.0436 3.45 36.36 10.53	1 0.8534 0.0252 0.86 9.09 11.11	2 1.1379 0.6531 1.72 18.18 16.67	11 9.48
2	29 25.06 0.6193 25.00 56.86 50.88	10 16.707 2.6924 8.62 19.61 26.32	6 3.9569 1.0549 5.17 11.76 66.67	6 5.2759 0.0994 5.17 11.76 50.00	51 43.97
3	10 8.8448 0.1509 8.62 55.56 17.54	5 5.8966 0.1363 4.31 27.78 13.16	1 1.3966 0.1126 0.86 5.56 11.11	2 1.8621 0.0102 1.72 11.11 16.67	18 15.52
4	13 14.25 0.1096 11.21 44.83 22.81	13 9.5 1.2895 11.21 44.83 34.21	1 2.25 0.6944 0.86 3.45 11.11	2 3 0.3333 1.72 6.90 16.67	29 25.00
5	1 3.4397 1.7304 0.86 14.29 1.75	6 2.2931 5.9924 5.17 85.71 15.79	0 0.5431 0.5431 0.00 0.00 0.00	0 0.7241 0.7241 0.00 0.00 0.00	7 6.03
Total	57 49.14	38 32.76	9 7.76	12 10.34	116 100.00

Frequency Missing = 6

The FREQ Procedure

Statistics for Table of VV6 by V17

Statistic	DF	Value	Prob
Chi-Square	12	17.3802	0.1358
Likelihood Ratio Chi-Square	12	17.7617	0.1231
Mantel-Haenszel Chi-Square	1	0.6761	0.4109
Phi Coefficient		0.3871	
Contingency Coefficient		0.3610	
Cramer's V		0.2235	

WARNING: 60% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV6 by VV18

VV6	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	0 4.0268 4.0268 0.00 0.00 0.00	8 6.1875 0.5309 7.14 72.73 12.70	3 0.7857 6.2403 2.68 27.27 37.50	11 9.82
2	22 17.571 1.1161 19.64 45.83 53.66	23 27 0.5926 20.54 47.92 36.51	3 3.4286 0.0536 2.68 6.25 37.50	48 42.86
3	7 6.5893 0.0256 6.25 38.89 17.07	10 10.125 0.0015 8.93 55.56 15.87	1 1.2857 0.0635 0.89 5.56 12.50	18 16.07
4	10 10.25 0.0061 8.93 35.71 24.39	17 15.75 0.0992 15.18 60.71 26.98	1 2 0.5 0.89 3.57 12.50	28 25.00
5	2 2.5625 0.1235 1.79 28.57 4.88	5 3.9375 0.2867 4.46 71.43 7.94	0 0.5 0.5 0.00 0.00 0.00	7 6.25
Total	41 36.61	63 56.25	8 7.14	112 100.00

Frequency Missing = 10

The FREQ Procedure

Statistics for Table of VV6 by VV18

Statistic	DF	Value	Prob
Chi-Square	8	14.1664	0.0775
Likelihood Ratio Chi-Square	8	16.0716	0.0414
Mantel-Haenszel Chi-Square	1	1.3642	0.2428
Phi Coefficient		0.3556	
Contingency Coefficient		0.3351	
Cramer's V		0.2515	

WARNING: 53% of the cells have expected counts less
than 5. Chi-Square may not be a valid test.

