

**INFORMATION RETRIEVAL INTERACTION AND THE
UNDERGRADUATE STUDENT AT HISTORICALLY
DISADVANTAGED HIGHER EDUCATION INSTITUTIONS IN THE
WESTERN CAPE, SOUTH AFRICA: A COGNITIVE APPROACH**



By

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GAVIN R DAVIS



**Submitted in partial fulfillment of the requirements for the degree of PHILOSOPHIAE
DOCTOR in the Department of Library and Information Science, University of the
Western Cape**

SUPERVISOR : Professor G H Fredericks (UWC)

CO – SUPERVISOR : Professor P G Underwood (UCT)

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**BELLVILLE : University of the Western Cape,
South Africa**

DECLARATION

“I declare that *INFORMATION RETRIEVAL INTERACTION AND THE UNDERGRADUATE STUDENT AT HISTORICALLY DISADVANTAGED HIGHER EDUCATION INSTITUTIONS IN THE WESTERN CAPE, SOUTH AFRICA: A COGNITIVE APPROACH* is my own work, that it has not been submitted before for any degree or assessment in any other university, and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references”.

Signature.....

Date.....



DEDICATION

This work is dedicated to my parents: The late Alfred Davis and Katie Pretorius Davis



KEYWORDS

Databases	Retrieval
Information	Searches
Precision	Strategies
Recall	Systems
Relevance	Students

LIST OF ACRONYMS

ALEPH	Automated Library Expansive Programme
ANC	African National Congress
ASK	Anomalous State of Knowledge
ASLIB	Association of Special Libraries and Information Bureaux
ATM	Automatic Teller Machine
CALICO	Cape Library Co-operative
CAPETECH	Cape Technikon
CHE	Council on Higher Education
CPUT	Cape Peninsula University of Technology
DBMS	Database Management Systems
DET	Department Of Education and Training
EED	English for Educational Development
ERIC	Educational Resources Information Centre
FOIOTI	Finder of Information on the Internet
GUI	Graphical User Interface
HD	Historically Disadvantaged
HDI's	Historically Disadvantaged Institutions
HDS	Historically Disadvantaged Student(s)

HE	Higher Education
ICT	Information Communication Technology
ICTs	Information Communication Technologies
IMF	International Monetary Fund
IPM	Information Provision Mechanism
IR	Information Retrieval
IRS	Information Retrieval Systems
IS	Information Systems
IT	Information Technology
KWIC	Keyword In Context
KWOC	Keyword Out of Context
LIS	Library and Information Science
LISA	Library and Information Science Abstracts
NLP	Natural Language Processing
OPAC	On-line Public Access Catalogue
OPACs	On-line Public Access Catalogues
PENTECH	Peninsula Technikon
PRECIS	Preserved Context Indexing System
SADC	Southern African Developing Community
SAP	Structural Adjustment Programmes
SCECSAL	Standing Conference for Eastern, Central and Southern African Library Associations
SPSS	Statistical Package for the Social Sciences
UWC	University of the Western Cape
WB	World Bank

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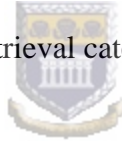
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SUMMARY

Although South Africa has been a democracy since 1994, one of the key issues still facing the country is the development of skills in its people. There are still underlying problems that are quite prevalent in terms of the development of important skills, particularly information literacy skills of especially black South African students at tertiary institutions. It is not easy to understand the significance of information literacy if one does not take into account the student's awareness level and his/her understanding of the concept of information. Unfortunately academics and librarians alike at times base many of their judgements on assumptions that need to be addressed. One of these assumptions is the computer literacy level of students, often viewed synonymously with information literacy.



Although computer literacy is an important skill for searching electronic information sources, including online databases and the Internet, the researcher's argument is that this is not enough to overcome conceptual and cognitive problems relating to information – seeking. Computer literacy is a component of information literacy. Students need to know when information is needed; identify the information needed to address a problem; evaluate the needed information; organize the information meaningfully and use the information to address the problem identified. Almost all of the students in this study encountered the library and computers for the first time when they came to the University of the Western Cape and the former Peninsula Technikon. Their search behaviour bears testimony to their lack of information searching skills.

The study was conducted within the framework of Belkin's anomalous state of knowledge (ASK) theory. Belkin's premise is that searchers for information approach Information retrieval systems with some anomaly. According to Belkin this anomaly and user's perception of the problem changes with each interaction between user and information retrieval mechanism. For this reason, he argues, information retrieval (IR) systems need to be designed to be iterative and interactive. The significance of this interaction is later identified as an integrated, dynamic whole aimed at retrieving information for helping the user manage a problem. It was found in this study that students experienced various states or manifested certain behavioural patterns. Searches were also found to be more cyclical than linear. So, although Belkin's theory had some significance in this study, student search patterns were more complex.



The researcher puts forward certain recommendations to address the problem. The end of apartheid brought about new challenges especially for institutions of higher learning. Both the University of the Western Cape (UWC) and former Peninsula Technikon (PENTECH) as institutions catering for especially the historically disadvantaged student need to adapt but at the same time maintain high standards in terms of student development. The merger between the former PENTECH and the Cape Technikon (CAPETECH) to form the Cape Peninsula University of Technology (CPUT) puts further challenges on the academics and librarians at CPUT. This also calls for a stronger sense of commitment from librarians, academics and information communication technology (ICT) specialists before appropriate information technology systems can be designed or subscribed to.

CHAPTER ONE

PROBLEM STATEMENT

1.1 Introduction

The demise of apartheid¹, the ideology espoused by the South African National Party from 1948 to 1994, necessitated transformation in a number of sectors. Higher education institutions became one of these sectors. The discrepancies and inequalities of the past had to be replaced by a more equitable distribution of resources (African National Congress, 1994: 3). This equity invariably had to be accompanied by human resource development.



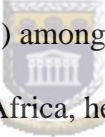
However, the diversity of the student population in South Africa, from especially historically disadvantaged institutions of higher learning, called for inter - cultural communication. These in turn implied additional challenges placed on all role players at these institutions, amongst others academics, library workers and students.

As a further drawback to the historically disadvantaged student (HDS), “...the physical presentation of information is bound to the limited number of communication media which are available in a given culture” (Menou, 1983: 121). In South Africa, this is

¹ Apartheid involved a number of issues, which left a marked effect on the lives of the people of South Africa, especially on those of blacks. Among these issues were labour regulations, race classification, group areas, separate amenities, separate education and job reservations. In terms of governance, Afrikaners held political control and privileges. The irony of it all is that South African born blacks were regarded as being inferior to white immigrants.

particularly true for students who come from rural areas. Not only are very few students exposed to school and/or public libraries, many come from rural areas where these facilities are almost non-existent. These students often encounter libraries and computers for the first time when they enter tertiary education. It is no surprise therefore when they are given assignments that they struggle to find information relevant to their academic needs. Besides having to cope with information retrieval systems constructed in the English language, which in many instances is their third language, they cannot conceptualise what information is.

1.2 Background to the problem

In a study conducted by Ruth (1997: 170)  among students at the University of the Western Cape (UWC), Bellville, South Africa, he argued that although the UWC started “...conceptualizing a programme that centred on curriculum development, student learning, staff development and organizational development” by 1991, there appeared to be problem areas in its library. Some of these problems included the poor provision of services and a lack of efficiency by library personnel. He furthermore concluded that academics often assumed that the problem with learning lies with the student and that if a student has been introduced to the library he/she knows how to search for information.

Ruth (1997: 171) claimed that a basic assumption made by academics (lecturers) is that a student knows the difference between a journal article and the text of a book. Not mentioning concepts like periodicals, magazines, serials and journals, abstracts and

indexes to journal articles. Students are often told to “...go to the library and do research” (Ruth, 1997: 171). Academics also often referred students to photocopies and recommended sources thereby “perpetuating ...through reserved and / or prescribed texts and articles, the belief that only those sources contain the required set of facts needed to pass the course” (Ruth, 1997: 171). He concluded that some of the problems, which warranted further investigation at the UWC, for instance, included:

- basic education of students about information, libraries and electronic media
- a user - friendly computer system (information retrieval system)

Sayed (1998: 50 – 52; 56 – 59) came to the conclusion that black students at both the UWC and former Peninsula Technikon (PENTECH) had difficulties in a number of areas. Foremost amongst these were lack of confidence and poor computer competencies (apart from not having access to computers). However, Sayed (1998: 169) seems to regard information literacy as synonymous to computer literacy in his recommendation that “...acquisition of information literacy skills critically hinges upon basic infrastructure, such as computers being in place at the institutional level.”

It is this researcher’s contention that computer literacy is a component of information literacy. This implies that information literacy is not dependent on computer literacy, although the latter is an important skill in today’s competitive world.

Students in higher learning need to be goal-centred, which calls for a conceptualization of information and information retrieval systems. Students therefore need to know how to formulate search strategies when searching for information to meet their academic needs.

1.3 Significance of the study

In his keynote address at the official opening session of the forum on Science, Technology and Innovation for Sustainable Development, in Johannesburg, South Africa on the 27 August 2002, the former South African minister of Arts, Culture, Science and Technology made the following statement: "...[I]t is often recognised today that new technologies often provide unique and invaluable tools to address the concerns of sustainable development..." (Ngubane, 2002).



Ex-Minister Ngubane goes on to point out the weaknesses of the scientific and technological skills to exploit these technologies that currently exist in developing countries. However, he makes it clear that "...the knowledge base in developing countries should be strengthened [so] that the qualified human resources that are needed to develop and implement technologies [should] be increased" (Ngubane, 2002).

Developing countries furthermore have the responsibility to improve their education systems and technological policies in order to "...reap the benefits of international science and technology co-operation" (Ngubane, 2002). Indeed the concept of development in this context needs to be deconstructed. However, a detailed theoretical

discourse on the concept of development is beyond the scope of this study. It is the allusion to the improvement of education systems that is significant in this regard.

These sentiments were clearly signals from the South African government that for sustainable development and indeed competitiveness on a global level, the citizens of South Africa needed to develop technological skills. One can only assume that these technological skills include information technology skills as well as information literacy skills. While one observer noted that “[i]nformation technology in education, while being regarded by many as a luxury that a democratic South Africa cannot afford, is too powerful and pervasive a phenomenon to be ignored in a modern information society such as ours...” (Manie, 1994:2), another warned that “[a]n educational disconnect [exists] between the rapidly developing communications technologies and the information resources available to the public and the public’s ability to use these resources” (McClure, 1994: 115).



Against this background, the study is significant for more than just a computer literate student populace, but also for a need for students to know how to search for information using an on-line information retrieval system. The student as information seeker’s expectations of the information retrieval system therefore needed investigation.

1.4 Purpose of the study

At the time of this research the Cape Peninsula University of Technology (CPUT), Bellville campus, South Africa, was known as the Peninsula Technikon (PENTECH),

before it merged with the Cape Technikon (CAPETECH) in 2004 to become the CPUT.

For the purpose of this study the acronym PENTECH will be used most of the time especially with the presentation and analysis of the findings.

The overall purpose of this study was to observe the interaction between historically disadvantaged (HD) undergraduate students and on-line information retrieval systems. However, this interaction could only prove meaningful by an investigation of students' understanding of the assignment topic, the identification of keywords pertaining to the topic, the formulation of search strategies and the assessment of retrieved records for relevance. The analysis of such interaction would then ascertain whether information retrieval systems at the UWC and the former PENTECH were conducive to the academic literacy of HD undergraduate students at these two institutions. The objectives underlying this aim were therefore:



- to ascertain what the views of faculty librarians at the UWC and subject librarians at the former PENTECH were regarding their information skills instructions to undergraduate students
- to investigate students' understanding of an assignment topic
- to gain an understanding of how students identified keywords pertaining to the topic
- to gain insight into how students formulated search strategies when searching online databases and assessed retrieved records for relevance
- to explore existing on-line information retrieval systems used by undergraduate students and their effectiveness at these institutions

A basic assumption underlying these objectives was that all students were computer literate. The focus of this study was therefore on cognitive issues relating to the students in this study particularly pertaining to seeking for information in on-line databases. Internet searching using search engines was therefore beyond the scope of this study. It should furthermore be noted that it is not assumed that because students in this study came from historically disadvantaged backgrounds that they had cognitive difficulties. It is also not assumed that students from historically advantaged backgrounds do not have cognitive difficulties. The study is an extension of the findings of both Ruth (1997) and Sayed (1998).

1.5 Research questions



The main research questions that needed to be addressed were:

- Do the UWC and the former PENTECH information retrieval systems meet the academic information needs of its undergraduate students?
- How do historically disadvantaged undergraduate students interact with the information retrieval systems in place at the UWC and the former PENTECH?

To answer these questions the following stages had to be identified:

- assignment
- students' mediation of the meaning of the assignment topic
- formulating which search strategies were appropriate
- interaction with the information retrieval systems

- retrieval of information
- assessment of the information by the student in terms of relevance

There were also other subsidiary questions that needed answers. These were:

- Which are the available online information retrieval systems used by students at the UWC and the former PENTECH?
- What is the contextualisation of student access globally and locally with regards to historically disadvantaged students?
- What does the literature say about the information retrieval skills of students in general and historically disadvantaged students in particular?
- What does the literature say about information retrieval processes?
- What does the literature say about stages of information retrieval behaviour and processing?
- What are the theoretical underpinnings?
- What does the literature say about problems, gaps, and knowledge / power relations with regards to information retrieval and assessment?
- What is the historical development and contextualisation of on – line information retrieval systems?
- What are the various models of information retrieval?

These questions provide the basis of this study.

1.6 Clarification of concepts

With many concepts used in different contexts, problems tend to arise. In the discipline of information science and specifically, information retrieval, this is no exception. For this reason the following concepts warranted clarification:

1.6.1 Information

Definitions of information are quite diverse (Dick, 1991; Allen, 1996; Losee, 1997). Dick (1991: 114) for instance states that “...information is some active principle governing the human capacity to process fragments which are meaningless in isolation into a coherent and meaningful whole for the receiver.” Losee (1997: 254) on the other hand is of the opinion that information may be defined as “the characteristics of the output of a process, these being informative about the process and the input.” Information is furthermore defined as “ the process in which an informant’s cognitive structures are encoded and transmitted to an information seeker, who perceives the coded messages, interprets them, and learns from them” (Allen, 1996: 3). All these views have the common variable **process**. It is particularly this process in which the transfer of information takes place that needs further investigation. As Dick (1991: 112) furthermore states “...information is extended to include all possible sources...” and “...the content of one’s mind, cultural symbols and physical artefacts, etc, are all included in the meaning of information” (Dick, 1991: 112).

1.6.2 Literacy

Contrary to common belief in the past that literacy is the ability to read and write, the concept has become “...the ability to think, access information and use language in a variety of contexts” (Lemmer & Badenhorst, 1997: 445). Indeed having access to information would involve the ability to use some intermediary device like either a person or technology.

Aitchison (2001: 134) offers another definition when he states that literacy is a rather elusive concept. His view is that literacy covers “...a wide continuum ranging from basic alphabetisation through alphabetisation plus varying degrees of proficiency in workplace languages and basic life skills needed for effective functioning in society (so – called functional literacy...” Accordingly, the other side of the continuum deals with literacy “...as a complex set of skills and behaviours embedded within the political, economic and social relations of a particular society” (Aitchison, 2001: 134). Literacy is again regarded as more than just the ability to read and write.

1.6.3 Information literacy

According to Behrens, Olën and Machet (1999: 21), information literacy is the ability to access, evaluate and use information effectively from a variety of sources. Chowdhury and Chowdhury (2001: 3) suggest that information literacy is “...the ability to recognize when information is needed, the ability to locate, evaluate and use effectively the needed information.” A third definition posits that information literacy is “[k]nowing how to describe what you are looking for, deciding where the best places to start looking are, and

being able to evaluate a source's authority..." (Fialkoff, 2001: 2). All these definitions therefore point to the fact that the concept has a lot to do with a search process, but significantly the searcher should have the ability to evaluate the obtained information.

1.6.4 Information - seeking behaviour

According to Krikelas (1983: 5), information - seeking behaviour is "...any activity of an individual that is undertaken to identify a message that satisfies a perceived need. In this context, information is viewed as any stimulus that reduces uncertainty..." This message is conveyed by a generator of information and received by the searcher. It is Hjørland's (1997:139) contention that information – seeking behaviour takes place within a social framework. If there is consensus within a particular discipline, the individual seeker's behaviour tends to be restricted (Hjørland, 1997: 139). It is also argued that information – seeking behaviour has a lot to do with cognitive processes of an individual (Allen, 1996: 26). Tom Wilson (2000) perceives information – seeking behaviour as being purposive to satisfy some goal based on a need. The individual who is seeking for information will then interact with a manual or computerized system (Wilson, 2000). It seems therefore that information – seeking behaviour involves some internal aspect of an individual and culminates with an interaction with some device. These definitions are within the context of information retrieval and certainly cannot be generalized.

1.6.5 Computer literacy

Mueller (1997: 33) concludes that computer literacy refers to an individual's necessary keyboard skills and hardware and software knowledge to use applications correctly.

Keenan and Johnston (2000: 56) regard computer literacy as the “awareness of computing capabilities and an ability to recognize and articulate problems that can be solved with the aid of computing technology.” The authors make it clear that a person who is computer literate would not necessarily know how to do computer programming. From these definitions one can therefore conclude that computer literacy refers to the use as well as knowledge of hardware and software of computers.

1.6.6 Information technology literacy

This concept is regarded as “...when an individual is knowledgeable with current information technologies, [such as] artificial intelligence, digital electronics, optical data storage, advanced computers” (Mueller, 1997: 34). It seems that information technology literacy is the ability of an individual to know about existing information technologies and knowing how to utilise such technologies. In addition to this, Doyle (1995: 30) mentions the concept of information literacy in telecommunications, thereby indicating the ability of students to evaluate information obtained by the use of online resources.

1.6.7 Information system

An information system is “a linked and related system of entities (including one or more information devices) that provides access to one or more bodies of knowledge and acts as a mechanism through which individuals can inform other people or become informed” (Allen, 1996: 5). These information devices can include journal articles, books and electronic databases. In the context of this study information system is used synonymously with information retrieval system. Keenan and Johnston (2000: 137)

define an information system as “...a system, which allows the collecting, processing, storing and retrieving of information to meet users’ needs.” An information system therefore deals with information in various capacities.

1.6.8 Information retrieval

Ingwersen (1992: 228) defines information retrieval as “...processes involved in representation, storage, searching, finding, and presentation of *potential information* **Italics in the original**] desired by a human user.” Already in 1979 Van Rijsbergen (1979:4) argued that information retrieval has to do with the retrieval of documents likely to be relevant to a particular request from a searcher with an information need. More than two decades later Keenan and Johnston (2000: 136) stated that information retrieval is the “process of **searching** (emphasis in the original) a collection of items in order to identify those **documents** (emphasis in the original) that deal with a particular subject.” From these definitions it seems that information retrieval excludes non – relevant documents. However, information retrieval encompasses finding relevant as well as non – relevant records of documents or actual documents.

1.6.9 Information retrieval (IR) system

Ingwersen (1992: 228) defines an IR system as “[a]n information system which is constituted by interactive processes between its *system objects*, *system setting*, and the environment, capable of searching and finding *information* of potential value to an actual searcher of information.” This capability of the IR system is endorsed by the searcher’s ability to formulate search strategies to retrieve relevant information. To Keenan and

Johnston (2000: 136) an IR system “...allows for the collection, processing, storing and retrieving of information.” An IR system is therefore also a search tool and repository for storing information.

1.6.10 Information retrieval interaction

This concept refers to “...interactive communication processes that occur during retrieval of *information* by involving all major participants in IR, i.e. the user, the *intermediary*, and the *IR system* - the latter consisting of *potential information*, mainly in the form of text and text representations as well as *IR system setting* (Ingwersen, 1992: 228). Contextually, the user would refer to the student, while the intermediary would refer to any other human being searching on behalf of the user. To Keenan and Johnston (2000: 140), this interaction takes place in real time with the user directing the flow of work.



1.6.11 Database

Convey (1989: 8) defines a database as “...a collection of related items of information held in a form intelligible to the computer, it may be references to journal papers...full text of journal papers.” Arlene Taylor (1999: 31) regards a database as “...a set of records that are all constructed in the same way and are connected by relationship links.” Databases are not necessarily computer based, but in this context they are.

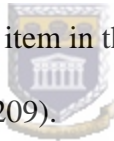
1.6.12 Indexing

The New Encyclopaedia Britannica (1990: 558) defines indexing as “...extracting from [a document] or assigning to it subject and other ‘descriptors’ - words or phrases denoting

significant concepts (topics, names) that occur in or characterize the content of the record.” Keenan and Johnston (2000: 132) offer a similar definition when they see indexing as the “process of analysing the information content of an item and expressing this in the language of a particular indexing system.”

1.6.13 Record

According to Rowley (1996: 158), a record “...is the information contained in a database relating to one document or item.” An entry in a manual or on-line catalogue, which relates to a book or journal article, can therefore be regarded as a record of the book or journal article. To Keenan and Johnston (2000: 209) a record is a “computing – unit in a computer file usually made up of fields.” In terms of information retrieval, a record is also the “bibliographic description of an item in the published literature or other recorded material” (Keenan and Johnston, 2000: 209).



1.6.14 Abstracting

This concept refers to “...a technique for condensing the full text of a document into a short summary that contains its main ideas (but invariably incurs an information loss and often introduces a bias” (New Encyclopaedia Britannica, 1990: 558). It is clear therefore that relying solely on an abstract of a document’s contents may result in essential and relevant information not being found. Abstracting also refers to “preparing a concise and accurate representation of document’s (*sic*) contents” (Keenan and Johnston, 2000: 1). Abstracting is therefore an activity whereby the contents of a document or entity is summarised.

1.6.15 Precision

This concept is defined as “...the proportion of retrieved material relevant to the enquiry. It is a measure of the degree of accuracy of a retrieval process...precision and ...recall are dependent on the efficiency not of the retrieval program, but of the indexing language used by the system” (Townley, 1978: 106). A detailed discussion of indexing languages falls outside the scope of this study. Another definition states that precision relates to a system’s ability “...not to retrieve records that are irrelevant” (Keenan and Johnston, 2000: 197).

1.6.16 Recall

Recall may be defined as “...the proportion of relevant matter retrieved from the total relevant matter in the database. It is a measure of the degree of efficiency of a retrieval process” (Townley, 1978: 107). Recall also relates to the ability of a system “...to retrieve relevant information” (Keenan and Johnston, 2000: 208).

1.6.17 Search strategies

According to Sparck Jones and Kay (1973: 170), search strategies may be divided into two, firstly “those which reduce a request specification so that, say, matches on only two terms out of three are required” and secondly, “...those which generalize by replacing one term by a less restricted one.” Searchers for information should know how to search for information via the information system by adopting either one or both of the above.

Keenan and Johnston (2000: 218) argue that a search strategy is a “plan of a search for information involving specification of needs, choice of search terms, degree of specificity

in searching and how to extend the search to broader, narrower and related terms.” A search strategy therefore has to do with the choice of search terms before and or during a search.

1.6.18 Users

In this study, searchers will be the preferred term, as users may refer to anyone making use of the library. The users or searchers in this context will refer to undergraduate students. Ingwersen (1992: 142), distinguishes among four types of searchers, namely a **non-specialist** who “... in his *actual* state of knowledge and problem space at event of IR, possesses insufficient knowledge of both types to perform retrieval effectively in a given ‘information space.’ ”



A **subject specialist** is a second type of user “...who possesses conceptual knowledge within that domain in which he is performing retrieval at a given moment.” A third type of searcher is the **IR specialist**, “...who may be regarded as a subject generalist, except within the domain of IR in which he supposedly is an ‘expert.’” Finally, an **expert** “...is a person who possesses both types of knowledge at the event of retrieval.” According to Ingwersen, the last two types traditionally serve as human intermediaries in IR. However, he argues that with the introduction of mechanistic intermediaries, subject specialists can become experts in IR. The assumption in this study is that the historically disadvantaged student is still at the non-specialist level.

Armstrong and Large in **Manual of Online Search Strategies** (2001: 2) argue that the experienced searcher who will fall into the last two categories would possess conceptual, semantic and technical knowledge. These translate into the conversion of an information need to a searchable query, to construct a query for a given system and to enter queries as specific search statements (**Manual of Online...**, 2001: 2).

1.6.19 Historically disadvantaged students (HDS)

HDS in a South African context would refer to black students who because of apartheid were denied access to resources such as proper schooling, which in turn would include access to computers, for example. Examples of deliberate denial of access are with the Dental and Pharmaceutical professions. Although a few black students prior to 1994 qualified as dentists and pharmacists, dental practices and pharmaceutical companies refused to accept them. In fact many black students were forced to pursue courses that would qualify them as teachers, as they were deliberately barred from courses which would lead to professions like medicine, dentistry, engineering and law. Many of the universities and colleges were then controlled by whites (Du Pre, 1994:113). There was virtually no upward mobility and advancement for blacks. Despite South Africa having become a democracy since 1994, some black students are still disadvantaged. The concept of black is explained in more detail in Chapter 4.

1.7 Theoretical framework

Information retrieval (IR) problems, both with search questions and retrieval systems, are far from resolved (Vickery, 1970; Van Rijsbergen, 1979; Park, 1993; Megill, 1997).

Judgements or assessments to ascertain whether information provided to users of libraries were relevant to their needs, also proved problematic (Ellis, 1996: 12). These relevance judgements were *stated relevance* and *user relevance*. According to Ellis (1996: 13), Cleverdon, Mills and Keen, as early as 1966, regarded the *stated relevance*, on the one hand, as being the decision of what constitutes relevance by anybody with reasonable knowledge of the subject field. *User relevance*, on the other hand, was the searcher's decision on what was relevant.

1.7.1 User-system interaction: a cognitive view

According to Hert (1997), the traditional match paradigm concentrated more on the improvement of a match between queries and documents. She mentions that performance was often measured in terms of the system's ability to find relevant information based on the query (Hert, 1997: 6). User interpretation and analysis of the retrieved information was therefore not the most significant factor. This called for a broader approach, including the user's perspective. This can be regarded as the cognitive approach, which seeks first to focus on the user (Rowley & Slack, 1998: 5). Since information - seeking behavioural skills of students are discussed here the cognitive paradigm in this particular context is embraced. Figure 1 depicts the match and cognitive paradigms. The cognitive view sees a much broader approach to user – system interaction, taking into account the user's information need.

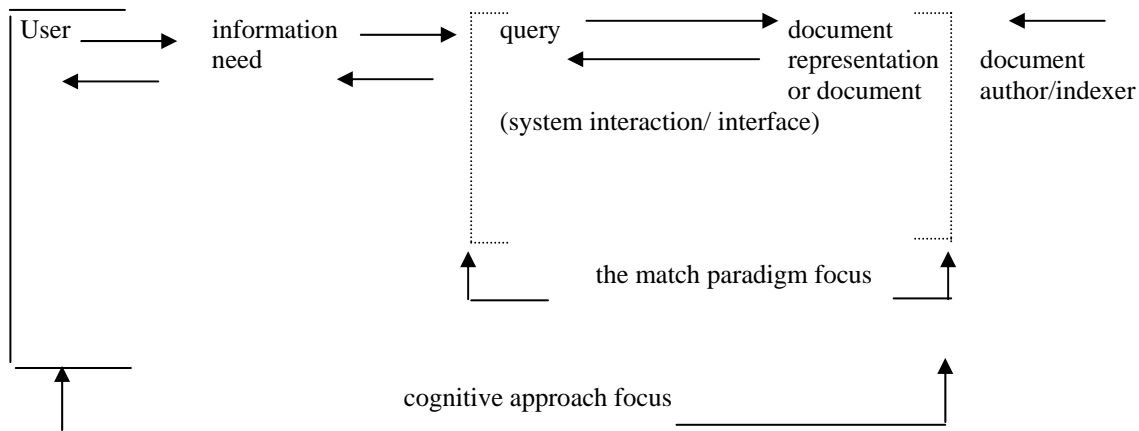


Figure 1. A general approach to the IR phenomenon

Source: Hert (1997: 7)

In terms of the cognitive viewpoint, Belkin’s Anomalous State of Knowledge (ASK) hypothesis, for instance, posits that “...an information need arises from a recognized anomaly in the user’s state of knowledge concerning some topic or situation, and that in general, the user is unable to specify precisely what is needed to resolve that anomaly” (Belkin, Brooks and Oddy, 1982: 61). One can assume that this is particularly true in terms of the information needs of university students. For information technology to be an aid to information literacy, students need to understand why they have a need for information and what this need entails.