Effective Sample Size = 112
Frequency Missing = 10

The FREQ Procedure

Table of VV6 by VV20

VV6	VV20			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	1 2.7523 1.1156 0.92 8.33 4.00	5 3.5229 0.6193 4.59 41.67 15.63	6 5.7248 0.0132 5.50 50.00 11.54	12 11.01
2	10 10.321 0.01 9.17 22.22 40.00	13 13.211 0.0034 11.93 28.89 40.63	22 21.468 0.0132 20.18 48.89 42.31	45 41.28
3	5 3.8991 0.3108 4.59 29.41 20.00	4 4.9908 0.1967 3.67 23.53 12.50	8 8.1101 0.0015 7.34 47.06 15.38	17 15.60
4	8 6.422 0.3877 7.34 28.57 32.00	7 8.2202 0.1811 6.42 25.00 21.88	13 13.358 0.0096 11.93 46.43 25.00	28 25.69
5	1 1.6055 0.2284 0.92 14.29 4.00	3 2.055 0.4345 2.75 42.86 9.38	3 3.3394 0.0345 2.75 42.86 5.77	7 6.42
Total	25 22.94	32 29.36	52 47.71	109 100.00

Frequency Missing = 13

The FREQ Procedure

Statistics for Table of VV6 by VV20

Statistic	DF	Value	Prob
Chi-Square	8	3.5596	0.8945
Likelihood Ratio Chi-Square	8	3.8042	0.8743
Mantel-Haenszel Chi-Square	1	0.4300	0.5120
Phi Coefficient		0.1807	
Contingency Coefficient		0.1778	
Cramer's V		0.1278	

WARNING: 47% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 109
Frequency Missing = 13

WARNING: 11% of the data are missing.

The FREQ Procedure

Table of VV7 by VV8

VV7	VV8				
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	5	Total
1	21 27.147 1.3917 18.10 31.34 44.68	33 28.302 0.7799 28.45 49.25 67.35	8 4.6207 2.4714 6.90 11.94 100.00	5 6.931 0.538 4.31 7.46 41.67	67 57.76
2	4 3.2414 0.1775 3.45 50.00 8.51	4 3.3793 0.114 3.45 50.00 8.16	0 0.5517 0.5517 0.00 0.00 0.00	0 0.8276 0.8276 0.00 0.00 0.00	8 6.90
3	22 16.612 1.7475 18.97 53.66 46.81	12 17.319 1.6335 10.34 29.27 24.49	0 2.8276 2.8276 0.00 0.00 0.00	7 4.2414 1.7942 6.03 17.07 58.33	41 35.34
Total	47 40.52	49 42.24	8 6.90	12 10.34	116 100.00

Frequency Missing = 6

Statistics for Table of VV7 by VV8

Statistic	DF	Value	Prob
Chi-Square	6	14.8548	0.0214
Likelihood Ratio Chi-Square	6	18.4710	0.0052
Mantel-Haenszel Chi-Square	1	0.0932	0.7602
Phi Coefficient		0.3579	
Contingency Coefficient		0.3369	
Cramer's V		0.2530	

WARNING: 58% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 116
Frequency Missing = 6

The FREQ Procedure

Table of VV7 by V15

VV7	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	35 43.22 1.5635 29.66 51.47 46.67	33 24.78 2.727 27.97 48.53 76.74	68 57.63
2	5 5.7203 0.0907 4.24 55.56 6.67	4 3.2797 0.1582 3.39 44.44 9.30	9 7.63
3	35 26.059 3.0675 29.66 85.37 46.67	6 14.941 5.3502 5.08 14.63 13.95	41 34.75
Total	75 63.56	43 36.44	118 100.00

Frequency Missing = 4

Statistics for Table of VV7 by V15

Statistic	DF	Value	Prob
Chi-Square	2	12.9571	0.0015
Likelihood Ratio Chi-Square	2	14.0832	0.0009
Mantel-Haenszel Chi-Square	1	12.2613	0.0005
Phi Coefficient		0.3314	
Contingency Coefficient		0.3145	
Cramer's V		0.3314	

Effective Sample Size = 118
Frequency Missing = 4

The FREQ Procedure

Table of VV7 by VV18

VV7	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	29 24.531 0.8142 25.66 43.94 69.05	33 36.796 0.3917 29.20 50.00 52.38	4 4.6726 0.0968 3.54 6.06 50.00	66 58.41
2	5 3.3451 0.8187 4.42 55.56 11.90	3 5.0177 0.8113 2.65 33.33 4.76	1 0.6372 0.2066 0.88 11.11 12.50	9 7.96
3	8 14.124 2.6552 7.08 21.05 19.05	27 21.186 1.5956 23.89 71.05 42.86	3 2.6903 0.0357 2.65 7.89 37.50	38 33.63
Total	42 37.17	63 55.75	8 7.08	113 100.00