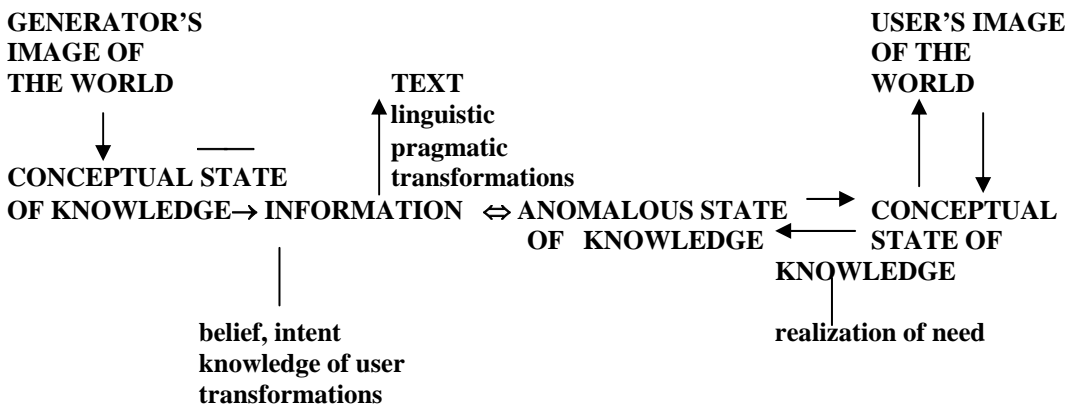


Figure 2. A cognitive communication system for information retrieval

Source: Belkin, Brooks and Oddy (1982: 61)

According to Belkin, Brooks and Oddy (1982: 61), as depicted by Figure 2 however, this anomaly and user's perception of the problem changes with each interaction between user and information retrieval mechanism. For this reason, they argue, information retrieval (IR) systems need to be designed to be iterative and interactive (Belkin, Brooks and Oddy, 1982: 61). Belkin and Vickery (1985) later emphasise the significance of this interaction as being an integrated, dynamic whole aimed at retrieving information for helping the user manage a problem.

The cognitive paradigm has received some criticism. Frohmann (1992: 371) for example states rather mockingly:

The cognitive viewpoint presents itself neither as one theory among many, nor as a local theory of specific problems, but as a *total* theory for LIS, and as its *only* theory. It occupies not only the LIS homelands but also colonises its hinterlands, silencing theoretical guerrilla movements by the imposition of a universal discourse.



Frohmann is particularly critical of Belkin's model. He claims that this model depends too much on the user's image which depicts an individual's mental representation of knowledge in relation to a so – called "knowledge store" that represents a depository of knowledge representations (Frohmann, 1992: 373). The cognitive view "excludes discourses in which the conflicting and contradictory aspects of the production, transmission, transformation, manipulation, reception, distribution, exchange, and maintenance of all that is collected under the rubric 'information' can be articulated" (Frohmann, 1992: 373). It is important that user mental models are changed by the generators of knowledge. It is because of this that Frohmann argues that the problem with the cognitive viewpoint assumes that generators' knowledge or image of the world need not be correct for the transfer of information (Frohmann, 1992: 379).

Hjørland (1997: 65) refers to Belkin's approach as a kind of paternalism where "...someone assumes the responsibility for the direction of others' information searches".

Despite these criticisms the cognitive view comes closer to understanding the subjective experiences of users searching for information. Although Belkin's emphasis was on the user in general terms, the idea with this study was to use this framework to get to an understanding of students' search behaviour when searching for information in online databases (Belkin, 1984:112). Although there are other models in the cognitive paradigm, it is particularly the ASK phenomenon that needed closer attention. Belkin's framework would then also have to be seen within the context of the university setting. This context would particularly be the university library. As Suttie (1990:103) reiterates "...the university library has to cater for the needs of its student body...not in a narrow sense of providing an ethnocentric service within broadly Western European parameters, but rather by means of a dramatic rethink of its total functioning in the South African context". This would certainly hold for a North American context as well.

1.8 Research methodology

As stated earlier, the emphasis of this particular study was to focus on the information - searching behaviour of undergraduate students at the University of the Western Cape and the former Peninsula Technikon in the Western Cape province of South Africa and their interaction with on-line information retrieval systems.

Relevance judgements regarding online information retrieval systems effectiveness as perceived by the student (participant) were based on the experimental mode of data gathering. Data collection methods included think-aloud protocols, videotaped interaction and online transaction logs. The approach in this study was therefore more qualitative than quantitative, although quantitative methods were used to analyse data. A more detailed discussion of data collection methods is given in chapter 6.

1.9 Sampling frame

Undergraduate students were selected from various language and cultural groups. The method of selection was purposive sampling. In this regard Park (1993: 326), quotes Sharan B. Meriam who in 1988 referred to purposive sampling as “...based on the assumption that one wants to discover, understand, gain insight; therefore one needs to select a sample from which one can learn the most.”

A sample of approximately 20 students from each institution was selected, namely those students who received on-line training in information retrieval by librarians at both the UWC and the former PENTECH. Data about these students were obtained from the two respective libraries and / or faculties and academic departments. In other words students were really selected with the assistance of faculty and subject librarians from the two respective institutions. Caution was exercised to ascertain whether these students were really from disadvantaged backgrounds. High school records were checked to see from which schooling backgrounds students came.

The total number of librarians who directly worked with students was four from the former PENTECH and eight from the UWC. The data facilitated thinking-aloud training. There was no attempt to generalize the findings of the sample to the population. As Silverman (2001: 248) states "...[g]eneralizability is a standard aim in quantitative research and is normally achieved by statistical sampling procedures." The researcher was therefore not interested in a large sample giving quantitative data only. The idea was to study a process in the selected cases. This process related to the interaction between the student participant and the online retrieval systems at the two institutions. These variables were analysed using secondary analysis, although as mentioned earlier, the study is basically qualitative by nature. In addition to student interviews, human intermediaries, namely librarians, were interviewed regarding instruction methods to students searching on-line information retrieval systems. A more detailed analysis of these interviews is given in later chapters. Results from interviews with students are given in Chapter 7, while those relating to librarians are given in Chapter 6.

1.10 Pilot study

A pilot study was conducted with four undergraduate students across Faculties at the University of the Western Cape to test the reliability of the research instruments as well as the validity of the research method. These undergraduates were not part of the main group of participants. Since the study was conducted under controlled conditions at both institutions it was rather difficult to do the pilot study at the Peninsula Technikon.

The researcher had the advantage of being an employee at the University of the Western Cape. It was also much easier to find volunteers to participate in the pilot study. It was therefore less of a problem to obtain the necessary permission for a suitable venue, a desktop computer and a software package (WINCAM 2000) as well as audiovisual equipment which were provided by the UWC's audiovisual department. Audiovisual equipment included a video camera and microphone. Careful consideration was given to students' positioning in front of the computer with regards to audio quality and lighting. Initial problems regarding these were identified and subsequently rectified. Some of the problems with thinking – aloud were also eliminated. These pertained to long pauses between and during searches. The pilot study also gave the researcher the opportunity to amend the assignments given to student participants in the actual study.

1.11 Limitations and delimitations



A major limitation of the study was the inability to obtain a sample of students from the Dentistry faculty at the University of the Western Cape. It was rather difficult to contact these students, as they were off-campus most of the time. This could also be ascribed to the fact that the nature of this discipline warranted a practical fieldwork approach, especially in the townships. Communication problems with some of the authorities at one of the institutions were also worrisome. Some problems were encountered with thinking aloud. Some students spoke softer than others. However these problems were minimal.

The study is limited to historically disadvantaged students on the undergraduate level. These students would exclude students who come from previously advantaged backgrounds. For the purpose of the study therefore, historically disadvantaged students included all non-white students. In terms of geographical delimitation, only students from the UWC and the former PENTECH were included in the study. Students were selected from all the faculties at both institutions, except Dentistry at the UWC.

It was also necessary to obtain data from librarians who directly worked with students. For this reason, only subject librarians and faculty librarians at the former PENTECH and the UWC were selected. These were not two librarian types but rather a way of identifying librarians who dealt with information retrieval at the two institutions. These designations or job titles were assigned by the two respective institutions.



Another limitation of the study is that owing to logistical problems actual training sessions of librarians with students could not be observed. Librarians were therefore interviewed to find out whether and how they conducted information skills training with undergraduates.

1.12 Ethical considerations

The researcher understood that there are ethical implications with any research conducted with human participants, but has taken all the steps necessary to ensure that no person's rights were violated in any manner whatsoever. All tapes were transcribed and no

personal details other than important variables for the research like gender, course registered for, year level, language orientation and place of residence during high school, are given.

Data collecting was based on the principle of informed consent. As Rosnow and Rosenthal (1997:115) state, “The principle of informed consent was predicated on the assumption that participants [in research] are entitled to know what they were getting into; informed consent guidelines tell us to acquaint potential participants with the essential facts of a study (such as its purpose and the nature of the instruments used).” It was therefore my ethical responsibility as researcher “...of making sure that [my research assistant] conducted the research as [I] would” (American Psychological Association, 1982: 21). In this regard my research assistant was instructed to be sensitive to ethical issues.



Given that this is a case study, “...individuals and institutions stand to gain or lose by the transmission and utilization of knowledge acquired in an evaluation” (Simons, 1989:117). However, it is my contention that both the participants as well as the institutions may benefit from the results of this study. Despite these sentiments, I commit myself to fully respect the dignity of the research participants and acknowledge that none of the participants had an obligation to participate.

The aim was to argue that the participation of students and library personnel in the study might help solve a problem without necessarily implying disapproval or punishment upon

refusal to participate (Reece and Siegal, 1986; Marshall and Rossman, 1989; Stanley, Sieber and Melton, 1996; Locke, Silverman and Spirduso, 1998; Davis, 1999).

1.13 Structure of chapters

Chapters are structured as follows:

Chapter 1 deals with the problem statement and the theoretical framework upon which this study is based. In chapter 2 a discussion of the origins of information retrieval research and the emergence of information science and its place within Library and information science (LIS) is explored. Chapter 3 focuses on information processes and skills. In chapter 4 global trends in higher education with specific reference to student access are discussed. Chapter 5 deals with the design of this study. In chapter 6 the existing on-line retrieval systems, student access and mechanisms of student support at the UWC and the former PENTECH are discussed from librarians' perceptions. Chapter 7 focuses on the findings of the research. Data relating to video - and audio taped interactions and the software used to capture search interactions are also given. In Chapter 8 a detailed analysis of the findings in Chapter 7 is given within the historical context of the UWC and the former PENTECH, undergraduate students' information - seeking and information – searching behaviour as well as Belkin's ASK theory. Finally, chapter 9 focuses on the conclusion to the study and recommendations inclusive for further research.

CHAPTER TWO

INFORMATION RETRIEVAL RESEARCH: LITERATURE REVIEW

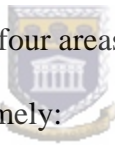
2.1 Introduction

Information retrieval is a phenomenon often ascribed to the discipline of Information Science (The origins of information science, 1987: 4). Librarians would probably argue that they have always performed the task of reference work, which closely resembles information retrieval. This argument holds some water although the traditional library was "...oriented more to the provision of documents than to the supply of information" (Heaps, 1978: 1). Librarians, as intermediaries in the search process for information, however, would attach a different meaning to the concept of relevance in information retrieval than actual users. Indeed, information retrieval (IR) problems, both with search questions and retrieval systems, have become far from resolved (Vickery, 1970; Van Rijsbergen, 1981; Park, 1993; Megill, 1997). Information science itself underwent much scrutiny as a discipline.

Vast bodies of literature have appeared over the decades in an attempt to place information science within the main stream of the sciences. Christopher John Fox (1983: 4) for instance claims, "...information science is in the rather embarrassing position of lacking any clear understanding of [information]..." In fact there is hardly agreement among information scientists in the literature of the concept (Fox, 1983: 42). To have a

closer understanding of the phenomenon of information science, it is important to explore some definitions of the concept.

2.2 Definitions of Information Science

Vickery and Vickery (1987: 1) offer a simple definition of information science as being “...the study of the communication of information in society.” Information science is therefore a “... social activity of facilitating information transfer” (Vickery and Vickery, 1987: 1). It is their contention that the term ‘information science’ appeared with some scientists “...moving from research, development, or production into a new occupational role that of providing an active information service to their colleagues” (Vickery and Vickery, 1987: 9). The authors mention  four areas that characterize the historical development of information science, namely:

- problems relating to the communication of information specifically in science & technology, also known as ‘Science Information’
- information technology, which is the use of computers and telecommunications in information-handling
- scientific method application to practical information problems, so-called information systems study
- scientific study of the communication of information in society, that is information science’ as an academic discipline

Miranda Lee Pao (1989: 3) seems to have a much better explanation in her attempt by stating, "...[t]he processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information." Information science is then "...derived from or related to mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, library science, management, and some other fields" (Pao, 1989: 3). It is significant to note that information science is not only related to library science as a discipline, but to a number of others. Taking this into account, librarians can therefore not lay claim to information science as falling solely within their domain. However, the objective is not to debate whether information science and library science are more closely related than other disciplines, but to gain a meaningful understanding of its place within the sciences.



Poole (1985: 1) suggests that one of the problems with information science is the "absence of basic, supporting theory while simultaneously indicating (by the paucity of literature on the topic) that theoretical research and theory development have not been major field activities." He furthermore strongly suggests that information science is often regarded as an illegitimate science given the lack of a body of published theoretical research (Poole, 1985: 6). This is partly true due to the fact that information scientists and librarians have been viewed as closely related and even synonymous. The latter particularly do not have a strong research culture. It is argued that information science as well as library science draws on other disciplines, to form a meta-discipline (Poole, 1985: 7). This implies that both library science and information science adopt theoretical frameworks from other disciplines.

According to Fox (1983: 95) "... information science is the purpose – oriented discipline which aims to 'facilitate the communication of information between human beings' ". He furthermore argues that information is not meaning, although meaning is closely related to information. However, he fails to elaborate exactly what the difference between the two concepts is.

In Principles and applications for information science for library professionals

(1989: 4), Olsgaard sees information science as "...the study of the formation, organization, storage, retrieval and transmission of information." Olsgaard's view is that information science does not involve these functions but relates to a study of them. The storage and retrieval of information are concerned with "...compiling information in one setting and effectively getting it back again" (Principles and applications for information science for library professionals, 1989: 6). This closely resembles the process of indexing. Olsgaard is furthermore of the opinion that information science "...in its purest form attempts to determine how we think, store, retrieve, and transmit information" (Principles and applications for Information science for library professionals, 1989: 8).

It is Fugmann's (1993:1) contention that the fact that "... a definition for the notion of information has been adopted by some information scientists, which was borrowed from another field ... has markedly impeded progress in information science..." There are clearly different views to a definition of information science. However, the concept of information is common in all the definitions. As stated earlier, information retrieval

research is derived from information science. It is therefore useful to explore the origins of information retrieval.


2.3 Information retrieval models

It is suggested that significant studies in information retrieval can be traced back to the 1950's (Ellis 1990: 1). Some of the early researchers included Mortimer Taube & I. S. Wachtel (1952), Hans Peter Luhn (1959), Tefko Saracevic (1959) and F. W Lancaster (1972).

Indeed much has been written and published on the subject of information retrieval. Models for approaching problems in IR research were put forward since the 1950's. Of these the Cranfield tests as early as 1957 probably played the most important part in the development of information retrieval research (Cleverdon, 1962; Foskett, 1977; Information retrieval experiment, 1981; Ellis, 1996). The purpose of the first Cranfield test under the supervision of C W Cleverdon, librarian of the College of Aeronautics, Cranfield, Bedfordshire in the United Kingdom, was to "...establish a methodology which would make possible the objective comparison of four systems: a faceted classification; UDC; alphabetical subject headings; and Uniterms" (Foskett, 1977: 442). The Association of Special Libraries and Information Bureaux (ASLIB) set up this particular test on a grant from the National Science Foundation in the United States of America. Although a detailed account of the Cranfield tests will not be given in this study, it is important to note that there were certain limitations regarding Cranfield 1. One of the

major limitations was its “...failure to measure precision...” (Information retrieval experiment, 1981: 271).

The second Cranfield tests were more significant than the first as the measure of effectiveness of indexing devices was now more explicitly relevance-based. These tests “...were carried out to investigate the effect of varying the different generic index language features on retrieval performance, and, more specifically, to examine the effects on retrieval performance of devices intended to increase precision and those intended to increase recall” (Ellis, 1996: 7).

A common feature of both Cranfield 1 and 2 is the emphasis placed on retrieval system effectiveness, with the assumption that  searchers could make relevance judgements. Despite the limitations of the Cranfield tradition, researchers in later years adopted this particular model. It was only until the 1970's and 1980's that approaches to information retrieval based on cognitive and behavioural assumptions started to emerge (Ellis, 1996: 20).

There are other models of IR research, namely statistical and probabilistic techniques, expert intermediary systems, artificial intelligence, retrieval by association and hypertext. However, these are beyond the scope of this investigation. For the purpose of this study, the cognitive approach is adopted. The emphasis is on the interaction between the information searcher and the IR system.

Information retrieval is more characterized by the “emphasis of information relevant to a request, rather than direct specification of a document...” (Heaps, 1978: 4). Heaps suggests that spoken communication between humans is by sound waves travelling a distance of approximately 1000 feet in 1 second. Communication between computers, or computers and peripheral devices, is by electrical impulses that travel about 100feet in 1μ second. The concept of information within the context of information therefore needs closer attention.

In this regard Buckland (1991) mentions three principal uses of the word **information**, viz.:

- information – as – process. Here someone’s knowledge is changed when informed. Information is therefore the action of informing
- information – as – knowledge. Information is used to denote that which is imparted in information – as – process. This is basically knowledge communicated concerning some particular fact
- information – as – thing. This is used attributively for objects like data and documents because these are regarded as being informative

Brittain’s (1970: 10) concern more than thirty years ago that “[t]he place of user studies within the body of knowledge that goes, under the heading ‘information science’ is not firmly established ...” has certainly not been resolved. Indeed he argues that the use of information and user behaviour would be the domain of sociology and psychology

respectively (Brittain, 1970: 10). This is probably why information science has adopted many of the research methods of sociology and psychology.

To make matters more complex, very little empirical data on problems of research into information needs and requirements existed. He furthermore argues, “there is a deficiency of good theory in the area of user studies (and in information science)...” (Brittain, 1970:16). A conceptual construct is needed for a meaningful study of information. This construct “embodies only the most fundamental objects and operations encountered in dealings with information” (Cooper, 1978:13). This refers to information stored in some location, which implies “the existence of a system in which the information is stored...” (Cooper, 1978: 13).



2.3.1 Information retrieval research

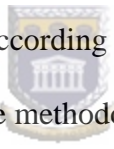
Although information retrieval research focussed mostly on a systems approach, e.g. the systems – centred approach (Choo, 1998) and system oriented approach (Vakkari, 1999), mostly web - based, since the 1980's, the cognitive model of information retrieval has probably become the most widely written about (Belkin, Brooks and Oddy, 1982; Ingwersen, 1982; Belkin, 1984; Brooks, Daniels and Belkin, 1986). In this particular model, the cognitive state of searchers of information is assumed. The user’s conceptualization of how to formulate a search strategy was often investigated. This in itself is useful. However, even if a user knows how to formulate a search strategy, he / she needs to be familiar with information retrieval systems, for a desired effect (Saracevic...et al., 1988; Saracevic and Kantor, 1988a, 1988b; Ingwersen, 1992). In this

regard, this study is undertaken within the framework of Belkin's anomalous state of knowledge (ASK) theory. Before indulging in a discussion of Belkin's ASK theory, the concept of paradigm within the field of information retrieval needs further explanation.

Ellis (1996: 174) cites Kuhn, who in 1962 put forward "...[t]he notion of a paradigm as representing a conceptual framework for scientific research..." According to Ellis (1996: 176), Kuhn drew a sharp distinction between paradigmatic or normal science and the state of pre-paradigmatic field. Kuhn's dichotomy held that "...the natural sciences (physics and chemistry *par excellence*) were mature paradigm - guided sciences while the behavioural and social sciences, as well as information science were in a pre-paradigmatic state (Ellis, 1996: 176). However, the validity of Kuhn's dichotomy was questioned and criticised. In this regard Ellis (1996: 176) cites Masterman, who in 1972 argued that the pre-paradigmatic field as posited by Kuhn, brought together three quite different situations into one, namely non-paradigm science, multiple paradigm science and dual science. This implied that "...the psychological, social and information sciences, far from being characterized by the absence of paradigms, were, on the contrary, characterized by their being too many" (Ellis, 1996: 176). Given this background to the notion of paradigm, the nature of the cognitive approach to information retrieval, particularly Belkin's approach, is further explored under theories of information retrieval.

2.3.2 Theories of information retrieval

As indicated in Chapter 1, Belkin and associates believed that all users of information have an anomalous state of knowledge (ASK). This anomaly and user's perception of the problem change with each interaction between user and information retrieval mechanism. For this reason, they argue, IR systems need to be designed to be iterative and interactive (Belkin, Brooks and Oddy, 1982: 61). Information retrieval systems should therefore "... attempt to use representations of ASKs as the basis for retrieval" (Belkin, 1981: 50). However, it will be useful to explore 'theory' in information retrieval further.

Theory refers to 'looking at' or 'viewing'. Hence to develop a theory is to look at or develop a view (Buckland, 1991: 17).  According to Neill (1992: 147), "...running parallel to [the] search for an appropriate methodology in information science has been a similar battle with logical positivism in the sister discipline of library science".

Accordingly, librarians tended to see librarianship as an art, not as a science.

Kochen (1974: 9) argues "[i]deally, a theory is a set of sentences in a formal language with a few powerful axioms, some special rules of inference, and a rich body of true theorems that capture the essential phenomena and concepts." For this reason the concepts of information and information use in IR systems need to be captured.

Kochen (1974:1) argues for a need for a theory of information retrieval citing examples of different perceptions of the concept. For this reason an information technologist would see an information retrieval system as "...a way of providing people with

documents they need” (Kochen, 1974:1). A problem area according to Kochen (1974: 9) when constructing a theory is “...developing the formal language and its system of interpretation: picking a suitable set of variables, predicates, and functions.” It is rather difficult to specify “... what the theory is to do with sufficient specificity and logical precision” (Kochen, 1974: 9).

On the other hand, a psychologist or biochemist would refer to the concept of information retrieval as “... the process of selecting and extracting from an organised collection of stimuli-responses (sic) associates a more-or-less specified one” (Kochen, 1974: 1-2). A possible reason for these perceptions is the difficulty of defining the concept of information. Kochen (1974: 2) suggests that the notion of the concept of information is not only unclear, but also still pervasive.



An IR systems theory is therefore needed “to clarify the meaning of *information* [**italics in the original**] in information retrieval” (Kochen, 1974: 2). He furthermore argues that the information technologist’s problem is to design systems, which would “... help specified users cope with specific classes of problems, for which documented knowledge is required” (Kochen, 1974: 2). The problem for the theorist would therefore relate to:

- explication of the notion of “representation” as related to data structure
- organization of knowledge made possible by information technologies
- analysis of questions, from the point of view of logic, computer science and behavioural science
- analyses of processes like questions-answering, question-asking, knowledge synthesis, knowledge utilization

According to Newell (1990: 15) a unified cognitive theory of cognition refers to “...problem solving, decision-making, and routine action”. He goes on to say that the term *cognition* evolved to show the central processes ignored by peripheral perceptions. Some theorists had the understanding that the traditional view of information – seeking behaviour has more to do with information need (Belkin and Vickery, 1985: 7). They argue that information is needed in much the same sense that people need food or shelter. However, this is really an underlying assumption that is never explicitly stated.

2.3.3 Information seeking

Hjørland (1997: 3) contends that “information seeking has mainly been studied in two large sub areas of information science: user studies and information retrieval.” These sub areas are both in a crisis, making them isolated from each other. The study of information seeking which “critically analyzes the positivistic and idealistic assumptions about knowledge and science ... [introducing] an alternative view of knowledge can help to overcome the crisis in both user studies and in information retrieval research” (Hjørland, 1997: 3).

Wilson (1994: 250) argues that despite information science’s focus on information seeking, it is but one of the disciplines that deals with this phenomenon. He cites consumer behaviour as an example. This is probably why his general model of information behaviour relates to an information need. Wilson (1997: 552) is of the

opinion that an information need is basically a subjective experience, which occurs in the mind of the seeker and may not be observable to another person. The person who is the seeker of information would then be in a better position to know what the need is.

However, this certainly does not imply that the person understands the need. Here one must actually distinguish between the seeker of information and the one searching on behalf of the seeker. The person who has a need for the information is the seeker while the intermediary is regarded as the searcher.

Kuhlthau (1993: xx) is of the opinion that "...information – seeking is a process of construction that begins with uncertainty and anxiety." She speaks about stages of the information search process being characterized by three realms, namely the affective, dealing with feelings, cognitive dealing with thoughts and physical dealing with actions. Unfortunately, she posits, "information retrieval has concentrated on what matches the system's representation of texts rather than responding to users' problems and process of information gathering" (Kuhlthau, 1993: 1). The information – seeker searches "...for meaning rather than a right answer, and views information as a way of learning and finding meaning or as a process of construction" (Kuhlthau, 1993: 3).

According to Large, Tedd and Hartley (1999: 31), the process of information seeking "... involves interaction among a number of sub-process: problem recognition, problem definition, search system selection, query conceptualization, query formulation, query execution, examination of results, and iteration of some or all these sub-processes if the results suggest this is necessary." Information seeking as a process requires cognitive

skills from the seeker of the information. Case (2002: 12) however warns that “...human behaviour itself is not completely rational or uniform”. He seems to suggest that context is an important factor. By context he refers to the person and the situation needed to place an investigation into a framework (Case, 2002: 13).

2.4 Information Retrieval Systems

Blair (1990:1) argues, “...information (or document) retrieval system design has been the poor stepchild of the computer revolution”. He furthermore argues that information retrieval is a difficult area in which to work, because it is often unclear what the fundamental issues or problems of the field are (Blair, 1990:1).



The concept of system is also hierarchical, as it can be simultaneously a macro- and a micro – system in relationship to some other system. As a subsystem of the University, the library can be regarded as a micro – system. The library can also be a macro – system with its departments being micro – systems. Efficiency of a retrieval system is defined solely in terms of user satisfaction with the items retrieved (Heaps, 1978: 8). People concerned with the system design should “appreciate the fact that user convenience and economic efficiency are not always compatible” (Heaps, 1978: 8).

I was particularly interested to see whether information retrieval systems subscribed to by the UWC and former PENTECH were designed for the needs of the sample of undergraduate students who come from historically disadvantaged backgrounds,

2.5 Conclusion

The concepts of information science, information retrieval and information seeking are in some way or other connected. However, studies have shown that information science cannot lay claim to both information retrieval and information seeking. Theorists dealing with information retrieval research argue that methods in information seeking and the somewhat problematic concept of information behaviour are often adopted from disciplines like sociology and psychology. Despite this apparent weakness in the discipline, information science is becoming a fast growing 'science'. Chapter 3 deals with processes and skills in information with specific reference to students.



CHAPTER THREE

INFORMATION PROCESSES AND SKILLS: LITERATURE REVIEW

3.1 Introduction

Whilst, in Chapter 2, the scene was set by an exploration of the literature on the origins of information science and the complexities of information retrieval, there is a need for a closer look at information processes and skills of students in the developed as well as developing world. It is important to note that the concept of disadvantaged student has different meanings in different contexts. For this reason, I will give an exposition of information processes and information skills in general and attempt to relate these to students. I will then conclude this chapter with a brief discussion of the concept of information literacy.

3.2 The information search process

The purpose of information retrieval is “to obtain relevant answers to questions” (Paice, 1977:1). This relevance is dependent on the formulation of search strategy by searchers to find a match with the information retrieval system (IRS). However, there is a view that “[t]he more specialised the clientele of an information centre, the more the indexing should be tailored to their specific needs and interests” (Lancaster, 1998:9).

Cleveland and Cleveland (2001:29) posit, "... in any retrieval system success or failure depends on the adequacy of the indexing and the closely related searching procedures..."

The authors maintain that searchers have one major advantage over an indexer. If a searcher does not find what is needed, the search process can start again. This is of course not possible if an indexer had indexed incorrectly (Cleveland and Cleveland, 2001:32). A fundamental problem that is common to all information retrieval systems is "... to give the best possible match between the description of a subject provided by a user to the pertinent documents in the system" (Cleveland and Cleveland, 2001:20). They suggest the following reasons why users found a search to be unsuccessful:

- the user found no sources
- the user found a source, but could not find information in the source
- the user did not find enough information
- the information found needed to be more in depth
- the user was uncertain if information was correct
- the information found was not relevant
- the information found was too complex
- the user wanted a different viewpoint other than what was found
- too much information was found
- the information found was outdated (Cleveland and Cleveland, 2001: 27-28)

These reasons cited by Cleveland and Cleveland would depend on the search strategy formulated by searchers of information. However there may also be other factors such as size of the database and restrictions placed by the retrieval system.

3.3 Online searching defined

Gash (2000:49) defines online searching “... or online information retrieval ... [as] a method of retrieving information from very large computer-mounted databases.” Gash suggests that online searching refers to a method users will use to retrieve information. However, online searching refers more to a process of trying to retrieve information which would solve a problem. This process takes place during an interaction between a searcher and a computer. The actual information would therefore be contained within the retrieved records.

3.3.1 Indexing systems for online searching



The online information retrieval industry evolved from “... the use of computers to assist in the compilation of indexes...” (Gash, 2000: 50). With many applications the so-called ‘hard’ sciences were the first to adopt automatic indexing. Chemical Abstracts and Biological Abstracts were two of the earliest pioneers in the field of automatic indexing (Gash, 2000: 51). The most important developments in the evolution of the modern information industry were:

- improvements in computer technologies - allow the construction of very large databases while still allowing very fast retrieval of information
- developments in hardware technology that enable simultaneous, interactive online access to the databases by a very large number of users

- developments in national and international telecommunications technology that enable users to have access to these databases with a fast response time, which is hardly true for developing countries
- improvements in the command language to allow really sophisticated searching for experienced searchers and also a subsequent development of **easier** menu searching to attract untrained users

Automatic indexing was preceded by computer – generated manual indexing systems. Some of the earlier indexes generated by computers included Keyword in Context (KWIC), Keyword out of Context (KWOC). These approaches were put forward to match a searcher’s search strategies.



Luhn (1959) formulated the KWIC method whereby many points of access are provided for conducting searches. The KWIC index was derived from titles of publications (Lancaster, 1998: 48). According to Lancaster (1998: 48) each keyword in a title “...becomes an entry point and is highlighted in some way, usually by being set off at the centre of a page...” The computer programme recognizes words that are not deemed useful enough and suppresses these from being used as entry points. Some observers found that although the KWIC method was popular, inexpensive and a relatively quick means of the production of indexes, other more sophisticated machine – generated methods superseded them (Foskett, 1996: 35).

The keyword out of context (KWOC) method relates to keywords in titles becoming access points out of context. These access points, unlike KWIC terms are set off in the left hand margin of the page (Lancaster, 1998: 49).

Although titles in KWIC and KWOC methods generate a number of entries, recall will be low, while relevance will possibly be high. Foskett (1996: 36) argues that with both indexing techniques “specificity depends on the authors’ choice of words, while exhaustivity again depends on how detailed the titles are.” Clearly, although users may have found some entries by searching for a term in KWIC and KWOC indexes, the likelihood of not finding specific entries cannot be ruled out.

Another system that has been developed to improve information retrieval was the Preserved Context Index System (PRECIS) by Austin (1984). PRECIS is a computer – generated set of index entries and cross-references for an item. These index entries emanate from terms and instruction codes as provided by an indexer. The Preserved Context Index System is fairly complex given that indexers have to make use of so – called operators or codes (Lancaster, 1998: 57).

Despite the complexity of PRECIS it seems that it has the advantage of giving a “...complete subject statement at each entry point...” (Foskett, 1996: 139). According to Foskett, another advantage of PRECIS is its multi-lingual nature, since it has proved to be successful in many languages.

With the increase in computer power and the exponential growth of information, the feasibility of text searching has also increased (Lancaster, 1998: 222). Taylor (1999: 158) states that Natural language processing (NLP) has as one of its goals the creation of IR systems that can:

- interpret users' information needs as expressed in free text
- represent the complete range of meaning conveyed in publications
- interpret a match between a user's information needs and the documents that meet those needs

Natural language processing also has to do with the manipulation of keywords and written language processing (Taylor, 1999: 163). Taylor furthermore points out that the success of keyword searching is dependent upon:

- authors writing about the same concepts using the same words
- searchers being able to guess the words authors used for the concepts

There is of course the probability that searchers may not search exactly in the way an index has been set up. This may lead to the retrieval of irrelevant materials (Taylor, 1999: 164).

3.3.2 The development of a search strategy

Soergel (1985: 351) is of the opinion that the conceptual formulation of a search query "...is at the heart of searching." The search strategy usually starts with a general and

simplified format and then proceeds to methods for structuring the search topics. These methods include:

- analysing facets
- sectioning search output
- sub-searches
- chained subsearches, information found in one step serves as the basis for selecting descriptors in the next step

Soergel (1985:132) furthermore argues that an information retrieval system should assist a user to recognise the relevance of a document. He mentions several ways in which this can be achieved, example:

- for documents with misleading titles, indexers can add a clarifying annotation
- reference librarians can annotate documents that bear an indirect, but important relationship to the problem at hand
- descriptors that led to the retrieval of the document should be highlighted

Soergel (1985: 133) however admits that certain limits prevail with both resources and expertise with regards to information systems. He argues that some users need more assistance than others, while others do not want assistance. He concludes that an information specialist "... acts as a true professional with independent judgements..." by assisting a user in the utilisation of documents, than merely doing searches. It is Soergel's (1985: 133) contention that the information professional therefore does not merely react to the wishes and preferences of the user.

According to Obeler (1983: 105), “[t]he continuing task, the professional responsibility, of the librarian is to bring information and user together in the most accommodating, least expensive, and most freedom-of –information-promoting way.” Bellardo in the *Online Searcher* (1990: 3) notes that “[o]nline searching, it has been claimed, demands the very best people – intelligent, self confident, but also sympathetic and understanding, creative and so on.” However, she argues, “...there is a small but growing body of research evidence that suggests that these assumptions about good online searchers have been overstated” (*The Online searcher*, 1990: 3). She mentions that reasons given for problems in training individuals to become online searchers relate to personality and intellectual traits. She furthermore argues that it is more the need for the intermediary, that is, the person who is the interface between the searcher and the retrieval system, to be thorough, analytical, probing, and to be able to understand requests in “meaningful” ways (*The Online searcher*, 1990: 5). This may well be so but there is a subjective aspect to on-line searching and specifically the true meaning of relevance.

The intermediary can never be in a position to understand the true meaning of relevance. An item of information within a record is said to be searchable if compared against some part of a search request (Paice, 1977: 6). It is retrievable if it can be printed out for the user’s convenience (Paice, 1977: 6). A user of a document retrieval system will find that “... not all of the relevant records are retrieved (though he will not know how many have been missed), and “... that many of the retrieved records are in fact irrelevant” (Paice, 1977:170).

The typical search procedure model as outlined by Cleveland and Cleveland:

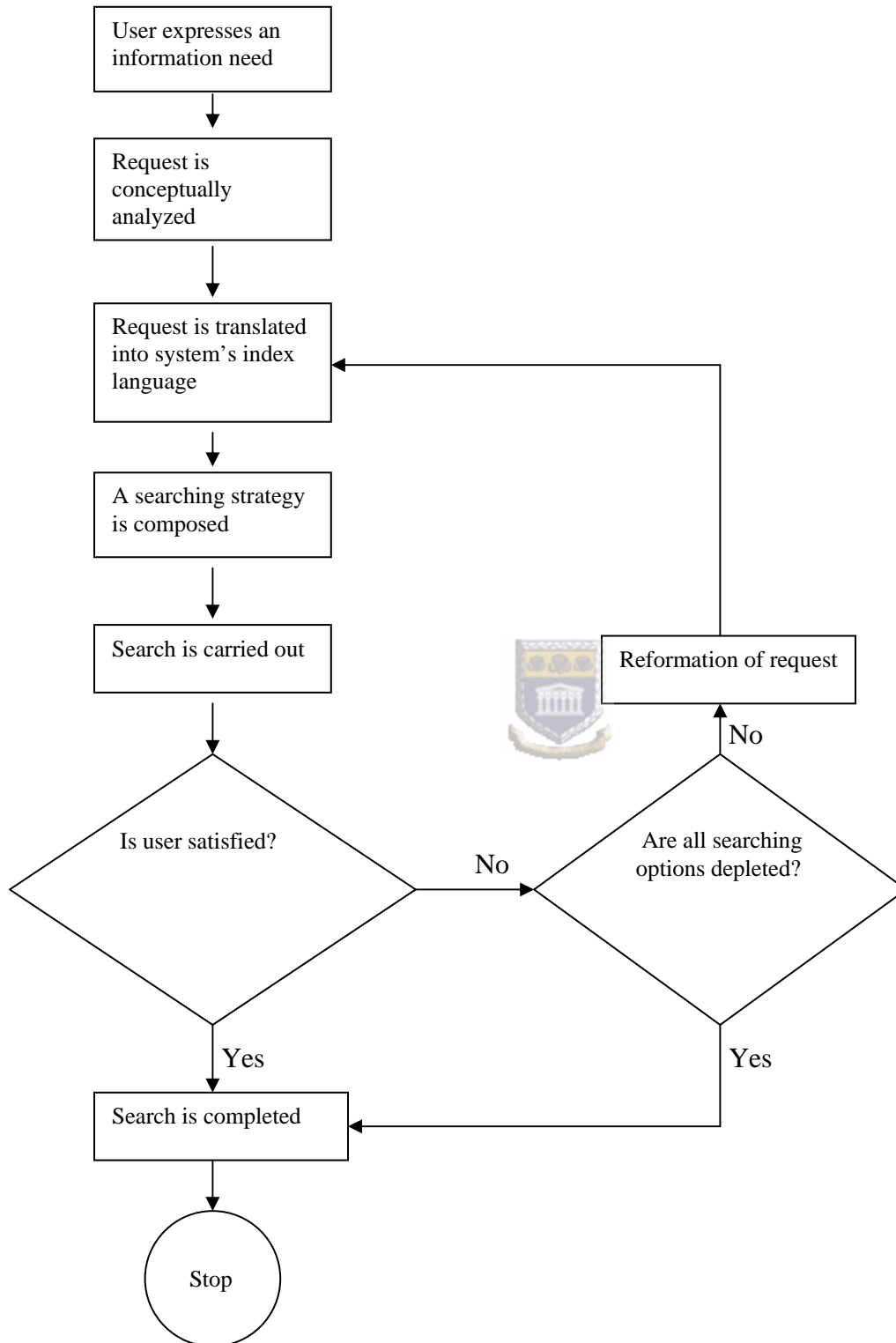


Figure 3: The searching procedure
Source: Cleveland and Cleveland (2001: 28)

In theory the process seems quite simple. There is however a cognitive process, which needs to take place especially when the search request is conceptually analysed and the search strategy, is composed. This model can also not be generalised given the searcher's level of competence in terms of searching. However, Cleveland and Cleveland's model is useful to illustrate that information retrieval systems need to be designed in such a way that searching is iterative.

3.4 Measures derived from relevance in information retrieval

There have been various attempts to measure the outcomes of information retrieval. In particular human thought processes are quite complex to measure. According to Boyce, Meadow and Kraft (1994: 61), "...measurement is a comparison of some attribute with a reference point or scale." They contend that all records are assumed classified as either relevant or not for a given information query. Records are either retrieved or not in response to the query. As depicted in Figure 4 is a contingency table derived from Boyce, Meadow and Kraft (1994: 61):

	Relevant	Not relevant
Retrieved	a	b
Not retrieved	c	d

Figure 4: Contingency table depicting sets of documents
Source: Boyce, Meadow and Kraft (1994: 61)

Contingency: possible retrieval outcomes are based on binary relevance measures.

According to the table there are basically four sets of documents, namely

- **a**: which denotes all relevant retrieved documents
- **b**: which denotes retrieved but not relevant documents
- **c**: which denotes relevant but not retrieved documents
- **d**: which denotes neither relevant nor retrieved documents

P = Precision, which is the ratio of the number of relevant records retrieved to the total number of records retrieved. The relevant equation is therefore:

P = $a/a+b$ or relevant retrieved documents / relevant retrieved documents + not relevant but retrieved documents. **P** can be measured by having the searcher rate each retrieved record on a binary scale.



R = Recall, which is the ratio of the number of relevant records retrieved to the number of relevant records existing in the database. The equation for recall is:

R = $a / a + c$ or relevant documents retrieved / relevant documents retrieved + relevant but not retrieved documents

N = Noise or false drop rate, which is the ratio of non-relevant records retrieved to total documents retrieved. **R** is basically the complement of **P**, i.e. (1-P). The equation for **N** is:

N = $b / a + b$ or retrieved but not relevant documents / relevant documents retrieved + retrieved but not relevant documents

F = Fallout, which is the ratio of non-relevant records retrieved to total non-relevant records or proportion of unwanted records that were retrieved. The equation for **F** is:

$F = b / b + d$ or retrieved but not relevant / retrieved but not relevant + neither relevant nor retrieved documents

O = Omission factor, which is the proportion of relevant records not retrieved. This is basically the complement of **R**. The equation for **O** is therefore:

$O = c / a + c$ or relevant but not retrieved documents / relevant retrieved documents + relevant but not retrieved documents

S = Specificity, which is the proportion of non - relevant records not retrieved or rejected. It measures the ability of a system to reject what a searcher wants to reject. The equation is:



$S = d / b + d$ or not retrieved and not relevant / retrieved but not relevant + not retrieved and not relevant documents

Earlier, Paice (1977: 6) hypothesised that if a particular request was submitted to an information retrieval system, there exists a file with **Y** records, which are relevant and **Z** records not relevant. After the search, 4 categories of records would emerge:

- **Y1** = retrieved relevant records
- **Y0** = relevant records not retrieved
- **Z1** = retrieved irrelevant records
- **Z0** = irrelevant records not retrieved

Recall ratio = $R = Y1/ Y = Y1/Y1 + Y0$ or retrieved relevant records / relevant records

Precision ratio = $P = Y1/Y1 + Z1$ or retrieved relevant records / retrieved records

Fallout ratio = measure the proportion of irrelevant records retrieved by a request:

$F = Z1/Z1 + Z0 = Z1/Z$ or retrieved irrelevant records / irrelevant records

According to Boyce and colleagues (1994: 182) the precision can be improved by “...making another iteration of a search”. The reason for this is that **P** only measures the precision achieved up to a point. It accordingly, does not measure the potential of the query or the information needs statement. Broadening a search, usually results in a decline of precision, i.e. the larger the recall, the less the precision (Lancaster, 1998: 3). However, Blair (1990) refers to a futility point, that is, the point at which a user decides it is no longer worth trying to improve results. A log-off command or close command usually quickly follows this.

Lancaster (1998: 3) cautions “[w]ith very large databases...it becomes increasingly difficult to achieve an acceptable level of recall at a tolerable level of precision.” He refers to the situation on the Internet regarding this, having become critical. For this reason it has become “... fashionable in recent years to view the information retrieval problem as primarily one of matching ‘the anomalous state of knowledge’ of a requester

with the more “coherent” [quotes in the original] state of knowledge of authors” (Lancaster, 1998: 13). To facilitate in making searching easier for searchers a basic requirement of a computer-based information retrieval system is that it should be simple to use (Paice, 1977: 1). Despite this requirement it should be borne in mind that the retrieval process is automated, but document processing is carried out by man or machine (Paice, 1977: 6). Understanding the cognitive processes of a user during searching can therefore facilitate in designing index languages in indexing and in searching (Cleveland & Cleveland (2001: 32).

3.5 Information processes: students’ information skills

The problem of student learning in the information age is not unique to Africa, in general and South Africa in particular. In studies conducted elsewhere, it was found that students rely quite a lot on finding information in a computer, assuming that there’s nothing of value in the library (Smith, 1997). Allen and Allen (1993) furthermore studied the logical, verbal comprehension and perceptual speed differences between librarians and students. Their findings were that students had lower verbal and logical comprehension but higher perceptual speed, which suggested the need for a different approach to information retrieval design.

Bruce (1997: 9) notes that another barrier for especially undergraduate students is that commercial online databases are often only available to library staff and research students. Similarly, one would find that Internet access is sometimes not available to undergraduates or on a limited basis (Bruce, 1997: 9). Kuhltau (1988: 258) proposed the

study of the student's perspective rather than that of the librarian for all aspects of information seeking. She indicated that the problem, the system and the process needs had to be investigated. Breivik and Jones (1993: 24) argue that quite a substantial number of educators received their academic qualifications prior to the technology explosion, thereby having received very little or even no training in the use of new information technologies. It would be problematic to incorporate these technologies into current educational programs, expecting students to understand them. It is to this end that Breivik (1998: 2) argues that despite the advancement of information technologies, "...higher education has only dabbled in the applications of information technologies...but so often does not choose to use them to enrich students' learning."

The Association of College and Research Libraries (2001: 16) regards the development of lifelong learners as a central aspect of the mission of any institution of higher education. Students or learners of higher education need to construct a framework in which to learn. Indeed colleges and universities "...provide the foundation for continued growth throughout their careers as well as in their roles as informed citizens and members of communities" (Association of College and Research Libraries, 2001: 20). In a South African context this is not far removed from the truth. To incorporate information literacy training at universities and colleges would require a collaborative effort from a number of stakeholders. Here one particularly thinks of academics, librarians and administrators of information technologies.

There are various models, which higher education institutions in South Africa can adapt to suit the needs of particularly disadvantaged students. However, a detailed discussion of the implementation of information literacy models is beyond the scope of this study. Suffice to say that I will not examine all, but mention a few. Eisenberg and Berkowitz (2000) for example mention five standards for information literacy in higher education, which were adopted by the Association of College and Research Libraries. These were developed to encourage students to become lifelong learners. Accordingly these standards are:

- Standard One – an information literate student determines the nature of and extent of the information need
- Standard Two – the information literate student accesses needed information effectively and efficiently
- Standard Three – the information literate student evaluates information and its sources critically and incorporates selected information into his / her knowledge base and value system
- Standard Four – the information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose
- Standard Five – the information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally

These standards are quite similar to the Big6™ model as purported by Eisenberg and Berkowitz. The Big6™ briefly encompasses six stages, namely:

- task definition
- information seeking strategies
- location and access
- use of information
- synthesis
- evaluation

Clearly information literacy has a lot to do with cognitive skills, irrespective if computers or other information technologies are used to search for information. Although it is difficult to argue against the many benefits that an information seeker derives from computer and/or information technology skills, it must be borne in mind that these skills are not necessarily prerequisites for information literacy. I want to argue that both computers and the broader information technology are means to an end, not an end in themselves in this context. Indeed having computer and information technology skills are often regarded as crucial for people to survive in the information age (Clyde, 1997: 50).

However, placing too much emphasis on these skills can be a barrier for information literacy. Information seeking is a subset of information literacy. Without a conceptualization of what one is seeking, the exercise of seeking becomes superfluous. Information literacy skills are therefore important. The concept of information, which lies at the centre of all the literacies mentioned, reinforces this importance. Information literacy with the coexistent concepts is depicted in Figure 5.

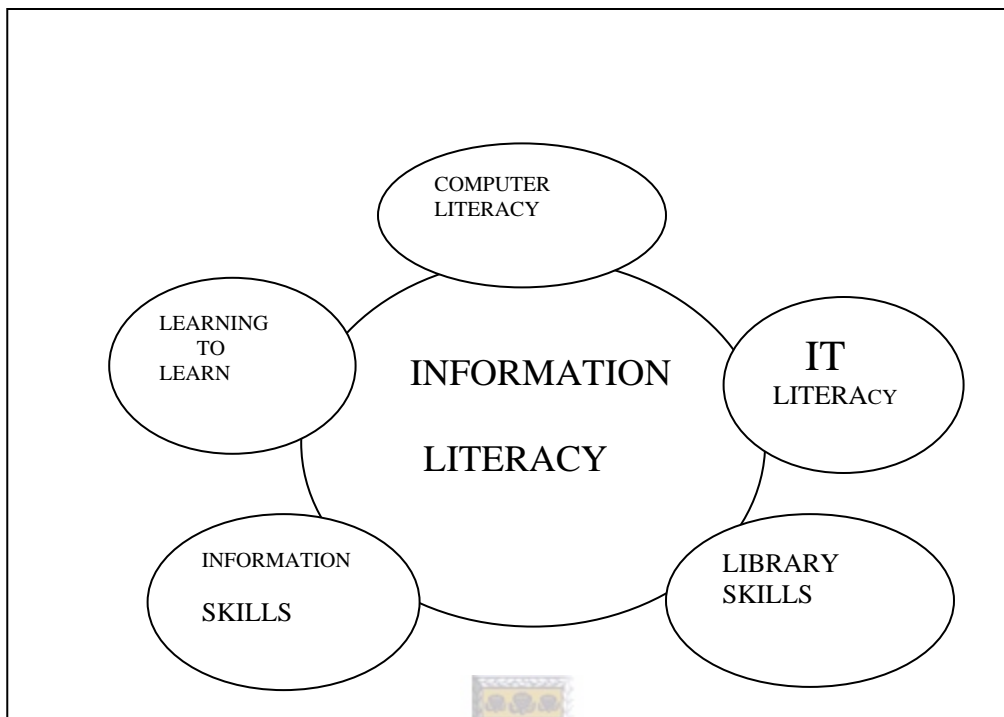


Figure 5: Concepts influencing and coexisting with information literacy
 Source: Bruce (1997: 21)

Clearly information literacy is coexistent with these other concepts. One can actually argue that information literacy embraces these other concepts; is at the centre of these concepts as activities. Brandt (1998: 41) seems to confuse information literacy with more of an application of technology to fill information needs. As mentioned earlier, my personal view is that information technology facilitates in the process of information literacy. However, later Brandt (2001: 73) acknowledges that information literacy goes beyond “...the skills and knowledge involved in information seeking and retrieval, and strives for higher levels of understanding regarding the context of information in today’s society, its composition and organization, as well as its use for lifelong learning.” One cannot deny that computerized and networked information resources form an integral part

in information seeking. Learners therefore have to have some knowledge and an understanding of the technological environment of these resources (Brandt, 2001: 75). He argues that for this reason an information technology (IT) literacy curriculum should feed directly into an information literacy curriculum. Similarly, the integration of library skills and computer literacy skills should form part of such a curriculum. This may stimulate students to adopt and acquire information skills necessary for life long learning.

Before a student can become information literate, he/she should be made aware of what the concept of information is. In this regard a number of outcomes are important. These include: a student should be able to recognize a need for information, identify and locate appropriate information sources, know how to gain access to the information contained in those sources, evaluate the quality of the information obtained, organize the information and use the information effectively. Other observers prefer to use the concept of user education to encompass a broad method of addressing the problems related to information literacy. In this regard Gericke (1997) posits, “[u]ser education should ...include all forms of instruction aimed at improving the use of libraries... [including] training in information handling skills...and computer literacy should be included.”

Lwehabura (1999: 129) argues that user education “...aims at changing an individual’s behaviour and experience towards the use of library and other information sources.” It seems that these definitions are mainly concerned with the use of the library as an information resource. User education therefore cannot be equated with information literacy, but is a means of instruction aimed at information literacy. Lwehabura (1999:

130) seems to endorse this by stating, “[e]fforts should therefore be made to equip African university libraries with enough computers and latest IT facilities so that libraries can function properly.” However, these quantitative measures can hardly address the fundamental problem of information literacy. For this reason a closer look at the student as information seeker and searcher is important.

3.6 Conclusion

An attempt was made to understand the processes, which take place during information searching. It was clear from the literature that these are complex processes, which cannot be generalised especially with the conceptualisation of information needs and the formulation of search strategies. The confusion that some writers create with their views on information literacy does not offer a solution for dealing with these complexities.

Chapter 4 explores global trends in higher education with regards to student access and in particular the impact of apartheid on disadvantaged institutions of higher learning in South Africa. These are equally complex issues. However, placing higher education in South Africa in context may offer the reader an understanding of the complex nature of the information seeking and searching behaviour of disadvantaged students.

CHAPTER FOUR

GLOBAL TRENDS IN HIGHER EDUCATION: STUDENT ACCESS

4.1 Introduction

The previous chapter concentrated on information processes and skills in a generic sense. The focus was on the formulation of search strategies of searchers of information as identified in the literature. It was also noted that information literacy, although a broad concept, plays a vital role in the higher education landscape. In this chapter the discussion focuses on global trends in higher education in different contexts and in South Africa, particularly within a historical context. As Higgins (1994:11) puts it, “Students are the single important resource of our universities and colleges”. It is an undeniable fact that “...most nation states are going through a transformation process that is strongly affected by global trends and pressures” (Maassen & Cloete, 2002: 14).

4.2 Higher education: global trends in different contexts

Luc E. Weber (1999: 4) points out that “Higher education in North America and Western Europe is in a more or less advanced process of massification.” The same can probably be said of higher education in the developing world. Particularly during the nineties historically disadvantaged institutions in South Africa saw growing numbers of students. With South Africa becoming a democracy, the years post –1994 up to the turn of the 21st century experienced a process of massification. This quickly gave way to diminishing

numbers as more and more students out of necessity had to forfeit their studies. One of the reasons for this forfeiture of studies was students' inability to pay their tuition fees (Vergnani, 1999: 42). Vergnani contends that fewer black students qualified for higher education and in particular university admission. In addition to this those who qualified deserted the "...troubled , historically black universities, to which they were once restricted by apartheid law" (Vergnani, 1999: 42).

For the reader who is not *au fait* with South African politics the concept of black may somehow be problematic here. In the South African context a clear distinction is drawn between people of mixed descent (coloureds), those of Asian descent (Indians) and those whose mother tongue is one of the languages in the vernacular (black). Although it can be argued that the coloured people's mother tongue is also vernacular (Khoisan), it needs to be pointed out that these distinctions are not always clear and can sometimes be confusing. However, although all non-white people are really **black** in South Africa, these distinctions will suffice for the purpose of this study. However, when reference is made to historically black institutions, it would include institutions for coloureds as well as Indians.

The earlier allusion to troubled historically black universities basically refers to the 1980's and 1990's when students at most if not all historically disadvantaged institutions protested against apartheid education. The irony is that with the abolition of apartheid, some of these students preferred the historically advantaged institutions. This is not surprising given the wealth of resources at the latter. Towards the end of this chapter this

issue is discussed in more detail. The discourse on higher education in different contexts contrasts the higher education landscape in the developed and developing worlds.

4.2.1 Trends in the developed world

The Australian view is that university education has become a significant investment for students (Australia, Department of Education, Training and Youth Affairs, 1999: 12). The student is regarded as an important customer. For this reason there is “...an increased focus...and pressure on institutions to provide value for money through quality teaching and learning support services, including access to tutors and teachers as well as flexible access to learning materials and resources” (Australia, Department of Education, Training and Youth Affairs, 1999: 12). A high premium is therefore attached to quality assurance in the Australian higher education sector.



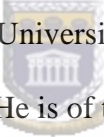
The British University model tries to reflect a kind of student –centredness. In this regard Bourgeois, *et al.* (1999: 15) are of the opinion that individual universities seek to be distinctive institutions “...in a cultural as well as organizational sense...” Each of these universities offers and represents “...something unique, something for which its graduates will be known and its alumni may feel proud” (Bourgeois, *et al.*, 1999: 15).

Weber (1999: 5) argues that in a North American context the growing demand for higher education “ has its origin not only in social aspiration but is justified by the increased requirements of the labor market, being caused by the application of increased

knowledge.” In a developed country this statement probably holds water. However, although students from disadvantaged backgrounds in developing communities would justifiably argue for an education which would fulfil expectations of the labour market, it remained a pressing question during the eighties and the nineties whether they were ready for such education.

In the preface to **Challenges facing higher education at the Millenium**, Werner Z. Hirsch and Luc E. Weber (eds.) (1999: viii) argue “ ... a learning society is based on individual initiative assisted by the social economic and political environment provided by the government.” However universities and other institutions of higher learning are not exempt from this obligation. It is therefore Hirsch and Weber’s (1999: viii) contention that “[t]he mission of universities comprises a moral obligation to contribute to the intellectual, cultural and economic settlement of society in general”. It is clear that this statement may need to be deconstructed within the context of a developing continent and country such as Africa and South Africa respectively. The cultural element as encompassed in this statement may be more of a challenge than the elements of intellect and economics. It is commonly understood that the continent of Africa and perhaps more so the country South Africa, is multi – cultural. This is particularly true for South Africa in terms of its diversity and multilinguism with its eleven official languages (Lor and Van As, 2002: 103). In a South African context the cultural settlement of society would therefore require a concerted effort from universities, especially those catering for the historically disadvantaged. The latter would indeed be more conversant in the vernacular than for instance in English.

Weber (1999: viii; 5) carries on the argument that “... universities contribute to both the intellectual vitality and the economic well-being of society; produce educated citizens ...” and “to act globally and in a competitive environment, the university, whether it likes it or not, must consider students to be clients by adapting programs to students’ needs and wishes”. According to Weber, this is achieved at the undergraduate level. Contributions to knowledge & economic well-being of society are accomplished at the graduate/professional level, while “appreciation of the value of the pursuit of knowledge is accomplished at all levels” (Weber, 1999: ix). In South African society, to achieve these aims there needs to be some form of redress.

David P. Gardner (1999: 24) argues that from a western point of view “[l]ittle systematic account is taken by faculty members, or  University administrations .. of how today’s undergraduate students prefer to learn.” He is of the opinion that “ ... there is a disconnect between students who come to the universities steeped in a technological, electronic, and other visually based methods of learning at a university pedagogy that is rooted more in the past than planted in the future ...”