Frequency Missing = 9

Statistics for Table of VV7 by VV18

Statistic	DF	Value	Prob
Chi-Square	4	7.4258	0.1150
Likelihood Ratio Chi-Square	4	7.7653	0.1006
Mantel-Haenszel Chi-Square	1	3.8875	0.0486
Phi Coefficient		0.2563	
Contingency Coefficient		0.2483	
Cramer's V		0.1813	

WARNING: 44% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 113
Frequency Missing = 9

The FREQ Procedure

Table of VV8 by V15

VV8	V15		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	30 29.726 0.0025 25.64 63.83 40.54	17 17.274 0.0043 14.53 36.17 39.53	47 40.17
2	35 31.624 0.3604 29.91 70.00 47.30	15 18.376 0.6203 12.82 30.00 34.88	50 42.74
3	3 5.0598 0.8385 2.56 37.50 4.05	5 2.9402 1.4431 4.27 62.50 11.63	8 6.84
5	6 7.5897 0.333 5.13 50.00 8.11	6 4.4103 0.573 5.13 50.00 13.95	12 10.26
Total	74 63.25	43 36.75	117 100.00

Frequency Missing = 5

The FREQ Procedure

Statistics for Table of VV8 by V15

Statistic	DF	Value	Prob
Chi-Square	3	4.1752	0.2432
Likelihood Ratio Chi-Square	3	4.0641	0.2546
Mantel-Haenszel Chi-Square	1	1.3207	0.2505
Phi Coefficient		0.1889	
Contingency Coefficient		0.1856	
Cramer's V		0.1889	

WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 117
Frequency Missing = 5

The FREQ Procedure

Table of V15 by VV18

V15	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	26 26.661 0.0164 22.61 35.62 61.90	42 40.626 0.0465 36.52 57.53 65.63	5 5.713 0.089 4.35 6.85 55.56	73 63.48
2	16 15.339 0.0285 13.91 38.10 38.10	22 23.374 0.0808 19.13 52.38 34.38	4 3.287 0.1547 3.48 9.52 44.44	42 36.52
Total	42 36.52	64 55.65	9 7.83	115 100.00

Frequency Missing = 7

Statistics for Table of V15 by VV18

Statistic	DF	Value	Prob
Chi-Square	2	0.4158	0.8123
Likelihood Ratio Chi-Square	2	0.4104	0.8145
Mantel-Haenszel Chi-Square	1	0.0003	0.9866
Phi Coefficient		0.0601	
Contingency Coefficient		0.0600	
Cramer's V		0.0601	

Effective Sample Size = 115
Frequency Missing = 7

The FREQ Procedure

Table of VV16 by VV18

VV16	VV18			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	32 33.75 0.0907 28.57 35.56 76.19	52 49.821 0.0953 46.43 57.78 83.87	6 6.4286 0.0286 5.36 6.67 75.00	90 80.36
2	10 8.25 0.3712 8.93 45.45 23.81	10 12.179 0.3897 8.93 45.45 16.13	2 1.5714 0.1169 1.79 9.09 25.00	22 19.64
Total	42 37.50	62 55.36	8 7.14	112 100.00

Frequency Missing = 10

Statistics for Table of VV16 by VV18

Statistic	DF	Value	Prob
Chi-Square	2	1.0924	0.5792
Likelihood Ratio Chi-Square	2	1.0857	0.5811
Mantel-Haenszel Chi-Square	1	0.2763	0.5991
Phi Coefficient		0.0988	
Contingency Coefficient		0.0983	
Cramer's V		0.0988	