Duderstadt (1999: 42) argues that “[r]apidly evolving technologies are dramatically changing the way we collect, manipulate, transmit and use information.” He goes on to say that “[t]he classroom ... may soon be replaced by learning experiences enabled by emerging information technology.” The students may accordingly force this paradigm shift upon the faculty themselves (Duderstadt, 1999: 42). In addition it seems that “[t]oday’s students learn primarily on their own through solitary reading, writing and

problem solving”. For this reason “[t]omorrow’s faculty may need to develop collective learning experiences in which students work together and learn together, with the faculty member acting as a consultant or a coach” (Duderstadt, 1999: 43). This paradigm shift may require infrastructural changes geared to the introduction of information communication technologies (ICT’s).

4.2.2 Trends in the developing world

It is Du’s (1992:118) contention that Chinese higher education does not have the comprehensiveness that Western universities have. He observes that a reason for this is the fact that “China is a developing country with limited material resources and intellectual manpower and with a considerable degree of economic and cultural disparity among its different regions”. However, in recent years China has made tremendous strides in moving away from the western model.

The question is to what extent is higher education in Africa in general and South Africa in particular in a similar position as China to move away from the western model? A brief reflection on the situation in selected countries in Africa follows. The nature of the study within the context of the discipline of Library and Information Science and South Africa’s involvement in among others the Standing Conference of Eastern, Central and Southern African Library Associations (SCECSAL) as well as being a member country of the Southern African Developing Community (SADC) are two reasons for this selection.

In the introduction to **A thousand flowers: social struggles against structural adjustment in African Universities** (2000), the editors argue that the Structural Adjustment Programmes (SAP) of the World Bank (WB) and International Monetary Fund (IMF) brought its own problems to Africa. The idea behind the SAP was to bring about economic recovery. However, funds to education were cut. The editors claim that “...many teachers and other academic staff were retrenched and wages were frozen” and “...development of an African educational system...seriously undermined” (**A thousand flowers...**2000: xi). Students have waged struggles in most of the African countries against the SAP adopted by their countries and institutions (Federici and Caffentzis, 2000: 115). Many student demonstrations have indeed “...targeted state corruption (Zimbabwe), authoritarianism (Zaire, Togo, Liberia) and the arrests of intellectuals critical of the ruling party (Sudan, Somalia)” (Caffentzis: 2000, 16).



Although Kenyans still suffered from Colonialism, there emerged “an alternative way of thinking about education and development” (Närman, 1995: 4). However, this kind of development can only be realised if “...an attempt to liberate our own minds from a basically Eurocentric perspective...” is achieved and development involves “...the needs and cultures of the very peoples themselves in Africa, Asia and Latin America” (Närman, 1995: 4). He later rightfully suggests that education is a basic human right, but also an indicator for development (Närman, 1995: 61). Clearly then, ignorance does not stimulate development. For this reason educational strategies and policies need to be formulated and implemented.

A research report regarding higher education in three East African countries, namely Kenya, Tanzania and Uganda found that students “...find themselves without the language and analytical skills necessary for rigorous academic study...” (Rajani, 2003: 14). Rajani’s contention is that the educational crisis in East Africa is “compromising quality and equity in higher education...” In Tanzania, problems in higher education during the 1980’s included a scarcity of books, other teaching materials and equipment. There was a decrease in academic staff as people were looking for greener pastures. Student numbers increased at the same time. This invariably placed a heavy burden on higher education institutions in the country (Mkude, Cooksey and Levey, 2003: 7). The same problem seemed to be prevalent in Uganda, where student numbers were on the increase with limited resources. This in turn led to a sharp deterioration in the quality of teaching and learning, not to mention empty library shelves and bare laboratories (Musisi and Muwanga, 2003: 10). Students suffered as a consequence, having no “...exposure to advances in information technology...” (Musisi and Muwanga, 2003: 11). The situation seemed no better in other countries in Africa. In Mozambique, for instance “Less than 2% of the student body had entered the University of Lourenco Marques by independence in 1975” (Mário, et al., 2003: 7). It was furthermore reported that this university catered to “...the sons and daughters of Portuguese colonists” (Mário, et al., 2003: 7). This was despite the fact that Portugal tried to expand its higher education to Africans in the 1960’s and 1970’s. Indeed, colonialism left a marked effect on Africa.

Federici (2000: 19) suggests that post-colonial efforts to develop African countries actually brought about a recolonization of Africa in terms of economics and politics. She

furthermore posits that the IMF and the WB played major roles in this recolonization. Apart from this apparent economic and political recolonization, Africa is also being intellectually recolonized, because “these agencies determine what can be studied, written and voiced in the continent” (Federici, 2000: 19).

Problems in higher education in South Africa were no different from what were experienced in other countries in Africa. However, one can only give a meaningful discussion of higher education in South Africa by relating to the political and to a lesser degree, economic and social history of the country and contextualising these to the present situation. Although economic and social issues played a less meaningful role, the politics of South Africa cannot be divorced from socio-economic issues. The politics of South Africa is particularly of importance given the country’s unique historical apartheid ideology, which invariably affected socioeconomics. This ideology was legislative and practised by the then ruling National Party from 1948 until 1993. For a meaningful discussion of higher education in South Africa, it would therefore only make sense to firstly discuss apartheid within its historical context.

South Africa occupied a unique position in the world in terms of its apartheid policy, which was prevalent for many years. For this reason one cannot discuss the impact of political, economic and social issues without mentioning apartheid. The apartheid ideology, according to Piet Cillie, who was in government from 1954 to 1978, as quoted by Giliomee and Schlemmer (1989:63), was “...to safeguard the self- determination of the Afrikaner.” However, apartheid involved a number of issues, which left a marked effect

on the lives of the people of South Africa. Unjust labour regulations, race classification, group areas, separate amenities, separate education and job reservations seriously affected Black people. Afrikaners held political control and privileges. The irony was that South African born blacks were regarded as inferior to even white immigrants. Some of these white immigrants had voting power and were given seats in the all-white parliament. According to Tutu (1994: 5), H.F Verwoerd (1953) commonly regarded as the father of apartheid, reiterated, "... there is no place for... [Africans] in the European community above the level of certain forms of labour" and "...the black child [should not be allowed] to graze in the green pastures of European society". These sentiments were reminiscent of decades of racial discrimination and oppression.

Political issues in South Africa invariably had an influence on the economic welfare of its citizens. Blacks were forced to have separate homelands in which to handle their own affairs. This in turn had an impact on access to basic resources. According to Lipton (1989: 8), "...apartheid...provided the white working and lower middle classes with preferential access to resources such as housing, welfare benefits and education with considerable political power to protect their privileges". Things proved no different in the higher education sector. One observer in a keynote address stated, "...millions of pupils and students in [South Africa] have been...cruelly abused and manipulated by Apartheid education" (O'Connell, 1991: 1). However, a discussion of student uprising and riots during the 1960's, 1970's and 1980's is beyond the scope of this study. For the purpose of this study it is important to define disadvantaged students within the context of South Africa.

4.3 Disadvantaged students

As with information literacy, the concept of disadvantaged student will of necessity have different interpretations in different contexts. In some contexts, the concepts of cultural minority, and ethnic minority are used to describe the disadvantaged. It should be borne in mind that in a South African context these concepts would be problematic, given that the majority of the people in this country are still marginalised. This marginalization is basically related to socio-economic issues. As stated earlier, the majority of South Africa's population was subjected to the unjust laws of apartheid (see chapter one). For the remainder of this chapter, a brief exposition of black student adjustment in higher education in different contexts is given. In some quarters it was felt that some black students are sensitive about being considered inferior to especially white students. It was argued that “ [u]nder apartheid, high schools didn't prepare black students for college, and many are trying to overcome that legacy” (Rossouw, 2004: 32).

However, a detailed discussion of apartheid education with regards to high schools, is beyond the scope of this study.

4.3.1 The developed world context

Asamen in **Black students: psychosocial issues and academic achievement (1989: 10)**, argues that education was withheld from Afro – American school –age children to perpetuate the mind-set that Blacks were inferior to Whites. She contends that prior to 1865 it was a violation of state laws in the United States of America to give education to

Black children, irrespective of affluence (Asamen, 1989: 10). Even though the situation changed from 1865 the “...distribution of educational financial support to Black children who attended separate schools from Whites was far from equitable” (Asamen, 1989: 11). This inequity invariably had a negative influence on the academic behaviour of black American students whose environments had a lot to do with conditions “...that many of them have been forced to experience by the policies and practices of the broader society” (Berry, 1989: 286). Consequently, children of black parents were often unsuccessful “...in a classroom that does not value the strengths of his or her lifestyle” (Berry, 1989: 288). Despite these disadvantages “ Afro – Americans have made some real gains in terms of their educational achievement since 1970” (**Black students...**1989: 7). The editors however realise that there was a need for equality in the education sector for all citizens of the United States. This did not exclude Black Americans from being committed to empower themselves to study (**Black students...**1989: 8).

However, the situation does not seem to have been better for Black students in White institutions. In a study conducted by William Boyd II in 1974, he found that black students agreed that “...predominantly white colleges are unprepared...to meet their needs” (Boyd, 1974: 57).

In a comparative analysis between black and white institutions of higher learning, Fleming (1984) found that:

- poorer resources in black institutions undermined the students who attended these institutions

- segregated institutions because of their social error in time outlived their usefulness
- those in favour of black institutions of higher education posited that black students could learn there without tensions of the black – white hostile undercurrents

There were also a number of barriers that made it difficult for black students in British higher education. Some of these according to John Bird (1996) were:

- discouragement from thinking about higher education
- isolation once in higher education
- a lack of black staff in higher education
- discriminatory practices by staff and students in higher education



Notwithstanding the fact that discriminatory practices are harmful and wasteful, “...higher education ...cannot compensate for a society in which there is widespread discrimination” (Bird, 1996: 2). It therefore depended on the citizens themselves to change their mind-sets.

A more recent study found that although black students in a particular district performed better than those in other districts, the former were still performing poorer than their white counterparts in the same district (Ogbu, 2003: 5). Some of the reasons cited for this academic achievement gap were “...low teacher expectations, peer pressures, or differences in learning styles” (Ogbu, 2003: 10). The low teacher expectations closely

matched racism and blatant discrimination against black students. It seems that the problem for black students despite desegregation in higher education institutions in Britain and the USA has not been resolved .

4.3.2 The developing world context

In a South African context Johnson – Hill (1998: 83) remarks that disadvantaged students often found examinations intimidating. Lecturers were often the culprits, by not preparing students for examinations (Johnson – Hill, 1998: 83). A similar trend manifested itself in Mehl’s 1985 study of first year Physics students at the UWC. He remarked that these students were “poorly equipped to meet the academic requirements of a university course especially in science – related disciplines” (Mehl, 1985: v). These remarks are not surprising, given apartheid’s purpose to bring about inferior education to the marginalised. Despite the fact that apartheid was abolished with the first democratic elections in 1994, its remnants remained. This has a great deal to do with the kind of divide that was created by the all white parliament then.

This divide was created by general and own affairs elements. The “own affairs” element in South Africa had serious implications for education (Bunting, 2002: 59). Own affairs for education implied that coloureds (House of Representatives), Indians (House of Delegates) and whites (House of Assembly) each had to be responsible for their own. However, black African students’ education “was nested in a ‘general affairs’ government department, which was termed the ‘Department of Education and Training’

(DET)” (Bunting, 2002: 60). One can therefore see that black South Africans did not handle their own affairs, which left room for further marginalization.

4.4 Conclusion

The chapter focused on the various contexts of higher education. Although by no means exhaustive, the basic premise was that problems with higher education and academic growth for students are not unique to Africa in general and South Africa in particular. The problem with student access, even after 1994, although more students could now enrol at any South African higher education institution, is still unresolved (Cloete, 2002: 417). Although politically emancipated many students are still socio-economically disempowered. This brought about the fact that “...although the composition (complexion) of the student body changed, access was still possible for only a small elite...” (Cloete, 2002: 417).

In chapter 5 a brief description of the design of this research is given. The chapter highlights the research methodology and methods as well as sampling frame.

CHAPTER FIVE

RESEARCH DESIGN

5.1 Introduction

In Chapter 4 consideration was given to higher education from a global point of view with regards to student access. From the literature it was clear that South Africa was not the only country to face major changes within the higher education landscape. However, there are more similarities with African countries than with countries in Europe, Asia and America.

The preceding chapter also attempted to illustrate a global trend in terms of students from disadvantaged backgrounds, notably that these students have largely been neglected in terms of access to ICT's. Although this is the case some attempt is being made at the two institutions under investigation in this study to give students access to ICT's. This access needs to take place in conjunction with certain mechanisms of student support.

As stated in the title, the emphasis of this particular study was to focus on the information - searching behaviour of undergraduate students and their interaction with information retrieval systems at the two historically disadvantaged institutions of higher education in the Western Cape. As stated in Chapter one, the UWC and the PENTECH have been selected purposively. Although these institutions do not only serve historically

disadvantaged students, both institutions have historically been involved in catering for the needs of this particular student.

Before I make an attempt to discuss the research methodology and methods applied to gather data, I need to briefly orientate the reader with the often highly debated paradigms of qualitative and quantitative research. To some social science researchers there is very little to choose between the two, since both have strengths and limitations (Silverman, 2001: 31). Social science research itself sets out to describe human behaviour (Babbie, 2004: 6).

5.2 Qualitative versus quantitative research



Powell (1991: 42) posits that “qualitative research (field studies and ethnographic techniques are related terms) focus on viewing experiences from the perspective of those involved.” He goes on to say that “... qualitative tends to apply a more holistic and natural approach to the resolution of a problem than does quantitative research” (Powell, 1991: 47). In addition more emphasis is placed on subjective aspects of human experiences and behaviour. This is true particularly because quantitative analysis deals with generalizations from a sample to the population of the sample. With qualitative research such generalizations cannot be made. Qualitative research deals more with a process than with a quantification of data. Bailey (1982: 495) refers to the analysis of such data as non-numerical. As Mouton and Marais (1994: 160) state, “...concepts in qualitative studies are frequently likely to be connotatively richer, while those in quantitative studies will be denotatively more specific.” However, Wilson (2002a)

suggests that qualitative research methods overlap with quantitative research methods because "...they include interviewing but the qualitative researcher is likely to use less formally structured interviewing procedures and may, in addition use methods such as observation, free-flowing discussion, and the analysis of documents...produced by the subjects." Myers (2000) furthermore notes that the qualitative paradigm has been criticized for its lack of objectivity and generalizability. However, she states that "[p]roblems related to sampling and generalizations may have little relevance to the goals of the study and the reality of the situation" (Myers, 2000).

It is useful to code qualitative data so that themes and patterns can be identified (Patton, 1990; Miles and Huberman, 1994). Creswell (2003:192) suggests that data need to be reduced to themes and categories for a logical picture. Coding therefore assists the researcher to identify peculiarities in the data as well.

Qualitative as well as quantitative data were coded. In the former case, a qualitative analysis software package Hyper Research was used for coding. For quantitative analysis the Statistical Package for the Social Sciences (SPSS) was used.

5.3 Research methodology

According to Rowley (1996: 202), a methodology is "...a body of methods, rules and postulates employed by a discipline." For this reason the "...choice of methodology for a study should fit the nature of the research problem" (Park, 1993: 325). However, Wilson

(2002b) is of the opinion that research methodology is often confused with research methods. He argues that some authors tend to write about methodology when they are really referring to the methods employed. For this reason he states that "... [m]ethodology...is prior to method and more fundamental, it provides the philosophical groundwork for methods" (Wilson, 2002b). Against this background the research methods employed in this study include semi – structured interviews and think-aloud verbal protocols.

5.3.1 Interviews with librarians

It was useful to interview librarians who directly worked with students on a daily basis. These librarians were in a much better position to relate to the kinds of work they performed with students. Librarians from both institutions were therefore interviewed for a meaningful understanding of how students were trained in information seeking and searching (Appendices A and B). These students were then selected purposively. To understand students' searching behavioural patterns, it was important to observe them when they were searching for information in on-line information retrieval systems. However, it was also important to learn from students whether they received information skills training. This in turn would give the researcher a better understanding of students' cognitive abilities to formulate search strategies. Students were therefore also interviewed.

5.3.2 Interviews with students

After having obtained the necessary data from librarians, students (participants) were interviewed to inform them of the procedures to be followed. To gain a better understanding of the kind of participant in the study, certain variables were important, e.g. gender, year level, strategies with assignments (Appendix C). Student participants from the different Faculties (in the case of the UWC) and subject areas (in the case of the PENTECH) were then given search topics relevant to their Faculties and subject areas respectively (Appendices E to T).

5.3.3 The thinking - aloud method



Data collection methods included think-aloud (verbal) protocols and videotaped interaction with on-line information retrieval systems. Students' conceptualisation of whether the online retrieval system yielded the desired information perceived by them to be relevant was therefore captured. These data were transcribed.

Kucan and Beck (1997: 271) define a thinking aloud protocol as "...a verbal report than (*sic*)an individual produces in an effort to explain his/her behaviour while in the process of doing something..." Ericsson and Simon (1984: 11) were of the opinion that verbal protocols are thoughts brought into consciousness. Ideas are therefore made verbal. These authors furthermore stated that human beings in their conscious state of being process information so that "a cognitive process can be seen as a sequence of internal states

successively transformed by a series of information processes” (Ericsson and Simon, 1984: 11). Verbal reports basically deal with short-term memory, which can quickly be accessed, and the contents reported on (Pressley and Afflerbach, 1995). This is a method often used in clinical and counseling psychology (Cacioppo, Von Hippel and Ernst, 1997: 928) and research on the comprehension of texts (Whitney and Budd, 1996: 341).

5.3.3.1 The thinking - aloud method in Information retrieval research

There were a few researchers in information retrieval research in general and in particular information seeking behaviour research that applied the thinking-aloud method. These researchers mostly worked in a hypertext environment (Yang, 1997; Xie and Cool, 1998).

Xie and Cool (1998: 323) for instance found that a lot of insight was gained in terms of the “...problems encountered by searchers and the adaptive strategies they employ in such situations.”

Thinking-aloud methods and recording of dialogues have the advantage that everything is recorded in real-time (Ingwersen, 1992: 95). Ingwersen furthermore posits that complicated cognitive tasks, which take place during longer periods, can be more meaningfully analysed. The disadvantage is that this method is too obtrusive; it is inevitable that researchers need to train respondents in thinking aloud before real experimentation can take place. The fact that interaction between researcher and respondent is recorded (in this case the online information retrieval system and the participant), may result in long pauses from the latter. However, Ingwersen (1992: 95)

states that by “... means of training sessions it is thus possible to reduce the pauses to a minimum...” Participants were therefore given the necessary training before they were asked to perform online searches (Appendices E to T).

The work of Meichenbaum and Biemiller (1998), although not concentrating on information – seeking processes, was significant in terms of identifying the nature of thinking aloud while tasks were being performed. This so-called task-related speech also referred to as thinking aloud afforded me the opportunity to evaluate the cognitive processes of the thinking aloud individual.

5.3.4 Online monitoring

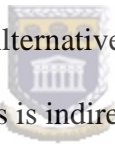


In addition to videotaping participants, their online search patterns were monitored by WINCAM 2000, an interactive software program that captures on screen searches. These transaction logs were also transcribed and printed out. The ideal would have been to analyze the transaction logs in real time with the verbal protocols. However, the product (WINCAM 2000) was only available on a trial basis. Despite this disadvantage the printed transaction logs were compared to the transcribed think-aloud protocols. The most appropriate methodology and data collection methods therefore had to be adopted to ascertain in real-time how students formulated search strategies, searched for the desired information and determined which records were relevant. It was important to determine how students searched for information in real time.

According to Borgman (Information Research, 1988: 143), although online monitoring is a useful method for gathering data, there are problems that are inevitable. The online searcher's permission is usually needed, as the researcher would collect "data on user identity, which allows the manipulation of personal characteristics variables..."

(Information Research, 1988: 143). In a case like this the sample size will be limited. On the other hand, the researcher could "...collect a larger sample without any data on the identity of the user, thereby losing valuable correlations" (Information Research, 1988: 143).

Tom Wilson (2002a) suggests that a researcher can log information directly, that is during searching, videotape thinking - aloud, while capturing searches on the screen.

Wilson sees this as direct observation.  Alternatively, people can be asked to report what they observed during their searches. This is indirect observation. Obviously with both of these there are subjective tendencies. Indirect observations can carry more bias than direct observation. It is also likely that participants may forget what they recorded earlier. For this reason I did not require participants to report on their searches. The chances were that they would not remember what they had done. It was also important to capture the searches at the time of searching. This is the reason for the online monitoring and videotaped thinking - aloud to co-occur.

Although the ideal of this study would have been to observe actual patterns of information - seeking in a naturalistic sense, it was basically impossible owing to distractions from other users of the library resources. To Mellon (1990: 1), naturalistic

inquiry is “an in – depth study of people, situations, and events.” Naturalistic inquiry is therefore a methodology which has to do with the “why” question more so than with the “how” question. Other words to describe this methodology are qualitative, ethnographic, phenomenological, ecological, documentary and case study (Mellon, 1990; Tesch, 1992; Maykut and Morehouse, 1994). However, this particular study although a case study of a sample of students from two institutions, also investigates a phenomenon, namely the online search behaviour of students.

5.3.5 Information retrieval systems searched

The information retrieval systems searched by students included Library and Information Science Abstracts (LISA), the Automated Library Expansive Programme (ALEPH), Educational Resources Information Centre (ERIC), EBSCOHOST databases such as Academic Search Premier and Business Source Premier, EMERALD, On-line Public Access Catalogues (OPAC's), in general and in certain instances Internet search engines. I need to state here that it was not a requirement of the study for participants to search using search engines. They did so of their own accord, which will become clear in a later chapter. It is important to note that both institutions have these information retrieval systems on-line although the interfaces in terms of access differed.

5.4 Conclusion

In this study I was interested to hear what students were thinking while searching for information. The idea was to ascertain participants' level of cognition at the time of searching. Human thought processes cannot always be predicted just by observing behaviour because "... [t]he totality of human information processing also includes internal cognitive processes..." (Johnstone, Tate and Bonner, 2004). To try to get as close to an interpretation of these internal cognitive processes, searches were recorded at the same time of the videotaped thinking - aloud protocols. However, some observers believe that verbal protocols only report the thought processes of participants but do not explain them (Russo, Johnson and Stephens, 1989: 759).



Chapter six examines more closely one particular aspect of academic growth, namely student access to on-line information retrieval systems. The chapter concentrates on students' interaction with on-line information retrieval systems as reported by librarians at the UWC and the former PENTECH.

CHAPTER SIX

ONLINE SEARCHING BY STUDENTS: LIBRARIANS' PERSPECTIVES

6.1 Introduction

Chapter 5 highlighted the design of this study. It dealt with the rather complex thinking aloud method as adopted from Psychology and online monitoring in information retrieval.

The focus of this chapter is on students' online searching and their access to on-line information retrieval systems as reported by Faculty and subject librarians at the UWC and former PENTECH respectively.



6.2 Users of online information retrieval systems

Before online information retrieval systems can be designed "...the different kinds of users and the way in which users may wish to search or identify information" need to be understood (Rowley and Farrow, 2000: 95). Accordingly, any information retrieval system "should be used by the group of people for whom it has been designed" (Rowley and Farrow, 2000: 96). The authors identify different kinds of users as novice and expert. Novice users refer to those who have never made use of a specific system before. However, novice users could also refer to those who make use of these systems less frequently. The novice user needs simple and intuitive interfaces (Rowley and Farrow,

2000:97). User-system interaction is important for effective retrieval (Readings in Information retrieval, 1997: 1) and enabling users to formulate the right search strategy (Foskett, 1996:234).

6.2.1 Online searching

Librarians at the two institutions under investigation were asked to indicate how often students made use of the online information retrieval systems at their respective institutions. The response from the faculty librarians at the UWC was that students used the online systems on a daily basis. The response from the subject librarians at the former PENTECH ranged from *almost daily* but mostly OPACs to *not so regularly*. From these reports one would assume that students from both institutions were *au fait* with searching online systems. However, one can also deduce that students at the UWC were more familiar with searching online systems than those from the former PENTECH.

Expert users use information systems on a regular basis, making the former more familiar with the systems. Does this mean that the UWC students were experts? This certainly cannot be concluded just based on the reports from the librarians. Even though the reports from the librarians at the UWC indicated frequent information system usage, the students still needed to fathom the operational aspects of these systems as well as the relevance of retrieved records. In this regard librarians were asked about students' interaction with on-line information retrieval systems. Faculty librarians at the UWC observed:

- that older students tend to be reluctant to use computers
- computer illiteracy
- failure to understand keywords

- inability from some students to formulate search strategies
- reading problems
- synthesis problems
- misinterpretation of the topic
- ignorance about databases
- visual literacy problems
- anxiety when using computers

Subject librarians from the former PENTECH had similar experiences:

- students tend not to check similar call numbers especially when searching the OPAC if a particular book is not available
- students had problems with search strategy formulation
- computer illiteracy, e.g. not familiar with hardware and peripherals like using a mouse
- lack of search strategy
- lack of computer skills
- inability to break down assignments into keywords
- cognitive problems
- language problems

The language issue was an interesting observation by the concerned librarian. The study

however did not focus on language problems. It is interesting to note that in both the

cases with the UWC librarians and those of the former PENTECH a common problem

surfaced namely lack of search strategy formulation. Librarians were then asked to

indicate what kind of information skills training they offered to students. The librarians

from the UWC responded:

- I teach book education – indexes, encyclopaedias
- I bring printed forms for students to handle
- I introduce students to OPACs
- I teach library user education mainly traditional printed sources for 1st years
- Second year students and onwards are introduced to online databases
- I give basic library catalogue instructions for 1st years
- I introduce printed references like dictionaries and encyclopaedias and searching skills for 1st years
- I teach electronic databases to 2nd years and beyond
- Orientation of information sources to 1st year students
- Second year students and beyond are taught how to use indexes and abstracts and PowerPoint
- I teach the use of the library catalogue
- I teach students how to search on-line databases
- I teach students how to search electronic journals
- I teach 1st year students how to use the library catalogue
- I teach students how to identify keywords
- I teach basic book education

- I give bibliographic instruction
- I teach OPAC use
- I teach database searching techniques
- I teach user education

The librarians from the former PENTECH reported:

- My sessions with students are mostly informal
- I mainly explain to academic coordinators
- I explain to students in a classroom setting
- I arrange group sessions only with requests from lecturers
- My problems with logins for students prevent hands-on instruction
- I give demonstrations for more senior students
- I do not give instructions for 1st year students because they do not have computer skills
- Pentech only concentrates on 1st year students' writing and communication skills. Students are therefore given basic orientation only on 1st year level
- I liaise with Communications lecturers. These are in all faculties
- I teach students how to find information and citations

At the University of the Western Cape some attempts are made to teach students online searching, while at the former Peninsula Technikon basic library education is offered.

There also seems to be a lack of hands-on instruction for students regarding online searching.



Rowley and Farrow (2000: 98) point out that the “cognitive frameworks which users bring to interaction with information systems...are important...for learning and recall of system functions”. Most users are believed to be naïve. New users are also subject novices who have an “inability to appreciate what the system can be expected to contain” (Rowley and Farrow, 2000: 276). Users also sometimes ill – define the task at hand. This creates an element of uncertainty, which relates to:

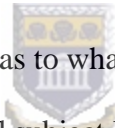
- what the user is likely to retrieve
- what the user is likely to accept as output from the process
- the search strategies proving the most effective

Librarians had to report on students' understanding of the task or assignment at hand. The following responses were received from the Faculty librarians at the UWC:

- It is really a 50 – 50 issue
- Most of the time students ask for my assistance
- Students have very little understanding of the assignment topic
- Students do not always understand; I try to encourage them to first use dictionaries and Encyclopaedias to understand the problem
- I help them most of the time
- Students do not understand. They always ask for assistance
- Students would come to me first instead of trying to figure out how to solve the problem
- Students ask for assistance, but understand most of the time

The subject librarians at the PENTECH responded:

- In very few cases; they often ask for assistance
- Most of the time students do not know
- I need to decode the question and analyse the topic
- Not always; Most of the time students ask for assistance
- Students most of the time ask me to interpret the assignment topic
- Students sometimes go to the shelves to browse without properly understanding the question



In both instances students are uncertain as to what the assignment or task entails. The support given to students by Faculty and subject librarians should also be coming from academics (lecturers) that assign these tasks to students. The question regarding lecturer support yielded the following from the University of the Western Cape librarians:

- I mostly phone lecturers who are quite approachable
- Other faculty librarians inform me but I hardly send students back to the lecturer
- Very little mediation from lecturers
- Sometimes some lecturers send their course outlines
- Not all lecturers are approachable
- Not much support from academics
- I send students back to the tutor or lecturer
- Not much from lecturers
- I rather try to determine what the problem is by speaking to the student directly

Responses from the librarians at the former Peninsula Technikon yielded:

- I usually send students back to the lecturer to find out what the assignment is all about
- Lecturers tend to set up assignment topics without checking whether the information is available
- Not much mediation; I send students back to lecturers

- Very little. Lecturers merely give assignments and expect students to find relevant information

Again these responses were quite similar. There appears to be very little communication between academics and librarians at both institutions. However Faculty librarians pointed the following out:

- I always inform lecturers of new developments
- I serve on the faculty library committee
- I send invitations to lecturers all the time
- Lecturers respond very poorly
- I phone lecturers or the contact person in each department of the faculty
- Unfortunately we have no library committee but I attend academic departmental meetings
- I have a sound relationship with lecturers, especially senior ones
- Lecturers do not speak to me directly; rather send students with their problems
- I liaise with lecturers quite regularly, trying to get their attention regarding student problems
- Good relationship with lecturers and liaise quite often
- Liaise quite often except for one department because 1st year students are sent to the library for information literacy training

It therefore appears that librarians communicated fairly well with academics. However, the situation was slightly different at the former Peninsula Technikon:

- Not much liaison with lecturers. Coordinators liaise with lecturers and Heads of departments
- Almost never. Only when students come to me with topics they do not understand. I usually refer them back to the lecturer
- I approach lecturers myself, because they hardly contact the library
- I usually meet with HOD's and the Deans, hardly with lecturers
- I sometimes attend departmental meetings to talk to academics; once a semester

Clearly librarians were more proactive than academics in both instances, although it seems that there were more problem areas at the Peninsula Technikon regarding responses from academics.

Rowley and Farrow (2000: 276) argue that students struggle even more when searching for information on the Internet in that:

- designers of databases do not know who the user is

- the user does not understand how the search engine conducts a search

It is therefore important that users progress from subject domain novices and computer novices to subject experts and computer experts. Developers of information retrieval systems should be aware of the degree of knowledge of the user. It is for this reason that the domain experience should be “reflected in the design of user interface prompts, alerts and help facilities” (Rowley and Farrow, 2000: 276).

Librarians were asked what students’ strategies were when searching for information in databases. Faculty librarians reported:

- I have to remind students most of the time to look for keywords
- There is a huge problem with formulating keywords
- Students tend to type the whole sentence of the assignment topic
- Students tend to type in whole sentences especially with advanced searches
- Some know, but most of them struggle
- Students have no clue how to formulate search strategies

Subject librarians stated:

- Some know how but most of the time I need to prod them on
- Students generally go directly to the Google search engine
- I usually formulate search strategies for students

Although not all librarians responded to the question, the general perception is that students had no idea of how to formulate a search strategy.

6.3 Online Search Services

Li (1985: 6) remarks that the growth of on-line search (retrieval) services can be ascribed to three technical developments. These are:

- large capacity computers with disk-storage for time-sharing at low cost
- software for machine – readable databases and interactive capability
- telecommunications to link the terminals of users in many locations with a single computer

It is especially telecommunications links that bring about effective online retrieval services (Li, 1985: 6). However, the speed at which searches are conducted depends on the “...computer’s speed, storage capacity, greater accuracy, and computer processing...” (Li, 1985: 6). Effective results are therefore dependent on efficiency of the tools used. Baeza-Yates and Ribeiro-Neto (1999: 7) posit that libraries were pioneers in adopting information retrieval systems for retrieving information. Although academic institutions first developed these systems, vendors became more involved with their production (Baeza-Yates and Ribeiro-Neto, 1999: 7). In fact access to databases is increasingly being provided by Online Search Services. Rowley and Farrow (2000: 279) distinguish among at least five types:

- ***Supermarket online search services***
 - Examples include DIALOG, DATASTAR and QUESTEL Orbit
 - These services are mostly tailored to specific markets
- ***Specialist Online Search Services***
 - Examples include DBE – LINK, which gives access to German language and other European databases
 - These services also give access to business and financial databases like ICC

- ***Publishers as search services***
 - These services basically refer to Publishers who offer information services
 - Examples are EBSCOsearch, Information Access Search and UMI'S Proquest Direct
- ***Platform Independent Search Services***
 - These provide access to CD-ROM databases, the Web and Client servers
 - Examples are OVID Technologies and Silver Platter.
- ***Bibliographic Services***
 - Provide services to specific communities
 - Offers a select range of databases, usually at special rates
 - An example is OCLC First Search



The services subscribed to by the University of the Western Cape and the former Peninsula Technikon are mostly Publisher related and Bibliographic. These services as reported by the librarians are:

The University of the Western Cape

- INFOTRAC
- SABINET
- SCIENCE DIRECT
- EBSCOHOST
- EMERALD
- SABINET
- OTHERS – Students are referred to the IT centre
- SCIENCE Direct
- EBSCOhost – Academic Search Premier
- EBSCOhost – Health Sources, Academic Search Premier, MEDLINE
- EBSCOhost – Academic Search Premier, ERIC, Masterfile, Infotrac
- NEXUS for dissertations and theses
- CALICO Library Catalogues
- EBSCOhost – Academic Search Premier, Business Source Premier
- Butterworths Online
- Mostly printed sources

The former Peninsula Technikon

- PUBMED
- ENCARTA – ENCYCLOPAEDIA
- WILSON – DISC
- EBSCOHOST - Library
- EMERALD - Library
- SABINET – IT centre
- CALICO Library Catalogues
- OTHERS – Students are referred to the IT centre
- EMERALD - Library
- SABINET – IT centre
- EMERALD – Library
- INTERNET (PDF format) – IT centre

Librarians reported that students have access to some databases in the library and others outside of the library as indicated. Librarians would therefore have no control on searches by students other than in the library.



6.3.1 Choice of Online Search Service

Users of online databases usually have to choose among a wide range of search services and databases. The first step is to identify the database that covers the subject area.

However, sometimes users have to consult and identify other databases at the same time if the required information is not found. According to Rowley and Farrow (2000: 281), this would often require the skills of experienced searchers. The inexperienced searcher often finds it difficult to identify relevant databases (Meadow, Boyce and Kraft, 2000: 292). They suggest that users often fail to retrieve useful information because of the wrong choice of database (Meadow, Boyce and Kraft, 2000: 293). Librarians at both the UWC and the former PENTECH were asked to comment on the kind of support students

were given in terms of selecting the appropriate database when searching for information.

Comments from Faculty librarians at UWC were:

- Sixty percent of the students takes initiative; a small percentage comes back
- Forty percent of the students asks me to assist them
- I have a manual for book education in terms of reading a topic
- Initially students would approach me especially at the beginning of academic year
- They would later go to the computer just to show peers that they are computer literate
- Students have no real searching skills; I have to do their searching for them
- I do not do searches for students
- I encourage students to do their own searches
- I only assist when students get stuck
- Students always ask me; they cannot formulate search strategies on their own
- Some students have anxiety problems with computers
- Students mostly approach me for the formulation of search strategies
- Some students have serious problems with searching on their own
- Students tend to type in the first name of the author
- When stuck students usually approach me
- I help students all the time; they never search on their own
- Students tend to go to the computer first before approaching me

Clearly, librarians were aware of the kinds of problems students were grappling with.

However, there was no uniformity in the approach adopted to assist students other than to

search on the students' behalf. The librarian, being experienced would search in more

than one database often not pointing out why a particular search engine or database was

used. The case for the former PENTECH did not seem any different:

- Despite the difficult subject field, the student doesn't really approach me
- With Internet searches, the students often approach me
- In certain disciplines 2nd years are taught by lecturers how to approach information retrieval systems
- Students mostly approach me to assist with the search
- Students are generally lazy; they don't want to use the skill
- Students assume that I am there to do the searches for them
- Students use the OPAC most of the time
- They either ask friends to help or search on their own
- They hardly approach me, only when they get stuck
- Quite an influx of students who would most of the time approach me
- There is a problem with one – to – one assistance
- Can reach more students in a classroom setting
- Very few students are computer literate

In the case of the former PENTECH, once again there was a lack of uniformity. Some librarians helped students to do searches; others referred students to the OPAC, although in most cases the librarian had to do the actual searching. Since the OPAC is a commonly used medium for searching, the next section briefly describes Interfaces.

6.4 Information Retrieval System Interfaces

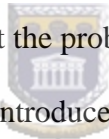
Meadow, Boyce and Kraft (2000: 293) define an interface as “something that lies between two entities.” Computer systems which interact with users have interfaces.

These interfaces enable the user to interact with the system. One can therefore conclude that an interface is interactive. Three basic generations of interfaces are identified in the literature. According to Baeza- Yates and Ribeiro-Neto (1999: 7), the first generation is derived from traditional catalogues or computerized circulation systems. These systems “expected exact matching of terms and were intolerant of user mistakes” (Rowley and Farrow, 2000: 296). The systems mostly catered for known-item searching, so-called menu-based searching with limited search facilities.

Second generation OPACs provided much better search facilities, which were based on keyword searching and post coordination of keywords (Baeza-Yates and Ribeiro-Neto, 1999: 7). In addition, these systems facilitated searching by subject heading and complex queries. The second-generation interfaces provided for hypertext and open system architectures (Baeza-Yates and Ribeiro-Neto, 1999: 7). However, although these second-generation interfaces worked through a command language and were menu-based, two

problem areas were identified (Rowley and Farrow, 2000: 297). One involved difficulty with browsing and the other brought about the fact that the searcher had to operate through different menu screens.

The third generation OPACs operates natural language interfaces, which allow users to input search strategy as natural language. These interfaces and facilities were further improved with the introduction of Graphical User Interface (GUI) – based OPACs. Brooks and Belkin (1983: 31) actually suggest an information provision mechanism (IPM), which “...should simulate some of the functions that a human intermediary performs in the document retrieval situation.” Allen (1996) argues that designers of information systems often “...add on a user interface that they hope will reflect a user model or user preferences.” It seems that the problem often lies with poor information systems design than with the interfaces introduced.



6.4.1 User interfaces

Users often are only interested to find the desired information when searching databases. They therefore do not need to know “...interior intricacies of the system...” (Meadow, Boyce and Kraft, 2000: 18). What this entails is that the user is in direct contact with the interface. Meadow, Boyce and Kraft (2000: 18) are therefore of the opinion that designers of computer interfaces should make “...best use of the user’s own perceptions and understanding of what is being dealt with.” Brophy (2001: 99) posits that these interfaces should “...enable users to formulate complex search strategies, provide advice

and feedback and be constructed to reflect the individual user's preferences and interests." This certainly would call for sophisticated user interfaces, which is already a reality with Internet search engines, but not yet developed with databases subscribed to by the UWC and former PENTECH.

In the case of students' academic needs and whether these were addressed by the information retrieval systems at their respective institutions, librarians at the UWC reported:

- I would think so; In training students are advised to know which databases are useful e.g. SABINET
- Interface change not always user-friendly
- The screen is sometimes cluttered
- The former used system PALS is better than ALEPH
- Students mostly get the information from the databases
- The problem is not with the databases
- Students sometimes expect to find the information on-line, where in some instances databases are not full text
- Yes. The problem lies with the student who doesn't seem to understand the dynamics
- There are conceptual problems on the part of the student
- Yes, the problem is with the student
- Some basic criteria hold for databases
- Students have cognitive problems

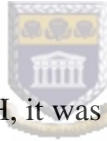
Subject librarians from the former PENTECH reported:

- I would think so; the problem lies with the student
- Yes, although search strategies play an important role
- Yes, especially SABINET
- However, students still have the inability to find the information in the journal
- Not really
- There is a need for more databases
- Students need to have more computer skills

Again the similarities in the responses are quite remarkable. Some librarians at the former PENTECH felt that even though students received the desired citations they still had problems in finding the relevant journal on the shelves. One librarian remarked that computer skills were inadequate.

6.5 Conclusion

In this chapter it was found that although students have access to existing online information retrieval systems at the University of the Western Cape and the Peninsula Technikon, reports from librarians at both institutions indicated problem areas. These problem areas stem directly from the lack of skills in information searching of students as perceived by the librarians. Librarians at both institutions furthermore reported that they experienced a lack of support from academics especially with regards to mediating with assignment topics. From these reports, although some librarians felt that online information system interfaces were not user friendly enough, the overall feeling was that the problem basically lay with the student.



At both the UWC and former PENTECH, it was found that very little support comes from lecturers in terms of the academic programme. Librarians often have to take the initiative to be proactive in liaising with lecturers. At times these librarians also have to play a mediating role with the interpretation of students' assignments.

Chapter 7 examines student participants' actual searching and search behaviour as videotaped and monitored online.

CHAPTER SEVEN

TRANSACTION LOGS AND VERBAL PROTOCOLS OF STUDENT

PARTICIPANTS: PRESENTATION OF DATA

7.1 Introduction

Chapter 6 set the scene for the presentation and interpretation of data relating to this study.

The previous chapter therefore concentrated on librarians' perceptions of students in the latter's search for information in databases and OPACs.

In this chapter, the verbal protocols and online transaction logs of student participants are presented. The chapter is divided into two major sections. The first section deals with quantitative issues, in particular descriptive data. The second section concentrates on qualitative issues, notably transaction logs and verbal protocols.

7.2 Gender and year level distribution

This section gives an indication of the students who participated in this study. Data are given in tables, figures and charts. Illustrations of search categories and IR system categories are presented in figures and charts. The data that are presented in this section are demographics such as gender and year level. The distribution of the gender groups at the two institutions is given in Table 1.

TABLE 1 GENDER DISTRIBUTION

INSTITUTION	MALE	FEMALE	TOTAL
PENTECH	12	6	<i>18</i>
UWC	11	9	<i>20</i>
TOTAL	<i>23</i>	<i>15</i>	<i>38</i>

It is significant to note that males outnumbered females in both the total number of participants across the two institutions as well as per institution. A common reason given by librarians is reluctance from some female students to participate owing to the videotaped recordings and the fact that they had to talk aloud.

TABLE 2 YEAR LEVEL DISTRIBUTION

INSTITUTION	1ST	2ND	3RD	4TH	BTECH	TOTAL
PENTECH	5	5	4		4	18
UWC	6	6	6	2		20
TOTAL	<i>11</i>	<i>11</i>	<i>10</i>	<i>2</i>	<i>4</i>	<i>38</i>

The distribution across year levels in Table 2 is relatively the same between the two institutions, although 1st and 2nd year level students were in the majority. In Table 3 this difference can be more clearly seen between the gender groups within and across institutions in terms of year level. As can be seen from Table 3, none of the year levels within the institutions dominated in terms of frequency. However, for frequencies in terms of year levels, 2nd year males and 1st year females across the two institutions seemed to dominate. The reason ascribed to this was reluctance from students on the more senior year levels.

TABLE 3 GENDER AND YEAR LEVEL DISTRIBUTION

INSTITUTION	MALE				FEMALE				TOTALS
	1 ST	2 ND	3 RD	4 TH	1 ST	2 ND	3 RD	4 TH	
PENTECH	2	4	3	3	3	1	1	1	18
UWC	4	3	3	1	2	3	3	1	20
TOTALS	6	7	6	4	5	4	4	2	38
		23				15			

7.3 Results from interviews with student participants

Prior to observing the actual information searching behaviour of student participants, the latter were interviewed. The data from these interviews are presented in Charts 1 to 12.

The idea behind interviewing student participants was to find some understanding of their strategies when given assignments by academics. Some of the questions that needed answers are presented in Appendix C. These questions were important to determine students' existing information and academic literacy skills. Since students were purposively selected, it was not necessary to determine their computer literacy skills. In other words, all students in the study were computer literate.

Student participants had to indicate which strategies they adopted when they were given assignments. Chart 1 illustrates the approaches adopted by the gender groups at the two institutions.

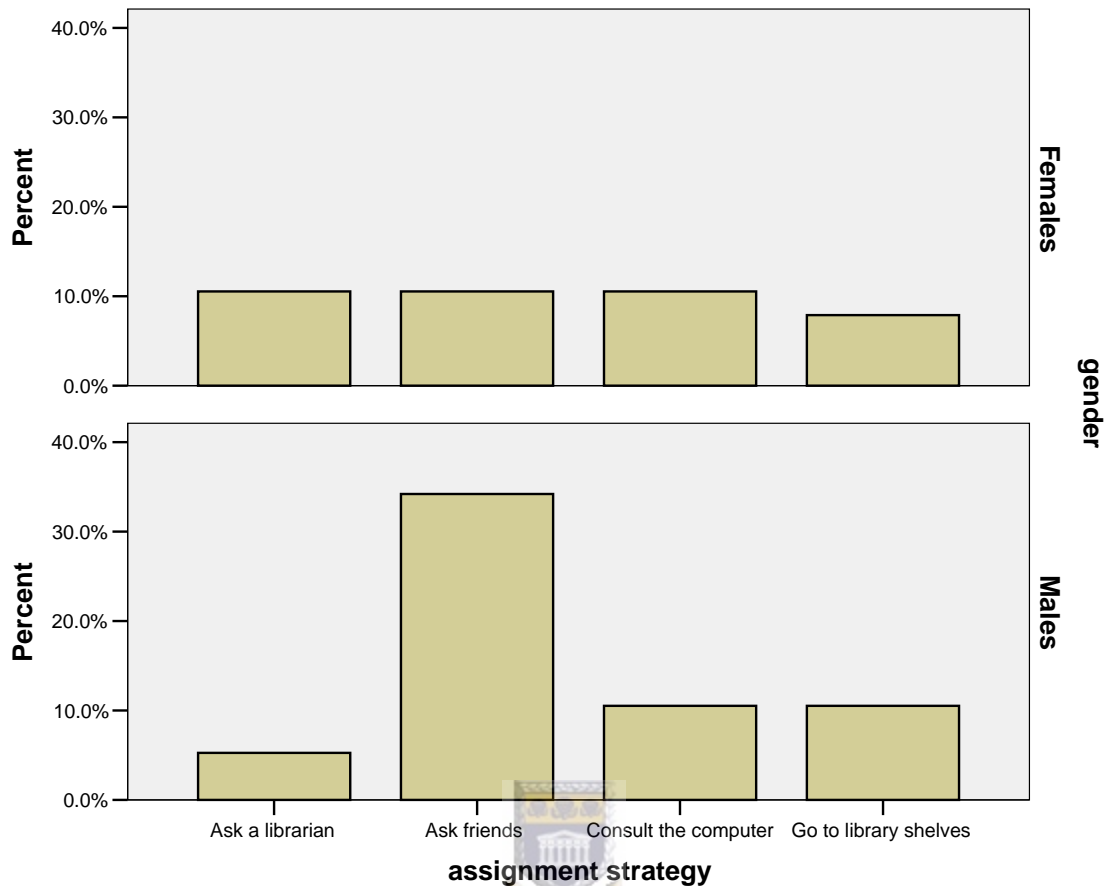


Chart 1: Assignment strategies among Gender groups

Significantly males tend to consult friends when given assignment topics. With females there was no significant method adopted. Importantly however, is the fact that librarians were consulted. Females also tend to use own initiative when searching for information.

It seems that students hardly make use of computer searches to search for information.

Note for instance in Chart 2 that 2nd year students tend to consult their friends more often than any of the other approaches. Although the percentages are low, very little attempt is made to use information retrieval systems. Fourth year students tend to go to the shelves for information, while 3rd year students tend to ask friend for help and make use of the computer. First year students would prefer consulting librarians and friends.

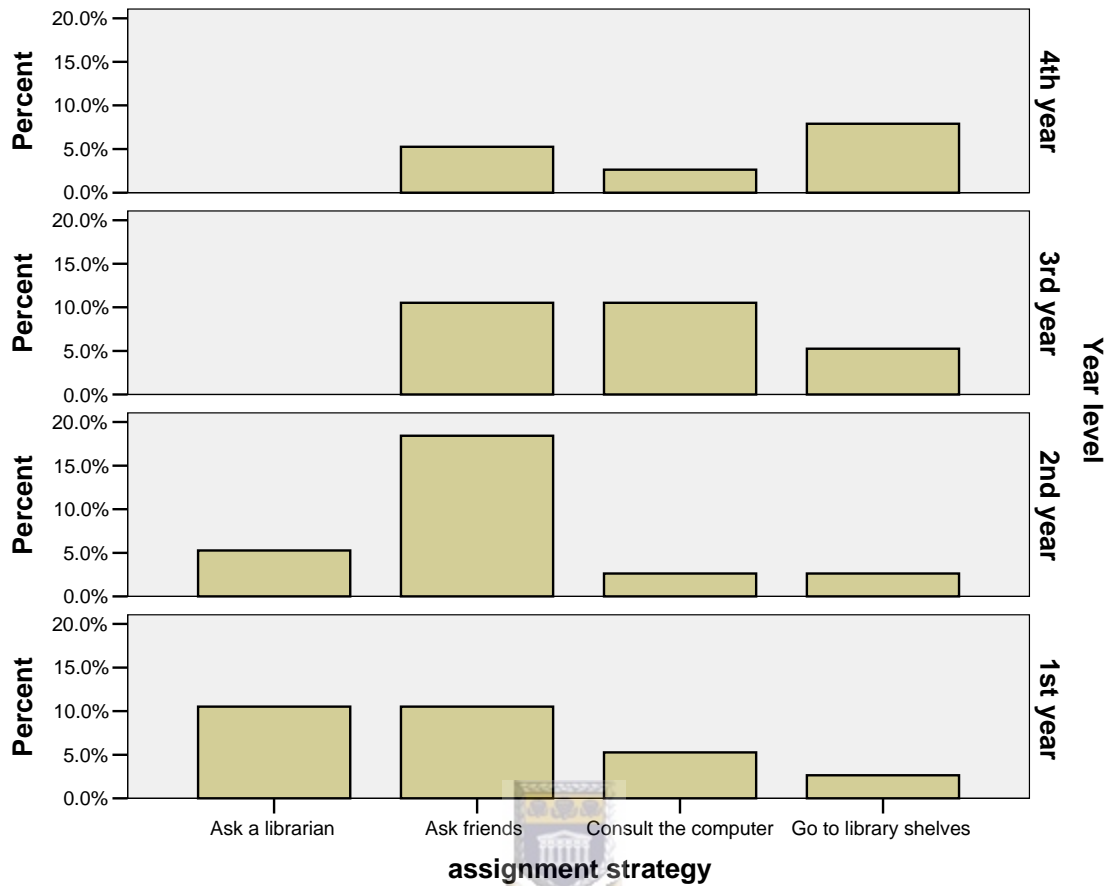


Chart 2: Strategy adopted by various year levels

Some of these results reflect what some librarians had to report. Clearly students tend to consult friends more so than they would librarians. Significantly none of the students indicated that they consulted their lecturers. The significance of these approaches can be seen more clearly from the illustration in Chart 3. It should be noted that this chart deals with a comparison of assignment strategies of student participants from the Peninsula Technikon and the University of the Western Cape. At both institutions student participants tend to rely more on asking friends for assistance than to consult librarians or directly use computers to search for information. It is however not clear why they chose these options and needs further investigation.

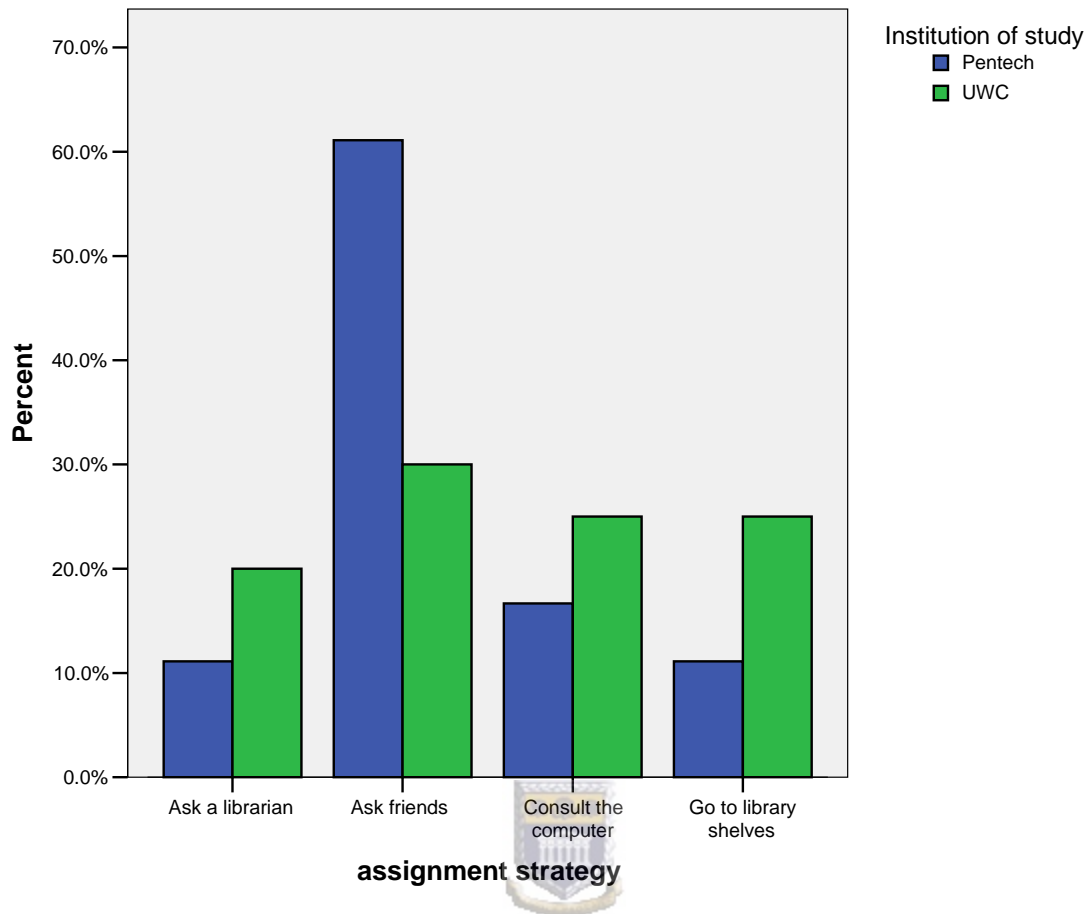


Chart 3: Assignment strategies compared

In Chart 4 an indication is given of the kind of sources students reported that they make use of when searching for information in the library. The idea was to find out what students information – seeking strategies were on the various year levels.

Fourth year students had no particular preference for the kind of sources used in the library. However, 1st 2nd and 3rd year students all made use of books more than journals. This verifies both the findings in the studies of Ruth (1997) and Sayed (1998).

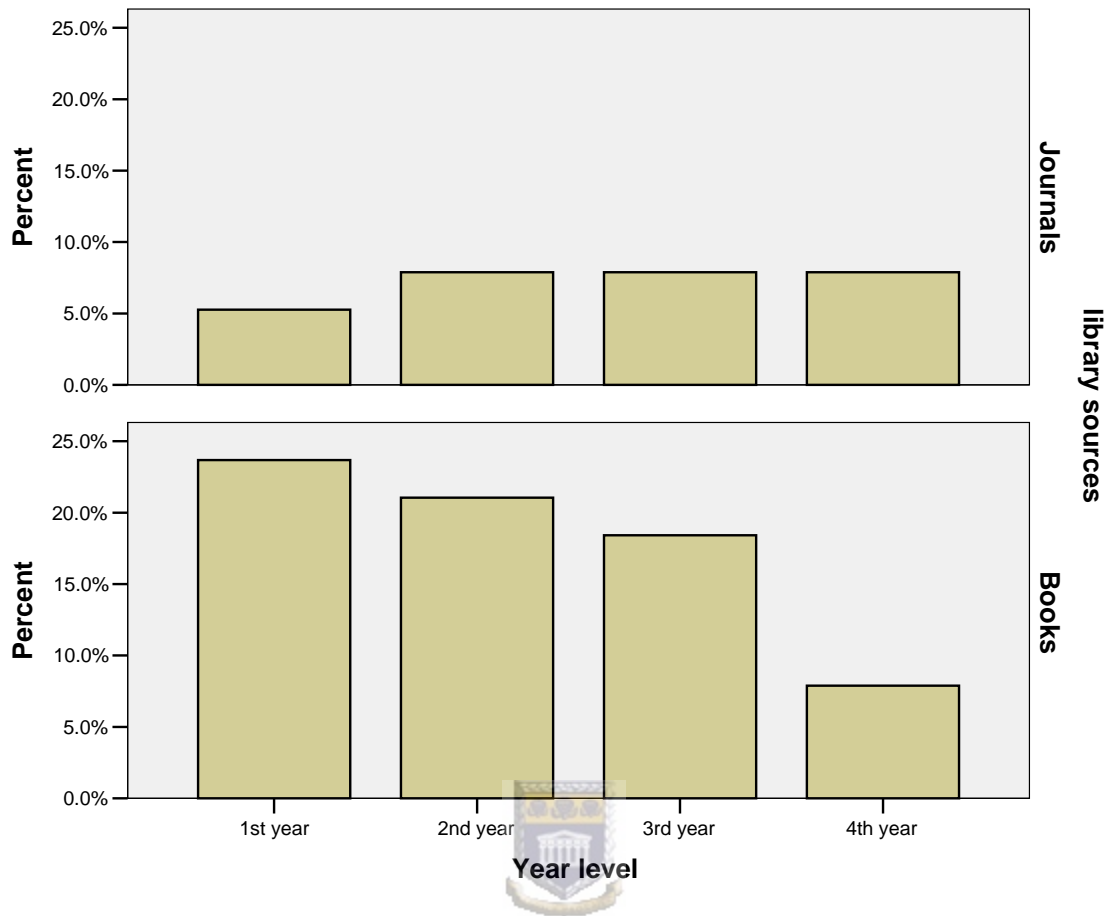


Chart 4: Library sources used across year levels

Chart 5 reveals that students from the PENTECH tended to search books more than Journals. It is also significant to note that more than 80% of the students from PENTECH reported that they used books mostly, while 60% at the UWC reported likewise. Very few students from the PENTECH as reported therefore make use of journals to search for information. However with the UWC students in this study similar results manifest themselves. Although the percentages are slightly lower than those of PENTECH, it is clear that students prefer searching for books.