Effective Sample Size = 112
Frequency Missing = 10

The FREQ Procedure

Table of VV16 by VV19

VV16	VV19		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	49 49.712 0.0102 44.14 55.06 79.03	40 39.288 0.0129 36.04 44.94 81.63	89 80.18
2	13 12.288 0.0412 11.71 59.09 20.97	9 9.7117 0.0522 8.11 40.91 18.37	22 19.82
Total	62 55.86	49 44.14	111 100.00

Frequency Missing = 11

The FREQ Procedure

Statistics for Table of VV16 by VV19

Statistic	DF	Value	Prob
Chi-Square	1	0.1165	0.7329
Likelihood Ratio Chi-Square	1	0.1170	0.7323
Continuity Adj. Chi-Square	1	0.0103	0.9191
Mantel-Haenszel Chi-Square	1	0.1154	0.7341
Phi Coefficient		-0.0324	
Contingency Coefficient		0.0324	
Cramer's V		-0.0324	

Fisher's Exact Test

Cell (1,1) Frequency (F)	49
Left-sided Pr <= F	0.4620
Right-sided Pr >= F	0.7177
Table Probability (P)	0.1796
Two-sided Pr <= P	0.8132

Effective Sample Size = 111
Frequency Missing = 11

The FREQ Procedure

Table of V17 by VV20

V17	VV20			
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	3	Total
1	12 12.18 0.0027 10.81 23.08 46.15	18 15.459 0.4175 16.22 34.62 54.55	22 24.36 0.2287 19.82 42.31 42.31	52 46.85
2	10 9.1351 0.0819 9.01 25.64 38.46	10 11.595 0.2193 9.01 25.64 30.30	19 18.27 0.0291 17.12 48.72 36.54	39 35.14
3	2 1.8739 0.0085 1.80 25.00 7.69	4 2.3784 1.1057 3.60 50.00 12.12	2 3.7477 0.8151 1.80 25.00 3.85	8 7.21
5	2 2.8108 0.2339 1.80 16.67 7.69	1 3.5676 1.8479 0.90 8.33 3.03	9 5.6216 2.0303 8.11 75.00 17.31	12 10.81
Total	26 23.42	33 29.73	52 46.85	111 100.00

Frequency Missing = 11

The FREQ Procedure

Statistics for Table of V17 by VV20

Statistic	DF	Value	Prob
Chi-Square	6	7.0204	0.3190
Likelihood Ratio Chi-Square	6	7.4471	0.2815
Mantel-Haenszel Chi-Square	1	1.5143	0.2185
Phi Coefficient		0.2515	
Contingency Coefficient		0.2439	
Cramer's V		0.1778	

WARNING: 42% of the cells have expected counts less
than 5. Chi-Square may not be a valid test.

Effective Sample Size = 111
Frequency Missing = 11

The FREQ Procedure

Table of VV18 by VV19

VV18	VV19		
Frequency Expected Cell Chi-Square Percent Row Pct Col Pct	1	2	Total
1	29 23.062 1.5286 25.89 70.73 46.03	12 17.937 1.9654 10.71 29.27 24.49	41 36.61
2	30 35.438 0.8343 26.79 47.62 47.62	33 27.563 1.0727 29.46 52.38 67.35	63 56.25
3	4 4.5 0.0556 3.57 50.00 6.35	4 3.5 0.0714 3.57 50.00 8.16	8 7.14
Total	63 56.25	49 43.75	112 100.00

Frequency Missing = 10

Statistics for Table of VV18 by VV19

Statistic	DF	Value	Prob
Chi-Square	2	5.5280	0.0630
Likelihood Ratio Chi-Square	2	5.6544	0.0592
Mantel-Haenszel Chi-Square	1	4.2492	0.0393
Phi Coefficient		0.2222	
Contingency Coefficient		0.2169	
Cramer's V		0.2222	

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Effective Sample Size = 112
Frequency Missing = 10