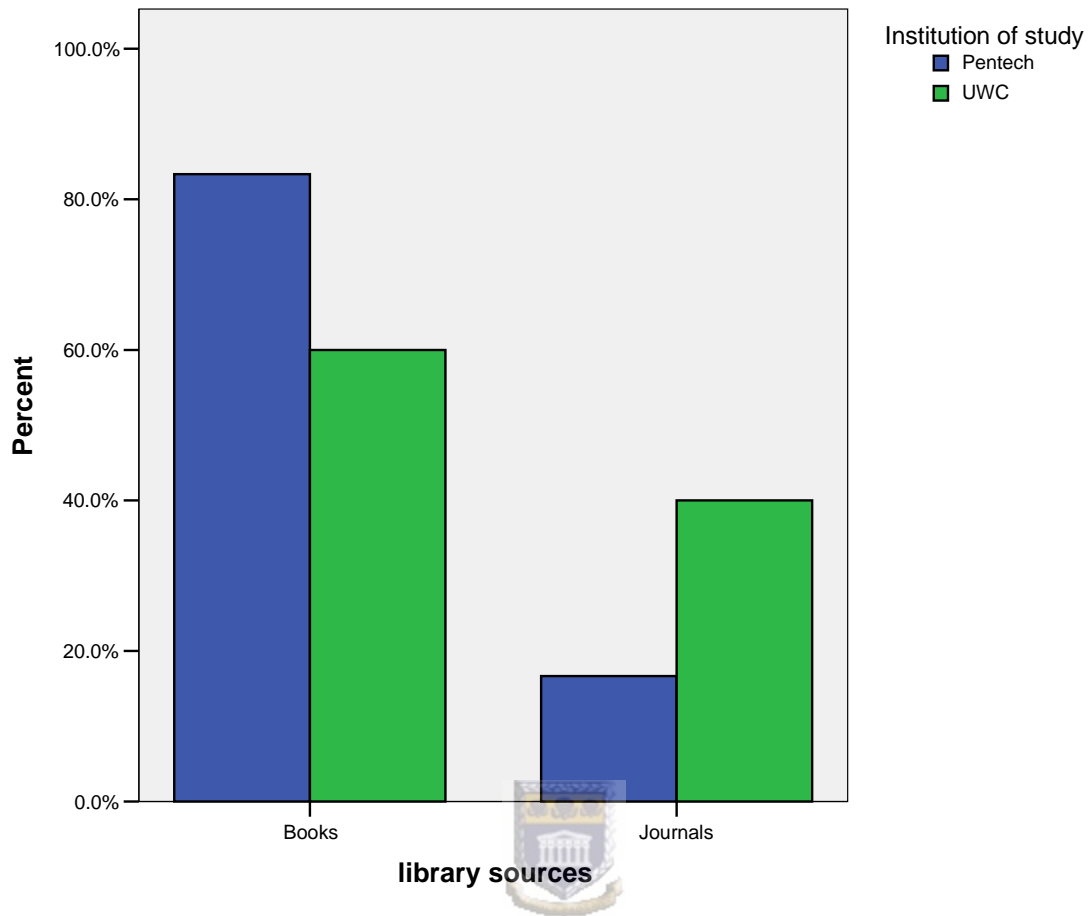


Chart 5: Library sources consulted

The question whether the information found in either books or journals was relevant yielded results as reflected in Chart 6. A close scrutiny of Chart 6 indicates that relevance in terms of information found in journals is relatively low across the year levels 1 to 3, but then steadily increases towards the 4th year level. Relevance in terms of books decreases from the 2nd year to the 3rd year and remains constant for 4th years. Significantly, 1st year students reported that they do not always find relevant information in books; neither do they sometimes find relevant information.

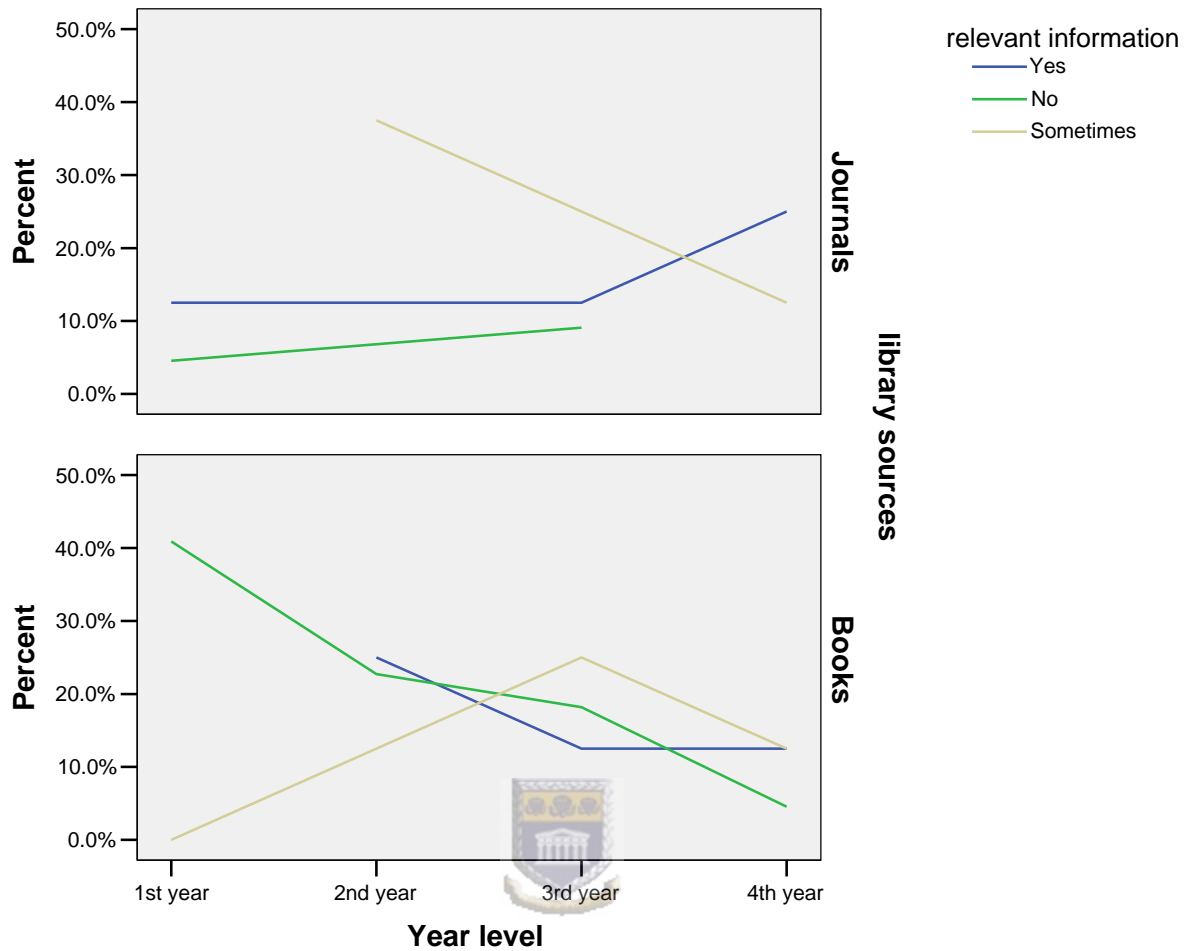


Chart 6: Relevant information sources across year levels

The students at the two institutions had dissimilar reports regarding relevant information in books and journals. Chart 7 illustrates the difference among students at the two institutions.

Students from the UWC reported no significant difference in finding relevant information in books and journals, while the PENTECH students found more relevant information in books. A significant percentage of students indicated that they sometimes found relevant information in journals.

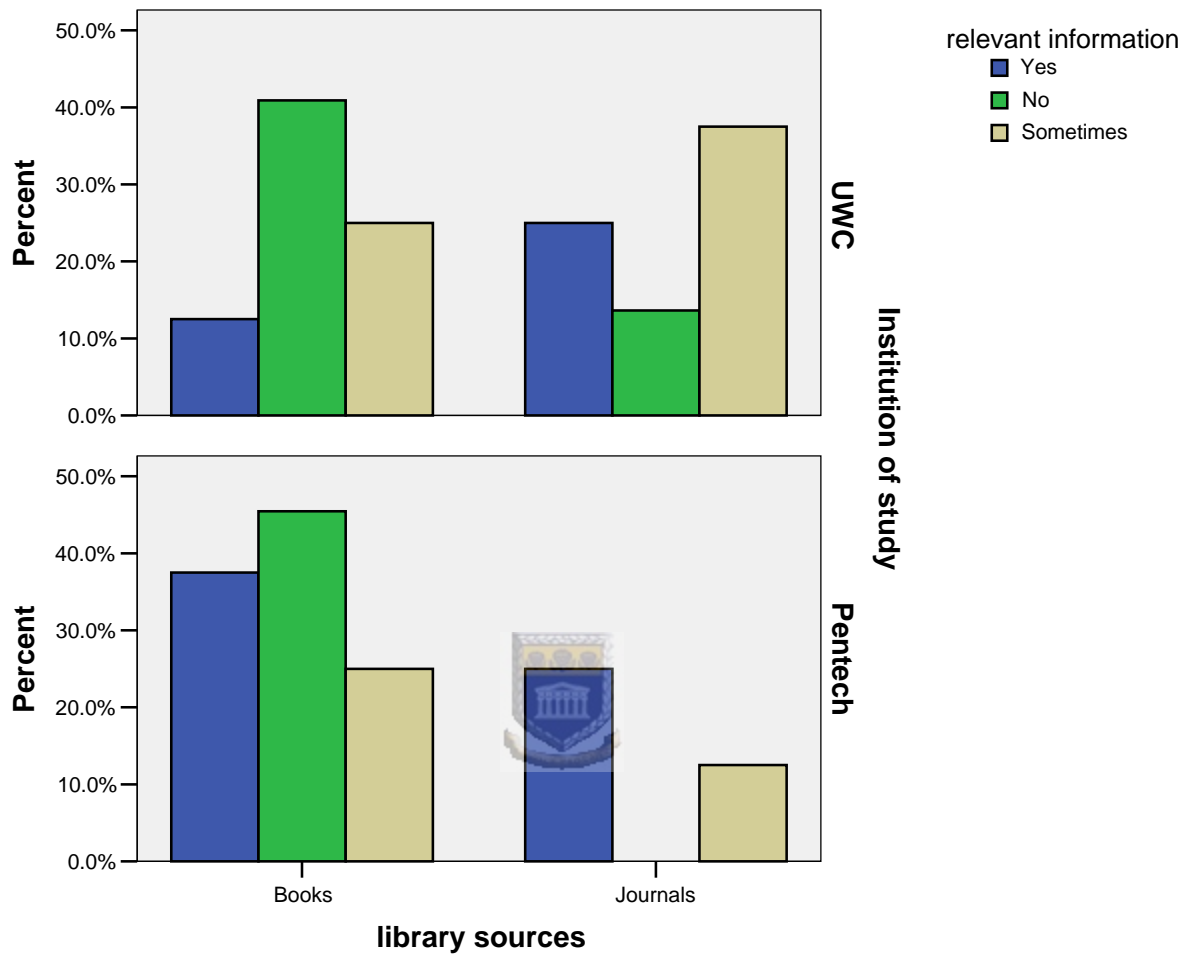


Chart 7: Relevant information sources at PENTECH and UWC

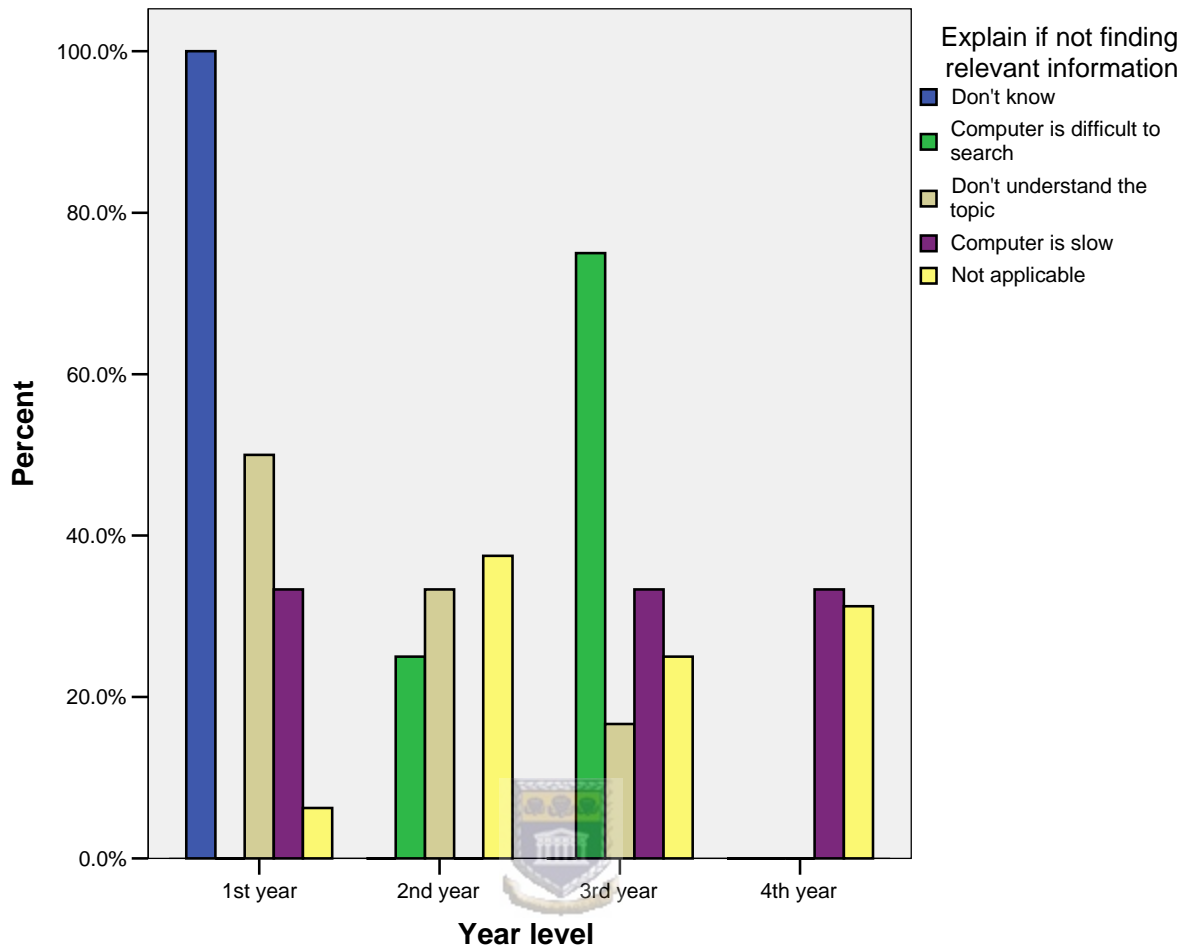


Chart 8: Year level reasons for not finding relevant information

Those students who reported that they failed to find relevant information in either books or journals were asked to explain the reasons why they thought this was the case. Chart 8 reflects the responses from the different year levels.

All the first year students who reported non – relevance reported that they did not know what the reason was. Almost 50% also indicated that they do not always understand the topic. Significantly a high percentage of 3rd year students reported that the computer was difficult to search. What they meant was that it was difficult to find information from

databases. Almost 40% of students on 1st, 3rd and 4th year levels indicated that the computers were most of the time slow. About 40% of 2nd year students reported not understanding the topic.

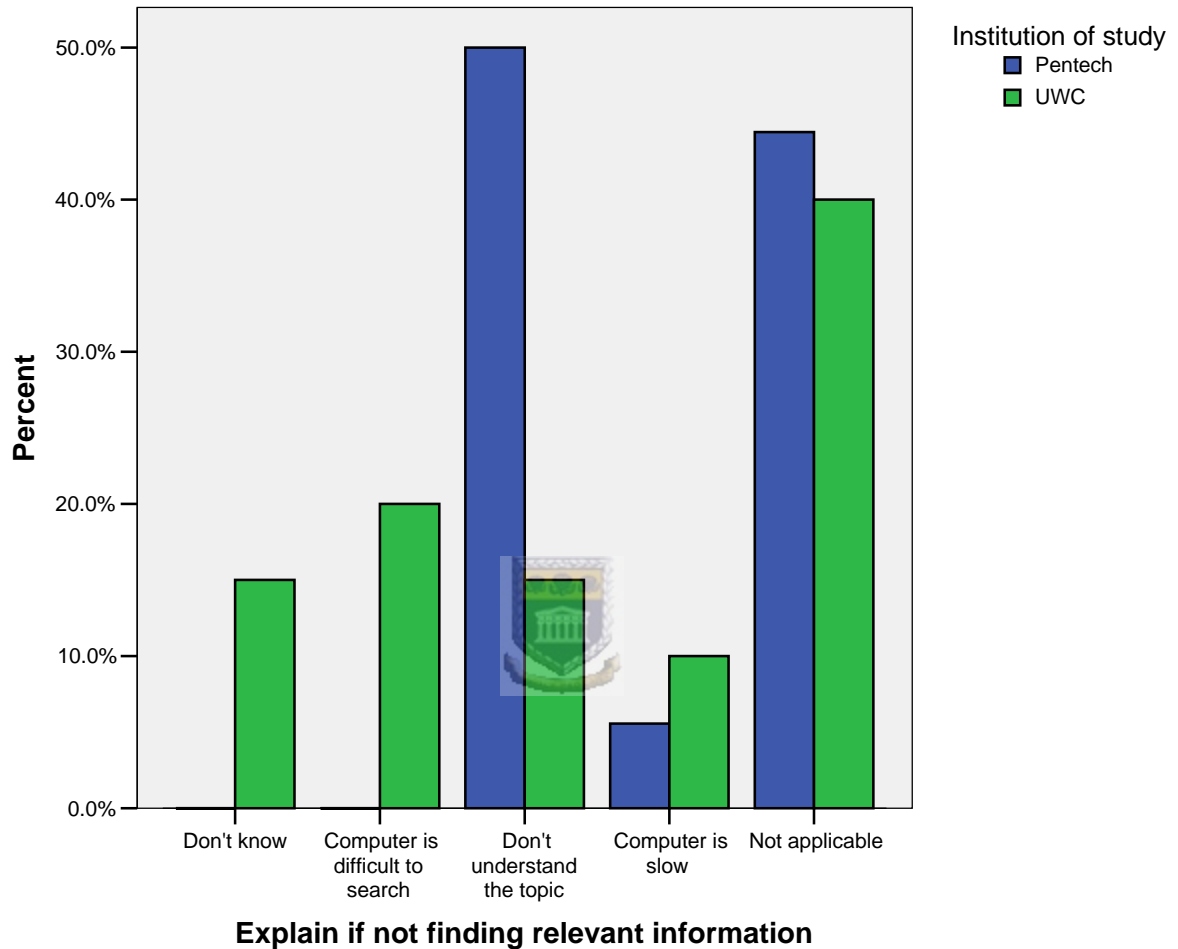


Chart 9: Reasons on institutional level for not finding relevant information

Students from the PENTECH mostly did not understand the topic as evident from Chart 9.

On the other hand, students from the UWC found computers difficult to search.

Student participants had to report whether they conducted their own online information searches. It was made clear to them that this kind of searching would refer to database and OPAC searching. In Chart10 the reports from students on the different year levels at the two institutions are illustrated.

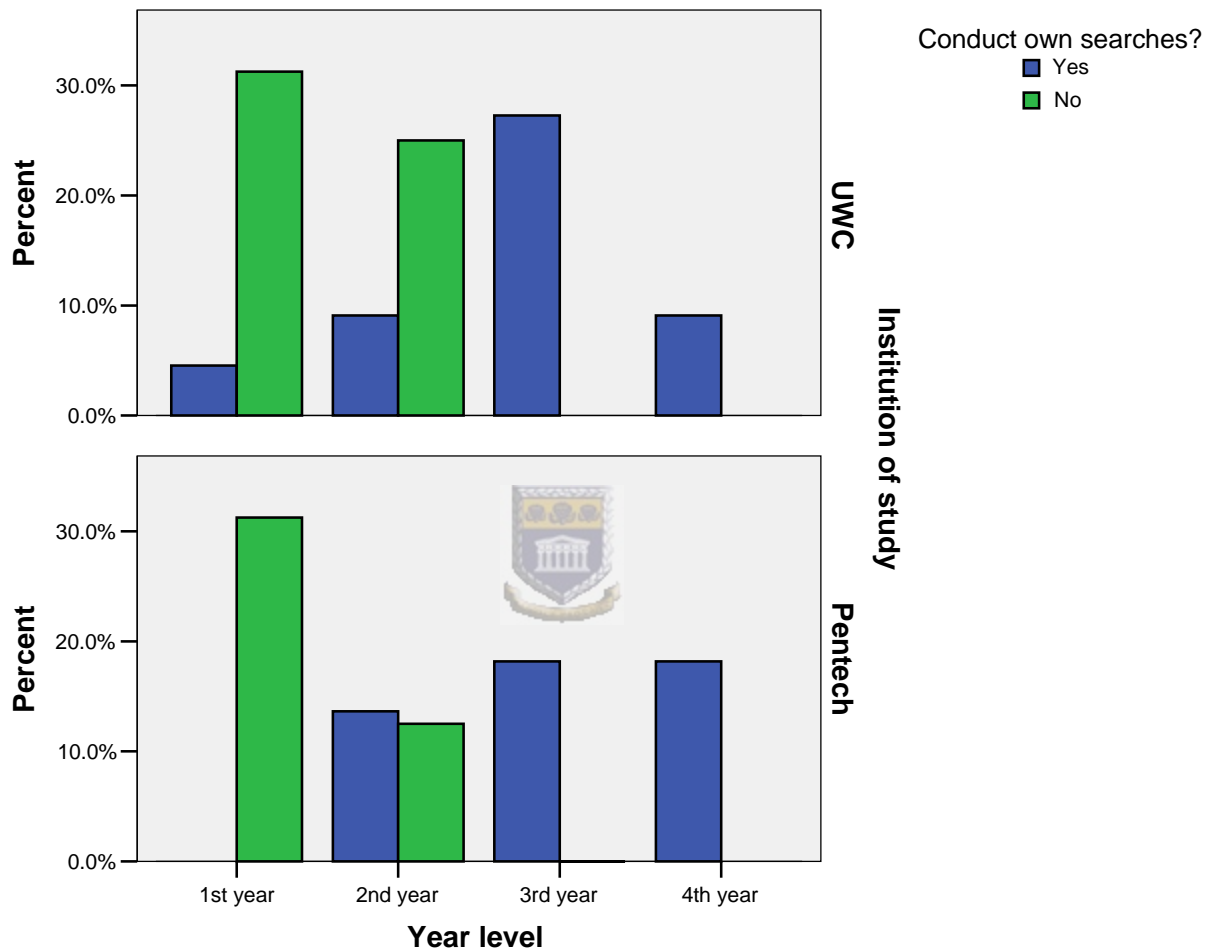


Chart 10: Online searching on institutional year levels

It is significant to note that there was no difference between the reports of 1st year students who indicated that they did not do their own searching. However, more students on 2nd year level from the UWC indicated that they did not conduct their own searches. A higher percentage of students from the UWC than from the PENTECH on 3rd year level reported

that they did their own searching. Fourth year or B. Tech students from PENTECH had a higher percentage than those from UWC in terms of doing their own online searching.

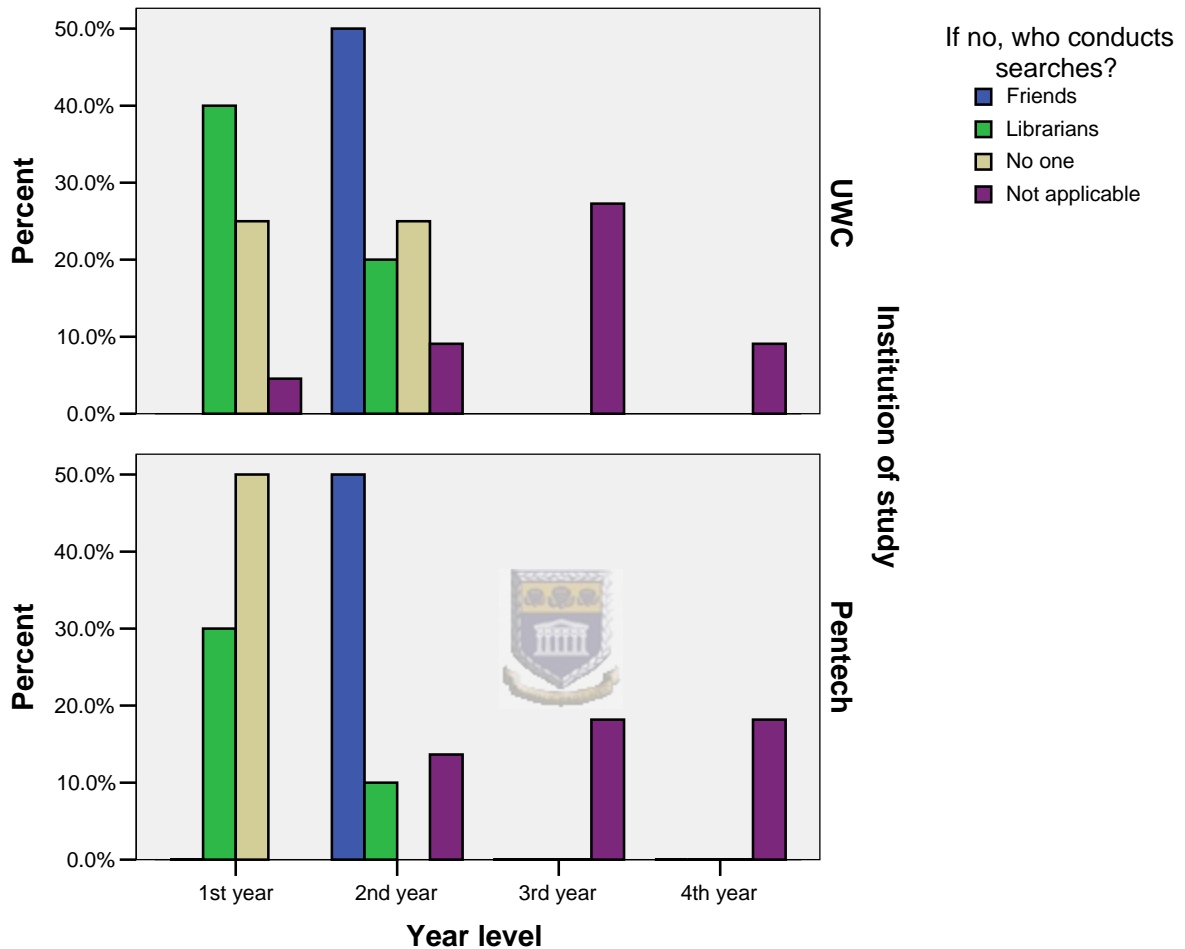


Chart 11: Searches conducted on students' behalf

From Chart 11 it is clear that 1st year students, who indicated that they did not search on their own, consulted librarians. However, a significant percentage of 1st year students at both institutions reported that no one searched on their behalf. Second year students depended more on friends assisting them in searching. Third and fourth year students conducted their own searches.

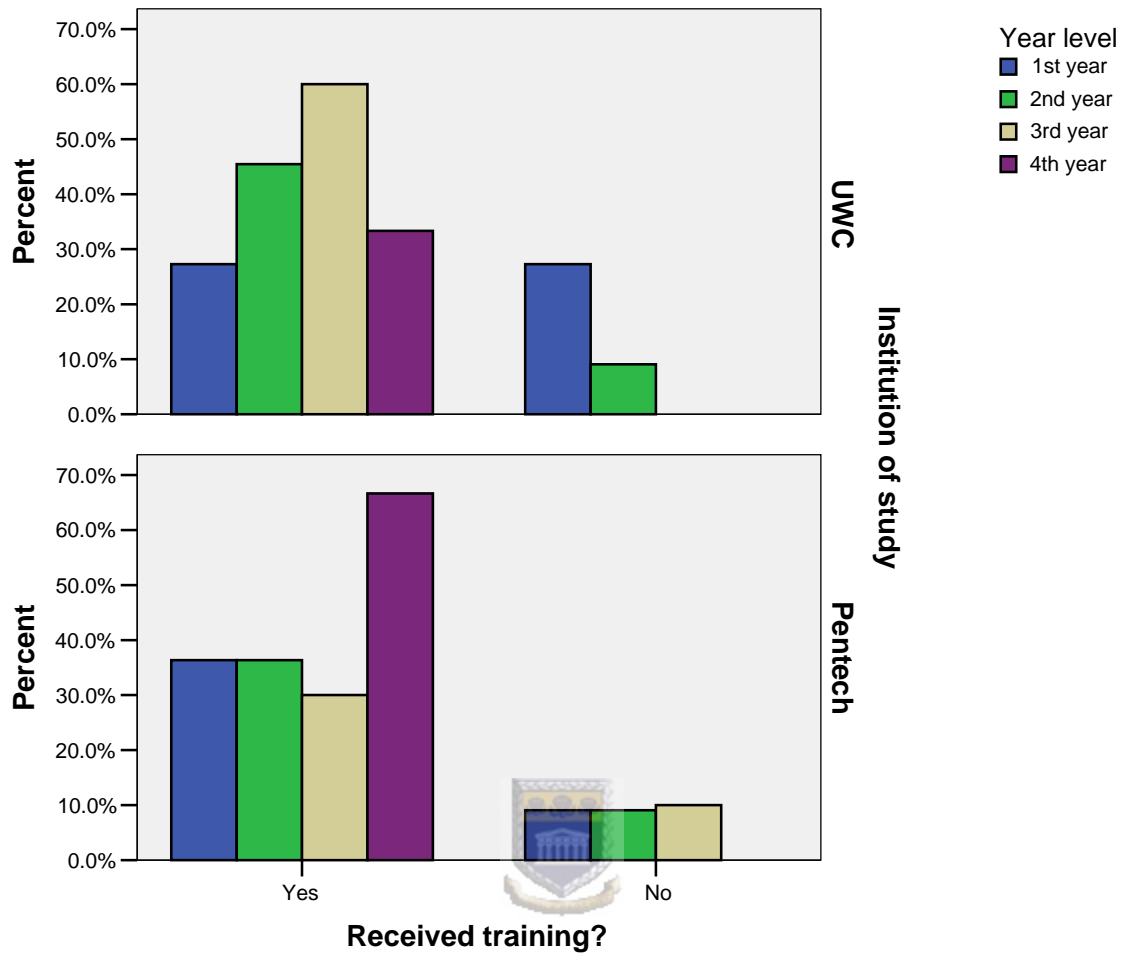


Chart 12: Online training for year levels

As illustrated in Chart 12 students from PENTECH on the first, second and third year levels had higher percentages than those from UWC in terms of having received online training. A higher percentage of fourth year students from PENTECH however indicated that they received online training. The majority of these students received training in their first year of study.

7.4 Participant profiles and search duration

In this section student participant data in terms of actual subject area or faculty as well as duration of searches are presented.

Table 4 reflects the profiles of students from the Peninsula Technikon who participated in the study. The number of students who participated was five 1st year, five 2nd year, four 3rd year and four 4th year students (BTECH). This was a response of 90% since the other two students failed to make it for the information searching sessions. In terms of Gender only 6 females participated while a total of 12 males participated.

TABLE 4 PENTECH: PARTICIPANTS' PROFILE

PART	SUBJECT	YEAR	GENDER	DURATION
1	BIOMED 1	1 st	Female	60 min.
2	BMAN2ND 1	2 nd	Male	50 min.
3	BMAN2ND 2	2 nd	Female	15 min.
4	BMAN3RD 1	3 rd	Male	40 min.
5	BTECHMARK 1	4 th	Male	20 min.
6	BTECHMARK 2	4 th	Male	20 min.
7	BTECHMECHENG 1	4 th	Male	20 min.
8	BTECHRBR 1	4 th	Female	20 min.
9	CHEMENG 1	1 st	Male	20 min.
10	CHEMENG 2	2 nd	Male	30 min.
11	ELECENG 1	1 st	Female	30 min.
12	ENVHEALTH 1	1 st	Female	15 min.
13	INTAUD2ND 1	2 nd	Male	25 min.
14	MARK3RD 1	3 rd	Female	25 min.
15	MECHENG 1	1 st	Male	35 min.
16	MECHENG 2	2 nd	Male	10 min.
17	MECHENG 3	3 rd	Male	40 min.
18	RET3RD 1	3 rd	Male	30 min.

KEY:

BIOMED	= Biomedicine	RBR	= Retail Business
BMAN	= Business Management	RET	= Retail
BTECH	= Bachelor of Technology		
CHEMENG	= Chemical Engineering		
ELECENG	= Electrical Engineering		
ENVHEALTH	= Environmental Health		
INTAUD	= Internal Auditing		
MARK	= Marketing		
MECHENG	= Mechanical Engineering		

There was little difference among the different year levels in terms of the average duration of the searches conducted by participants as reflected in Table 5. This holds true for the median duration of searches as well. Although participants were given exactly one hour to perform their searches, only one student managed to achieve this. From the table one can clearly see that on average 3rd year students took much longer than the other year levels. As expected 4th year students would take less time to search for information. However, this expectation is more of an assumption given that 4th year students are more senior than the students on the other year levels. However, later the duration will become significant in terms of level of difficulty of participant searches.

TABLE 5 PENTECH: YEAR LEVEL AND SEARCH DURATION

	<i>1ST YEAR</i>	<i>2ND YEAR</i>	<i>3RD YEAR</i>	<i>4TH YEAR</i>
	60 min	50 min	40 min	20 min
	20 min	15 min	25 min	20 min
	30 min	30 min	40 min	20 min
	15 min	25 min	30 min	20 min
	35 min	10 min		
TOTAL	150 min	130 min	135 min	80 min
MEAN	<i>30 min</i>	<i>26 min</i>	<i>33.75 min</i>	<i>20 min</i>
MEDIAN	<i>30 min</i>	<i>25 min</i>	<i>35 min</i>	<i>20 min</i>

Table 6 reflects the profiles of participants from the UWC. There were 20 students in total. These were six 1st year, six 2nd year, six 3rd year and two 4th year students. All the students who were purposively selected turned up for the sessions. The response was therefore 100%. In terms of Gender, nine participants were females while eleven were males.

TABLE 6 UWC: PARTICIPANTS' PROFILE

PART	FACULTY	YEAR	GENDER	DURATION
1	ARTS 1	2 nd	Female	40 min.
2	ARTS 2	1 st	Female	60 min.
3	ARTS 3	3 rd	Female	60 min.
4	CHS 1	3 rd	Female	10 min.
5	CHS 2	2 nd	Male	50 min.
6	CHS 3	1 st	Female	10 min.
7	EDU 1	2 nd	Male	10 min.
8	EDU 2	3 rd	Female	10 min.
9	EDU 3	1 st	Male	10 min.
10	EMS 1	3 rd	Male	35 min.
11	EMS 2	2 nd	Male	15 min.
12	LAW 1	4 th	Male	60 min.
13	LAW 2	1 st	Male	20 min.
14	LIS 1	4 th	Female	25 min.
15	LIS 2	1 st	Male	35 min.
16	LIS 3	2 nd	Female	30 min.
17	LIS 4	3 rd	Male	30 min.
18	SC 1	3 rd	Male	30 min.
19	SC 2	2 nd	Female	15 min.
20	SC 3	1 st	Male	55 min.

KEY: ARTS = Arts
 CHS= Community & Health Sciences
 EDU=Education
 SC= Science
 EMS= Economic & Management Sciences
 LAW= Law
 LIS=Library and Information Science²



Clearly from Table 7 there was very little difference among the different year levels in terms of the duration of searches. The mean time to search for the information was more or less the same although two students took the entire 60 minutes allowed searching for the information. However, the duration of searches will only be significant with the online transaction logs.

TABLE 7 UWC: YEAR LEVEL AND SEARCH DURATION

	1 ST YEAR	2 ND YEAR	3 RD YEAR	4 TH YEAR
	60 min.	40 min.	60 min.	30 min.
	10 min.	50 min.	10 min.	
	10 min.	10 min.	10 min.	
	20 min.	15 min.	35 min.	
	35 min.	30 min.	30 min.	
	55 min.	15 min.	30 min.	
TOTAL	190 min.	160 min.	175 min.	
MEAN	31.7 min.	26.7 min.	29.2 min.	30 min.
MEDIAN	27.5 min.	22.5 min.	30 min.	30 min.

² Not a Faculty but purposely selected. Students in LIS receive information skills training in their Courses

7.5 Online monitoring

Participants were monitored to check how they formulated search strategies and searched for information online for the assignments given to them. In addition to the online monitoring, participants were videotaped to capture verbal protocols. Online transactions and verbal protocols were also compared to check for correlations. This was a rather complex exercise because participants did not always interact with the online retrieval system as they thought aloud. The following section gives an overview of transaction logs and verbal protocols by participants.

7.5.1 IR system categories



The following categories were identified:

S_i = The total number of required IR systems to be searched

S_t = The total number of required IR systems searched that contained relevant information

S_n = The total number of required IR systems not searched

S_{tr} = The total number of searched IR systems from which information was retrieved

S_{tn} = The total number of searched IR systems searched from which information was not retrieved

$S_{tr\ell}$ = The total number of searched IR systems from which relevant information was retrieved

$S_{nr\ell}$ = The total number of searched IR systems from which relevant information was not retrieved

A dichotomous classification of these categories therefore yields the following equations:

$$Si = St + Sn$$

$$St = Str + Stn$$

$$Str = Strel + Snrel$$

This classification can be illustrated as follows:

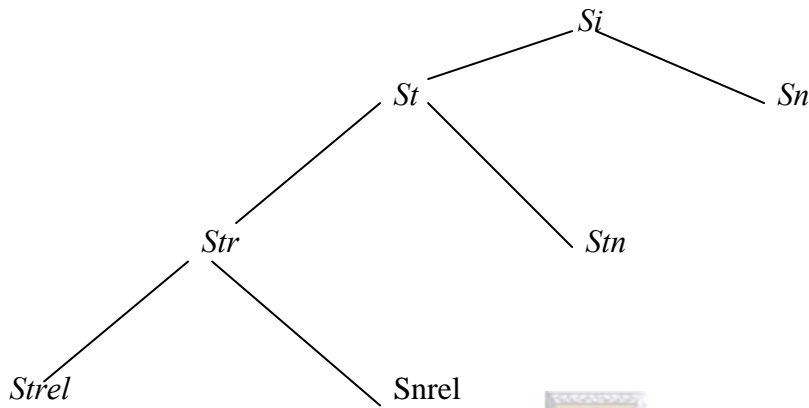


Figure 6: Classification structure for required IR systems



The categories can be illustrated on a two-dimensional plane. Figure 7 illustrates this two-dimensional plane.

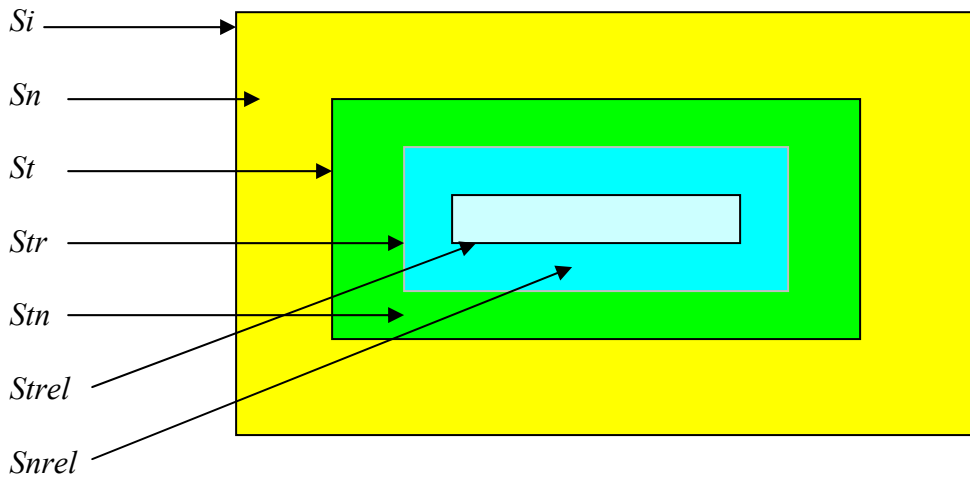


Figure 7: Two – dimensional representation of IR categories

Figure 8 illustrates the IR system categories for searched databases and OPACs

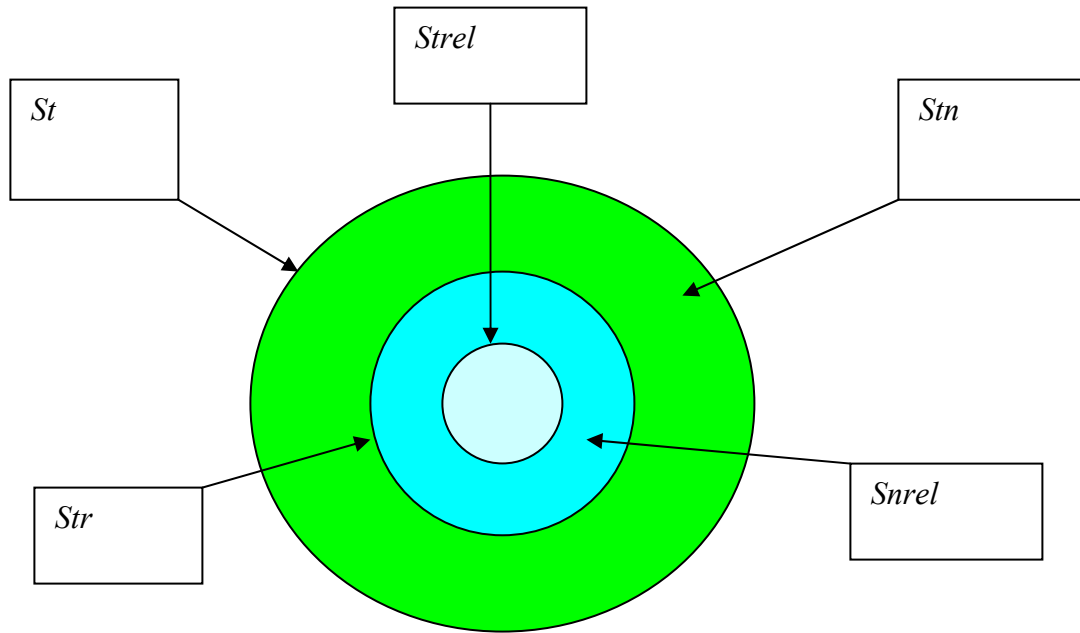


Figure 8: Categories of searched databases and OPACs



However, there is a grey area because neither Figure 7 nor 8 depicts IR systems from which non – relevant information was or was not retrieved. A depiction of this grey area is given in Figure 9.

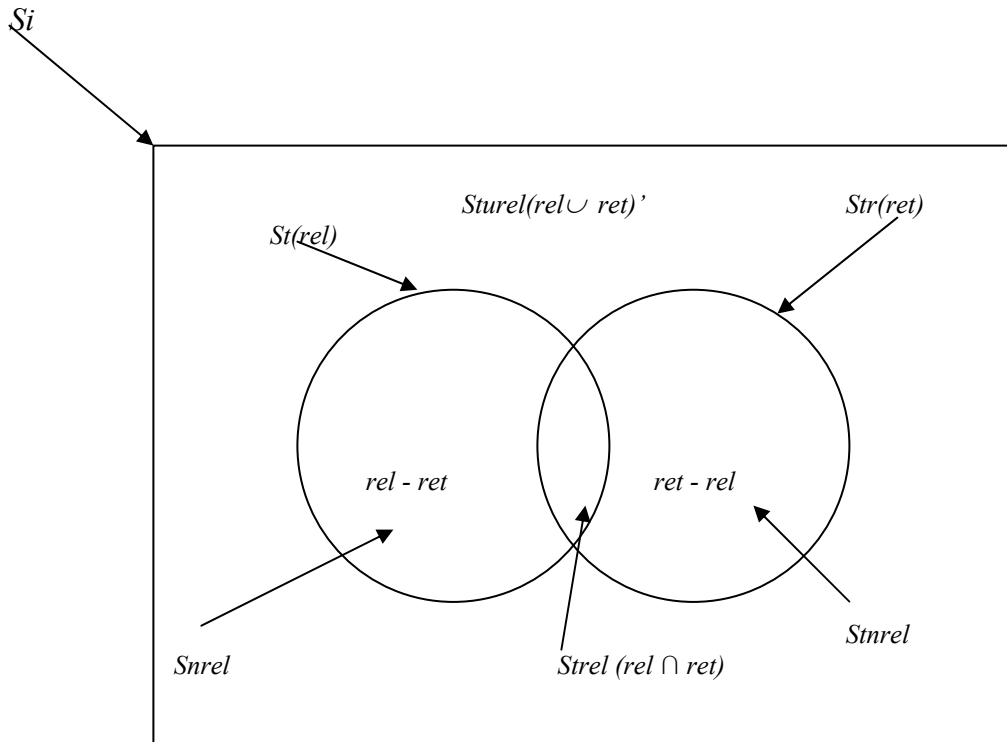


Figure 9: Venn diagram depicting grey areas of IR systems

Adapted from: Foskett (1996:17)



Figure 9 depicts the IR system categories. Si denotes the IR set of databases and OPACs participants had to search using the Boolean <and> operator. Subset St refers to the IR systems, which contained relevant information (Upon a search using the Boolean <and> operator the researcher found that all IR systems yielded relevant information). The subset Str denotes all IR systems from which information was retrieved, with $Strel$ illustrating the IR systems that yielded relevant retrieved information. Furthermore, the subset $Snrel$ refers to IR systems from which relevant information was not retrieved. The grey areas not depicted in Figure 8 are the subsets $Stnrel$, which illustrates IR systems from which non – relevant information was retrieved and $Sturel$, which denotes IR systems searched, which neither yielded relevant nor retrieved information. These subsets can be written in equation form as:

$St = Snrel + Strel = (rel - ret) + (rel \cap ret) =$ IR systems searched containing relevant documents

$Str = Stnrel + Strel = (ret - rel) + (rel \cap ret) =$ IR systems from which information was retrieved

$Stn = Snrel + Sturel = (rel - ret) + (rel \cup ret)' =$ IR systems from which information was not retrieved

If one compares the contingency model of Boyce, Meadow and Kraft (1994) in Chapter 3, the outcomes of Figure 9 can be illustrated thus:

	Relevant	Not relevant
Retrieved	$(rel \cap ret)$ $Strel$	$(ret - rel)$ $Stnrel$
Not retrieved	$(rel - ret)$ $Snrel$	$(rel \cup ret)'$ $Sturel$

Figure10: Contingency table depicting sets of IR systems searched
 Adapted from: *Boyce, Meadow and Kraft (1994: 61)*

The ratios for precision, recall, noise, fallout, omission and specificity, according to Boyce, Meadow and Kraft would therefore be:

$$P = (rel \cap ret) / (rel \cap ret) + (ret - rel) = Strel / Strel + Stnrel$$

$$= Strel / Str = \text{IR systems from which relevant information was retrieved} / \text{IR systems from which information was retrieved}$$

$$R = (rel \cap ret) / (rel \cap ret) + (rel - ret) = Strel / Strel + Snrel$$

$$= Strel / St = \text{IR systems from which relevant information was retrieved} / \text{IR systems which contained relevant information}$$


$\mathbf{N} = (ret - rel) / (rel \cap ret) + (ret - rel) = Stnrel / Strel + Stnrel$
 $= Stnrel / Str = \text{IR systems from which non - relevant information was retrieved} /$
 $\text{IR systems from which information was retrieved}$

$\mathbf{F} = (ret - rel) / (ret - rel) + (rel \cup ret)' = Stnrel / Stnrel + Sturel$
 $= Stnrel / Stn = \text{IR systems from which non - relevant information was retrieved} /$
 $\text{IR systems from which information was not retrieved}$

$\mathbf{O} = (rel - ret) / (rel \cap ret) + (rel - ret) = Snrel / Strel + Snrel$
 $= Snrel / St = \text{IR systems from which relevant information was not retrieved} / \text{IR}$
 $\text{systems which contained relevant information}$

$\mathbf{S} = (rel \cup ret)' / (ret - rel) + (rel \cup ret)' = Sturel / Stnrel + Sturel$
 $= Sturel / Stn = \text{IR systems searched, which neither yielded relevant nor retrieved}$
 $\text{information} / \text{IR systems from which information was not retrieved}$

If these subsets are presented in tabular or matrix form this would yield:

	Relevant	Not relevant	Total
Retrieved	$(rel \cap ret)$ $Strel$	$(ret - rel)$  $Stnrel$	ret Str
Not retrieved	$(rel - ret)$ $Snrel$	$(rel \cup ret)'$ $Sturel$	ret' Stn
Total	rel St	Rel' St'	$IR\ set$ Si

Where: St' = IR systems containing non - relevant information

7.5.1.1 Online transactions

Appendices U and V reflect to a large extent the kinds of problems student participants experienced with regards to the formulation of search strategies. Significant is the fact that some students had the tendency to type in terms incorrectly, especially spelling incorrectly. However very few students made use of keyword searching, despite the instructions and demonstration given by the researcher and research assistant. The search strategies as depicted in Column 5 of the tables in Appendices U and V are exactly the way student participants had entered them. These are therefore not mistakes on the part of the researcher. These online transactions were also recorded in real time as mentioned earlier. Tables 8 and 9 give an indication of IR system categories. All participants were required to search 4 times. In theory this would mean searching four different IR systems. However, there were some instances where the same IR system had to be searched twice (cf. Appendices **I**, **N**, **P** and **S**). In these cases the IR systems were regarded as if two different systems were searched per participant.

The subject areas in which PENTECH participants studied as well as IR systems categories are depicted in Table 8. These categories relate to IR systems required to search, actual ones searched and those from which information was retrieved.

TABLE 8 PENTECH: IR SYSTEM CATEGORIES

				%	%			%	%
PARTICIPANT	<i>Si</i>	<i>St</i>	<i>Sn</i>	<i>St/Si</i>	<i>Sn/Si</i>	<i>Str</i>	<i>Stn</i>	<i>Str/St</i>	<i>Stn/St</i>
BIOMED 1	4	4	0	100	0	1	3	25	75
BMAN2ND 1	4	4	0	100	0	4	0	100	0
BMAN2ND 2	4	4	0	100	0	0	4	0	100
BMAN3RD 1	4	4	0	100	0	4	0	100	0
BTECHMARK 1	4	4	0	100	0	3	1	75	25
BTECHMARK 2	4	4	0	100	0	4	0	100	0
BTECHMECHENG 1	4	3	1	75	25	3	0	100	0
BTECHRBR 1	4	4	0	100	0	0	4	0	100
CHEMENG 1	4	4	0	100	0	0	4	0	100
CHEMENG 2	4	4	0	100	0	2	2	50	50
ELECENG 1	4	2	2	50	50	2	0	100	0
ENVHEALTH 1	4	3	1	75	25	2	1	75	25
INTAUD2ND 1	4	4	0	100	0	2	2	50	50
MARK3RD 1	4	4	0	100	0	4	0	100	0
MECHENG 1	4	3	1	75	25	1	2	33	67
MECHENG 2	4	4	0	100	0	1	3	25	75
MECHENG 3	4	4	0	100	0	4	0	100	0
RET3RD 1	4	2	2	50	50	2	0	100	0
Average	4	4	0	89	11	2	1	63	37

St= Total number of required IR systems searched

Sn=Total number of required IR systems not searched

St / Si = Percentage of IR systems searched

Sn / Si = Percentage of IR systems not searched

Str / St = Percentage of searched IR systems from which information was retrieved

Stn / St = Percentage of searched IR systems from which information was not retrieved

PENTECH participants had an 89 % success rate in terms of the percentage of IR systems searched while the UWC participants only managed a 57% success rate. In addition participants from PENTECH had a 63% success rate in finding information in the searched IR systems, while the UWC participants scored 55%. The PENTECH participants therefore performed better than the UWC participants in terms of searching and finding information.

TABLE 9 UWC: IR SYSTEM CATEGORIES

				%	%			%	%
PARTICIPANT	<i>Si</i>	<i>St</i>	<i>Sn</i>	<i>St/Si</i>	<i>Sn/Si</i>	<i>Str</i>	<i>Stn</i>	<i>Str/St</i>	<i>Stn/St</i>
ARTS 1	4	3	1	75	25	1	2	33	67
ARTS 2	4	3	1	75	25	1	2	33	67
ARTS 3	4	1	3	25	75	1	0	100	0
CHS 1	4	1	3	25	75	0	1	0	100
CHS 2	4	2	2	50	50	0	2	0	100
CHS 3	4	4	0	100	0	3	1	75	25
EDU 1	4	2	2	50	50	1	1	50	50
EDU 2	4	1	3	25	75	1	0	100	0
EDU 3	4	3	1	75	25	0	3	0	100
EMS 1	4	2	2	50	50	1	1	50	50
EMS 2	4	1	3	25	75	1	0	100	0
LAW 1	4	3	1	75	25	1	2	33	67
LAW 2	4	1	3	25	75	0	1	0	100
LIS 1	4	3	1	75	25	0	3	0	100
LIS 2	4	4	0	100	0	3	1	75	25
LIS 3	4	4	0	100	0	1	3	25	75
LIS 4	4	2	2	50	50	1	1	50	50
SC 1	4	1	3	25	75	0	1	0	100
SC 2	4	1	3	25	75	0	1	0	100
SC3	4	4	0	100	0	2	2	50	50
Average	4	3	1	57	43	1	1	55	45

Si=Total number of required IR systems to be searched

St= Total number of required IR systems searched

Sn=Total number of required IR systems not searched

St / Si = Percentage IR systems searched

Sn / Si = Percentage of IR systems not searched

Str / St = Percentage of searched IR systems from which information was retrieved

Stn / St = Percentage of searched IR systems from which information was not retrieved

Tables 10 and 11 reflect the IR system categories, which relate to relevance and retrieval.

The tables illustrate how males and females performed during searches.

TABLE 10 PENTECH: RELEVANCE AND RETRIEVAL CATEGORIES

PARTICIPANT	Gender	Level	St	Str	Strel	Snrel	Stnrel	Sturel
BIOMED 1	Female	1 st	4	1	1	3	0	0
BMAN2ND 1	Male	2 nd	4	4	4	0	0	0
BMAN2ND 2	Female	2 nd	4	0	0	4	0	0
BMAN3RD 1	Male	3 rd	4	4	4	0	0	0
BTECHMARK 1	Male	4 th	4	3	3	1	0	0
BTECHMARK 2	Male	4 th	4	4	4	0	0	0
BTECHMECHENG 1	Male	4 th	3	3	3	0	0	0
BTECHRBR 1	Female	4 th	4	0	0	4	0	0
CHEMENG 1	Male	1 st	4	0	0	4	0	0
CHEMENG 2	Male	2 nd	4	2	2	2	0	0
ELECENG 1	Female	1 st	2	2	2	0	0	0
ENVHEALTH 1	Female	1 st	3	2	2	1	0	0
INTAUD2ND 1	Male	2 nd	4	2	2	2	0	0
MARK3RD 1	Female	3 rd	4	4	4	0	0	0
MECHENG 1	Male	1 st	3	1	1	2	0	0
MECHENG 2	Male	2 nd	4	1	1	3	0	0
MECHENG 3	Male	3 rd	4	4	4	0	0	0
RET3RD 1	Male	3 rd	2	2	2	0	0	0

Student participants from both institutions had difficulty in retrieving relevant information. At PENTECH only five student participants or 28% managed to find relevant information in all four IR systems searched. From these, more males and more senior students managed to find relevant information upon searching and retrieving information from all four IR systems. Significantly, male student participants in Business management and Marketing performed much better than the others. From the figure it is also clear that 3rd year students performed better than the other year levels.

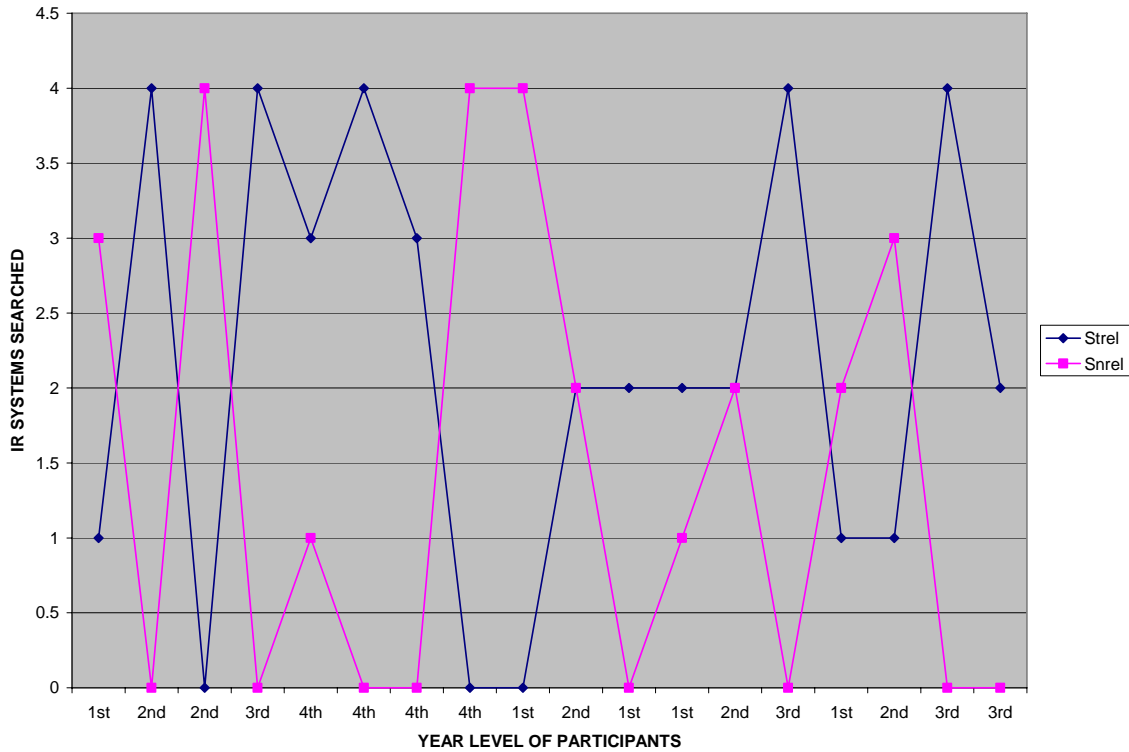


CHART 13: PENTECH FREQUENCIES WITH REGARDS TO RELEVANCE AND RETRIEVAL

From Chart 13 none of the student participants from PENTECH were successful in retrieving relevant information from all four IR systems. Only 2 or 10% of the students managed to find relevant information in 75% or 3 out of 4 IR systems searched. Both these students were on first year level. Significantly, one was male and one female. Perhaps this was not surprising, given that librarians from UWC reported that 1st year students were given a fair amount of orientation, while at PENTECH 1st year students were not introduced to computers. However, Faculty librarians also reported that senior students were reluctant to use computers.

TABLE 11 UWC: RELEVANCE AND RETRIEVAL CATEGORIES

PARTICIPANT	Gender	Level	St	Str	Strel	Snrel	Stnrel	Sturel
ARTS 1	Female	2 nd	3	1	1	2	0	2
ARTS 2	Female	1 st	3	1	1	2	0	2
ARTS 3	Female	3 rd	1	1	1	0	0	0
CHS 1	Female	3 rd	1	0	0	1	0	0
CHS 2	Male	2 nd	2	0	0	2	0	0
CHS 3	Female	1 st	4	3	3	1	0	0
EDU 1	Male	2 nd	2	1	1	1	0	0
EDU 2	Female	3 rd	1	1	1	0	0	1
EDU 3	Male	1 st	3	0	0	3	0	2
EMS 1	Male	3 rd	2	1	1	1	0	2
EMS 2	Male	2 nd	1	1	1	0	0	0
LAW 1	Male	4 th	3	1	1	2	0	0
LAW 2	Male	1 st	1	0	0	1	0	0
LIS 1	Female	4 th	3	0	0	3	0	2
LIS 2	Male	1 st	4	3	3	1	0	1
LIS 3	Female	2 nd	4	1	1	3	0	0
LIS 4	Male	3 rd	2	1	1	1	0	1
SC 1	Male	3 rd	1	0	0	1	0	0
SC 2	Female	2 nd	1	0	0	1	0	0
SC3	Male	1 st	4	2	2	2	0	0

Senior students from UWC performed rather poorly in terms of retrieving relevant information. As is clear from Chart 14, none of the students could retrieve information from all four IR systems. Apart from not retrieving information from all four IR systems, students also had very little success in finding relevant information.

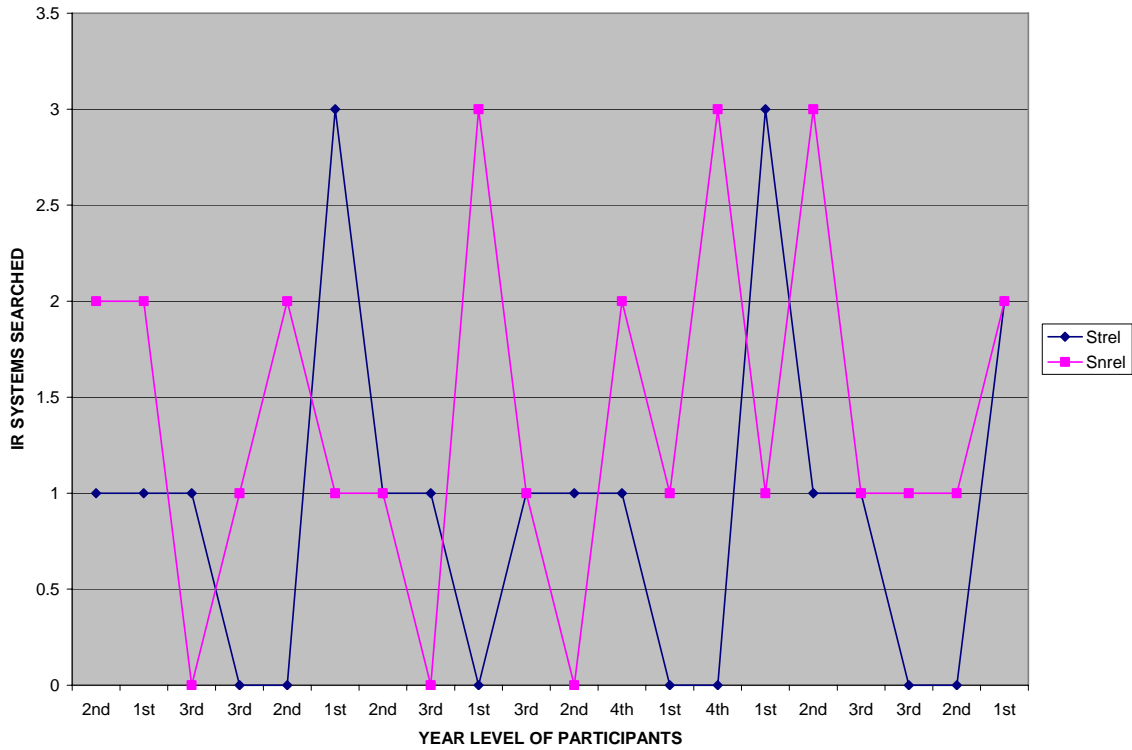


CHART 14: UWC FREQUENCIES WITH REGARDS TO RELEVANCE AND RETRIEVAL



Tables 12 and 13 give an indication of the ratios for precision, recall, noise, fallout, omission and specificity.

TABLE 12 PENTECH: RATIOS

PARTICIPANT	<i>Si</i>	<i>St</i>	<i>Str</i>	P% <i>Strel/ Str</i>	R% <i>Strel/ St</i>	N% <i>Stnrel / Str</i>	F% <i>Stnrel / Stn</i>	O% <i>Snrel /St</i>	S% <i>Sturel / Stn</i>
BIOMED 1	4	4	1	100	25	0	ND	75	ND
BMAN2ND 1	4	4	4	100	100	0	ND	0	ND
BMAN2ND 2	4	4	0	ND	0	ND	ND	100	ND
BMAN3RD 1	4	4	4	100	100	0	ND	0	ND
BTECHMARK 1	4	4	4	100	75	0	ND	25	ND
BTECHMARK 2	4	4	4	100	100	0	ND	0	ND
BTECHMECHENG 1	4	3	3	100	100	0	ND	0	ND
BTECHRBR 1	4	4	0	ND	0	ND	ND	100	ND
CHEMENG 1	4	4	0	ND	0	ND	ND	100	ND
CHEMENG 2	4	3	3	100	50	0	ND	50	ND
ELECENG 1	4	4	2	100	100	0	ND	0	ND
ENVHEALTH 1	4	3	2	100	67	0	ND	33	ND
INTAUD2ND 1	4	3	1	100	50	0	ND	50	ND
MARK3RD 1	4	4	4	100	100	0	ND	0	ND
MECHENG 1	4	3	2	100	33	0	ND	67	ND
MECHENG 2	4	2	1	100	25	0	ND	75	ND
MECHENG 3	4	4	3	100	100	0	ND	0	ND
RET3RD 1	4	3	2	100	100	0	ND	0	ND

Where: ND = Not defined because no information was found in the IR system

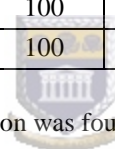


TABLE 13 UWC: RATIOS

PARTICIPANT	<i>Si</i>	<i>St</i>	<i>Str</i>	P% <i>Strel/ Str</i>	R% <i>Strel/St</i>	N% <i>Stnrel / Str</i>	F% <i>Stnrel / Stn</i>	O% <i>Snrel /St</i>	S% <i>Sturel / Stn</i>
ARTS 1	4	3	3	100	33	0	ND	67	ND
ARTS 2	4	3	3	100	33	0	ND	67	ND
ARTS 3	4	1	1	100	100	0	ND	0	ND
CHS 1	4	1	0	ND	0	ND	ND	100	ND
CHS 2	4	2	0	ND	0	ND	ND	100	ND
CHS 3	4	4	3	100	75	0	ND	25	ND
EDU 1	4	2	1	100	50	0	ND	50	ND
EDU 2	4	1	1	100	100	0	ND	0	ND
EDU 3	4	3	2	ND	0	ND	ND	100	ND
EMS 1	4	2	2	100	50	0	ND	50	ND
EMS 2	4	1	1	100	100	0	ND	0	ND
LAW 1	4	3	0	100	33	0	ND	67	ND
LAW 2	4	1	0	ND	0	ND	ND	100	ND
LIS 1	4	3	2	ND	0	ND	ND	100	ND
LIS 2	4	4	3	100	75	0	ND	25	ND
LIS 3	4	4	1	100	25	0	ND	75	ND
LIS 4	4	2	2	100	50	0	ND	50	ND
SC 1	4	1	0	ND	0	ND	ND	100	ND
SC 2	4	1	0	ND	0	ND	ND	100	ND
SC3	4	4	2	100	50	0	ND	50	ND

Where: ND = Not defined because no information was found in the IR system

The student participants from PENTECH had less difficulty in finding information in IR systems, which was relevant than those from UWC. Note that 44% of PENTECH participants had a 100% recall rate with the IR systems they searched while only 15% of UWC participants managed this. The precision with which relevant information was retrieved presents a better picture. Of the IR systems searched the information was retrieved with fairly high percentages. In this regard PENTECH participant searches had a 72% precision while the UWC participant searches had a 65% precision.

More participants from UWC failed to search IR systems with relevant information. For 100% of the IR systems searched, 40% of the UWC participants failed to retrieve relevant information, while for PENTECH only 22.2% of student participants failed to find relevant information.

TABLE 14 IR SYSTEM EFFECTIVENESS

IR SYSTEM	PENTECH					UWC				
	<i>SR</i>	<i>AS</i>	<i>IR</i>	<i>REL</i>	<i>REL/IR %</i>	<i>SR</i>	<i>AS</i>	<i>IR</i>	<i>REL</i>	<i>REL/IR %</i>
ASP	25	25	14	13	92.9	16	5	4	2	50
BSP	9	8	7	7	100	2	2	1	0	0
BUTTERWORTHS	0	0	0	0	ND	4	2	1	0	0
ERIC	18	14	6	4	66.7	10	9	6	2	33.3
HEALTH SOURCE	1	1	1	1	100	0	0	0	0	ND
INFOTRAC	0	0	0	0	ND	13	3	1	1	100
LISA	0	0	0	0	ND	4	3	2	1	50
MEDLINE	1	0	0	0	0	6	6	1	1	100
OPAC	18	16	9	8	88.9	20	15	10	7	70
SCIENCE DIRECT	0	0	0	0	ND	6	2	1	1	100
TOTAL	72	64	37	33	89.2	81	44	27	15	55.6

SR = Number of searches required

AS = Actual number of searches

IR = Number of cases of information retrieved

REL = Number of cases of relevant information retrieved

The Academic Search Premier database was the easiest to use by students from both institutions although the students from PENTECH had less difficulty in using it. This is however only true for the number of times that information was found in the IR system. If one takes into account the number of searches performed and the number of times relevant information was found, the percentages tend to be lower. In this regard, Academic Search Premier had a success rate of 52% at PENTECH, while at the UWC the success rate was only 12.5%. A similar situation arises for the success rate of the online public access catalogues. The success rate of the PENTECH OPAC was 44.4%, while that of the UWC OPAC came to 35%.

7.5.1.2 Thinking aloud or verbal protocols



This section gives an overview of the thinking aloud or verbal protocols of student participants.

(**Key:** **R**= Researcher, **P**= Participant and **RA**= Research assistant)

7.5.1.2.1 Choice of IR system

Student participants had to map out a plan how they were going to approach their searches. It is useful to note that from both institutions some participants had difficulty in mapping out exactly which databases they were going to use to search for the required information:

MALE: 1ST YEAR MECHANICAL ENGINEERING *MECHENG 1* - PARTICIPANT 15

P: I'm going to EBSCO. I'm going to Academic Search Premier.
To search for <Mechanical Engineering in South Africa>.

MALE: 2ND YEAR CHEMICAL ENGINEERING: *CHEMENG2* – PARTICIPANT 10

P: Now all I'm going to do is I'm going to use the Erica database. I'm going to use the Erica...the Eric...database to search for yet other articles. So I'm going to go back and clear what I've typed before. And then I need to go back again so that I can go to Eric. So I click by what I've typed before "chemical engineering for South African Students" and then I go back.

MALE: 2ND YEAR MECHANICAL ENGINEERING: *MECHENG 2* – PARTICIPANT 16

This student decided to search a database other than the ones required:

P: The best one to find is Business Source Premier. Business... about articles dealing with mechanical engineering in South Africa. The second one is based on Academic Research Premier. There particular I wanna go ...about what the research is "articles dealing with chemical engineering industry in the USA."

R: Don't do business search. Do academic search for both.

P: That one is ... I'm going to use Eric. I'm gonna search about journal articles dealing with Higher Education for disadvantaged students. The last one. I'm going to Pentech OPAC. Now I'm going to open EPSCO host? Then I search. My first research is based on Basic search Premier.

Despite only managing to be successful in searching one out of four databases the student participant carefully illustrated what he was about to do and then commenced his searches. Note the conceptual problems of alluding to pages instead of records:

P: Okay, I'm gonna use Academic Search Premier

P: I'm double clicking on it. Still I'm waiting for a reply. I'm gonna type the keyword for my search which is "mechanical ... in South Africa. (*typing the keywords*) Just type in the word – keyword and then click on search. Still waiting for reply. I found the data I'm looking for.

P: I got two pages to check on and selected the second one. The author ...the title of the book. I'm looking for is... The author? (*silence*) What is the source? The source is mechanical engineering. The date ...it's May 2002. Can't find the author.

Another 2nd year student with conceptual problems referred to the database name as a topic:

MALE: 2ND YEAR INTERNAL AUDITING – *INTAUD2ND1* – PARTICIPANT 13

P: The title is articles dealing with internal auditing principles. The source that I'm going to use is Business Source Premier. The title of the topic is business source. Then I'm gonna go back. Okay, and then the thing that I love to see is "the articles dealing with internal auditing principles"

Here he decided to shift from the one database to the other:

P: So I'm gonna go to the second question. By this one I'm gonna use Academic Search. So back...back...back...back...back...back. Gonna take this thing from the Business Source. Type from the

Business Source and put it under Academic Search. I'm going to double click Academic Search. I'm still waiting for it to open.

The student experienced some problems with the second search. Note how he stated:

P: But with this one they ask me about articles about internal auditing of higher education institutions. Using Academic Search. Article is about internal auditing of Higher Education Institutions. Gonna pick my... I'm gonna use Internal Auditing of Higher Education Institutions. (*typing while reading keywords*) Then back. Then search. I'm still waiting for it. Oops!

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: My topic is articles about Chemical Engineering for South African Students. I am going to start my search with Academic Search Premier. I click on Academic Search Premier and wait for the system to go down to the page and then I'm going to type this whole article ... this whole text.

R: Say what you are typing

This student carefully formulated how he intended to proceed:

MALE: 3RD YEAR BUSINESS MANAGEMENT: BMAN3RD1 – PARTICIPANT 4

RA: Talk as loud as possible. Okay, you must talk.

P: I'm starting. I'm going to click Business search. I'm going to check the article about management techniques for small businesses.

P: Seems as if I'm done now. I'm going back to search in the system for OPAC. Let's go back. Is OPAC also here? OPAC...OPAC... Let's see... search. What we want is a book about the subject area in which you are currently studying. Identify the author, date of publication, place of publication and publisher. Identify the book, title and author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher. Let's see which one I want.

This first year student gave a detailed account of how she would conduct her search:

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENG1 – PARTICIPANT 11

P: Hey there! (*quite enthusiastic*). I am going to search an IT article about electrical engineering for South African students. I went to EBSCO and I log in there. And now I'm going to Academic Search Premier.

P: So this is a very easy way of finding information on the journal that you want ... and to find the relevant information in the page that you want.

R: Next one

P: Okay, could that be OPAC?

R: This one

P: Right now I'm going insert OPAC. What I'm going to search here? I'm going to search the topic electrical. My search is to be electrical ... just electrical engineering. Okay, I type in electrical engineering and I'll just click search it to the digital system. I wait for the search to respond.

This student tried to log onto the system:

MALE: 3RD YEAR RETAIL: RET3RD1 – PARTICIPANT 18

P: I'm scrolling through. I'm minimizing. Going to Peninsula Technikon. I'm clicking that one to restore the database. Going to <student>. I'm gonna click my user identity. I don't have a password. I don't remember my password, but I will try another one. I did it last time. It doesn't go

through. Try it again. I must write something (*silence while trying to log in*) I can't get through. I'm trying to log in, but I can't get through.

This student experienced a problem with her search strategy formulation and decided to do the search again:

FEMALE: 1ST YEAR BIOMEDICAL TECHNOLOGY: BIOMEDI - PARTICIPANT 1

P: I have to go back to search for the journal I'm looking for. This is not what I'm looking for. I'm stuck! Go to. ...Go to search.

P: Okay, I think I go back to where I started. I will start again. Okay, I'm searching Medline info. I just added this. I'm experiencing a problem in finding my title I'm looking for because I'm looking for the incidence of HIV AIDS amongst South Africa and the article I'm looking for is in Medline

R: What are you doing now? Say what you're doing.

P: All right, I'm finished with the first one. I'm trying to go to the second search. My second search is about Academic Search Premier. Journal articles dealing with the SARS virus. That is my second topic. So I try to get back to that. I'm trying to search for that.

R: While you are clicking, say what you're doing.

Finding difficulty in searching the database she resorted to the same strategy adopted when she searched MEDLINE. She therefore read to check what the database entailed.

Despite reading the search tips she experienced a problem where to enter her search terms:

FEMALE : 1ST YEAR BIOMEDICAL TECHNOLOGY: BIOMEDI - PARTICIPANT 1

P: The journal is telling me to type the word I'm searching for, but my problem is I don't know what word to type there. Because I cannot see the place which is located for me to type the word... (*long silence*)

R: Say what you are trying to do now

P: Okay, I'm trying to scroll up and down to see which can help me to do. Since I'm searching I'm clicking. Let me click on search quickly for you. On my own I go. It says choose a database.

Since the student was struggling, the researcher asked her to do the next search:

FEMALE: 1ST YEAR BIOMEDICAL TECHNOLOGY: BIOMEDI - PARTICIPANT 1

R: Okay, do the last one. Right. Do the next one.

P: I am minimizing. I click on article EBSCO (*silence*) ERIC (*silence*) I click on ERIC then search. Okay, find the new one. Okay, on my screen I see I can find the whole page I've searched. I will type my search now.

R: Speak as you are typing.

P: My search – journal article dealing with Higher Education for Disadvantaged ... Ok! I'll just write journal article for Higher Education for Disadvantaged Students. Click that. Okay, (*typing while repeating the keywords*) “dealing with Higher Education. I just space Education so that the search is not too long (*typing*) Higher Education for Disadvantaged Students. I'm first writing my search then I click on search.

The student participant checked whether she had typed the search terms correctly:

FEMALE: 1ST YEAR BIOMEDICAL TECHNOLOGY: BIOMEDI - PARTICIPANT 1

P: So no results were found in the journal article dealing with Higher Education for Disadvantaged Students. I'm going to check the spelling. I do not think I have spelt it correctly. Okay! I think it's

because of that space. Education... I didn't write Higher Education. I must try to minimize now. I was trying to make my search short.

Another student had a similar approach:

FEMALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND2* – PARTICIPANT 3

P: Click on EBSCO. Okay, I can go to Eric. Okay, journal article dealing with Higher Education for Disadvantaged Students. (*repeating keywords*) Higher Education for Disadvantaged Students.

A more matured approach was followed by a senior student:

FEMALE: BTECH RETAIL BUSINESS MANAGEMENT *BTECHRBRI* – PARTICIPANT 8

P: I'm going to do the research, which is the search about information. I'm going to Business Search Premier. In there I'm going to research about the article on Trade Industry.

P: Then I'm writing article about (*typing the keywords*) Trade Industry. And I'm going to search so that I can get the information that I'm looking for. I'm going to clear it so that I can go to the next step. The next step I'm going to search about for the articles about the clothing Industry.

However, it is interesting to note that the student argued that the full text of the article may assist her to find the relevant information:

FEMALE: BTECH RETAIL BUSINESS MANAGEMENT *BTECHRBRI* – PARTICIPANT

R: Did you find the information for the first one?

P: No I didn't.

R: Okay, then go do the next one. What are you typing?

P: Articles about the clothing Industry in South Africa. (*long silence*) I'm going to full text to see if I am able to get the information I'm looking for. Then I'm going to search for my information.

This first year student was under the impression that he should type in the search words in a natural sense:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: *CHEMENG 1* – PARTICIPANT 9

R: What are you doing?

P: I'm going to EBSCO. I'm going to Academic Search Premier. I'm going to Academic Search Premier to search for chemical engineering in South Africa.... (*repeats*) for chemical engineering in South Africa. (*silence while reading the question*) Then I type in "chemical engineering in South Africa (*drawn out silence whilst typing the keywords*).

Noticing that the student was struggling, the researcher suggested:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: *CHEMENG 1* – PARTICIPANT 9

R: Carry on talking. Okay. If you get stuck do the next one.

P: (*very long silence*)

R: Speak louder. Carry on talking. Say what you are thinking.

P: I'm going to search in Academic Search Premier. Click on search. (*typing in silence*) There are no results.

R: Keep on talking.

On the whole student participants had little trouble in following the path to use to find the information:

FEMALE: 2nd YEAR ARTS: ARTS 1 – PARTICIPANT 1

P: I'm going to search incidents of HIV and AIDS amongst South African. I'm going to use INFOTRAC data. Let me go and Internet Explorer. Start. Double click on Internet Explorer. Then I go to library to electronic research database. I'm going to "T" and click on INFOTRAC. I click on proceed

FEMALE: 1ST YEAR: ARTS 2 -- PARTICIPANT 2

P: Okay here I'm going to look for databases. Firstly I have to tell for the database INFOTRAC. Then I'm going to do Academic research. Then I'm going to do ERIC databases. Use the ERIC database to indicate a number of relevant records for the following journal articles dealing with higher education for disabled students.

FEMALE: 1ST YEAR: CHS 3 - PARTICIPANT 6

R: Okay you can start.

P: Okay I'm making my search about HIV Aids among the white people. I'm going make my ... connect my search to MEDLINE database. I'll open the Internet ... I'll search it from the Internet. I first go to start then I go to programmes then I go to Internet Explorer.

MALE: 2ND YEAR: EDU 1 - PARTICIPANT 7

P: My topic is Higher Education for Disadvantaged Students in South Africa. I'm going to use Eric database, but I do I'm going to my research. I would start by clicking at start. From start I'll go to programme. And then once I get to programme I'll click on WINSPUR 4.01. From there I'll double click on the relevant database- That is Eric.

MALE: 3RD YEAR: EMS 1 - PARTICIPANT 10

R: Okay you can start. Say what your topic is.

P: My topic is Business Source Premier. I'm going to click on Internet.

MALE: 1ST YEAR: LAW 2 - PARTICIPANT 13

P: So I'm going to click on to Legal Resources 'cause I'm looking for legal resources. Now I'm in Legal Resources. Okay. The first thing I'm going to do is to click on Internet Explorer. Now I'm in UWC OPAC. Scroll. I'm going to Library. Find Library. I'm going to Electronic Resources. I found Electronic Resources and click on Databases, Now I find Databases. I'm going to look for Butterworths Nexis Lexis Online

FEMALE: 4TH YEAR: LIS 1 - PARTICIPANT 14

R: You can start!

P: So I'm going to search an assignment on HIV AIDS in South Africa. So I'm going to use Eric. So I'm going to click on start then programmes and then WINSPUR 4.1. Then I'm waiting for the information. Insert. Okay I'll click on Eric databases.

MALE: 3RD YEAR: LIS 4 - PARTICIPANT 17

R: Let's go!

P: I go to start first. Click on start. Go to Eric. Internet Explorer that I'm looking for

The student verbalized the path she had to follow to find the required information:

FEMALE: 1ST YEAR: COMMUNITY AND HEALTH - CHS 3 - PARTICIPANT 6

R: Okay you can start.

P: Okay I'm making my search about HIV Aids among the white people. I'm going make my ... connect my search to MEDLINE database. I'll open the Internet ... I'll search it from the Internet. I first go to start then I go to programmes then I go to Internet Explorer. I'm still waiting for it to open. It's taking long. I click there. Then I go to the library. Then I go to electronic journals there. Then to database. Then from databases. Okay let me check my first assignment.

P: My first question is about HIV AIDS. I'm going to search it on the Academic Search Database. Okay. No on the MEDLINE database. I go to the Medline database. I click there. I'm still waiting for it to open. I think my assignment is about HIV Aids amongst white people. It's taking long, but I'm still waiting ... I'm still waiting.

FEMALE: 1ST YEAR: ARTS2 - PARTICIPANT 2

It is interesting to note that this particular participant first gathered her thoughts on what she was going to do:

P: Okay here I'm going to look for databases. Firstly I have to tell for the database INFOTRAC. Then I'm going to do Academic research. Then I'm going to do Eric databases. Use the Eric database to indicate a number of relevant records for the following journal articles dealing with higher education for disabled students

She remembered the instructions perfectly in terms of the path she had to follow:

P: Firstly I have to go to start. Then I went to From ... I must go to WINSPIR 4.1 then WINSPIR 4.1 Then having my database now. I'm clicking Start. Then I'm going to Eric database. Click on here. Then and click okay. Let me double click Eric database. Then click okay.

However, the first search dealt with INFOTRAC and not ERIC. This was despite the fact that she indicated earlier what her *modus operandus* was going to be.

This student participant approached his searches explaining the actual path:

MALE: 1ST YEAR: LIBRARY SCIENCE - LIS 2 - PARTICIPANT 15

P: I'm going to double click the Eric Database and then okay. I'm still waiting for the process of the computer. Oh! I found it okay. I've done the research now. Just put in my keywords in the Eric Database. Advantages and disadvantages (typing the keywords) of the students in South Africa. Okay I've done the search now. Okay, I think there is something wrong with my spelling.

He attempted to search for HIV / AIDS but was reminded by the research assistant:

P: Okay, HIV... HIV

RA: No what is the question? Number one.

P: Higher Education for disadvantaged students in South Africa. The keywords are the Higher Education for Disadvantaged Students in South Africa. (typing while repeating the keywords)

He realized that his spelling was incorrect:

P: There's something wrong with my spelling ... I think there is something wrong with my spelling. Higher Education. I found out what is wrong (re-typing the keywords while repeating it) Ah! I think it's going to be okay now. I'm still waiting. Still waiting ... still waiting for higher Education disadvantaged students.

RA: Keep on talking

P: I think there is something wrong with this. I think ... I think it's my keywords is wrong. Let me go. I'm going to try other keywords like Student and South Africa. I think I'm going to be right now. Still looking for the ... Ooooh! I get it. I found it. I found it ... I found it what I'm looking for.

The first two online transactions correspond with the verbal protocols. However the student was either confused or forgot to change the search strategy. It is however clear that she misread the instruction, because she indicates in her thinking aloud:

FEMALE: 2nd YEAR: ARTS I- PARTICIPANT 1

P: Secondly I'm going to use the Eric database. Okay on ... and HIV and AIDS in South Africa. I have five records here.

It is furthermore interesting to note that she actually searched in the library online catalogue for a journal article although the instruction is clear that she had to make use of the ACADEMIC SEARCH PREMIER database. She actually found information using the BROWSE option. However, the number of relevant hits was limited, because she made use of the TITLE field option. It seems that this participant was not clear what the concept of Sociology was. This is a conceptual problem as is clear from the verbal protocol:

P: Journal article. Okay I want Sociology and the title. The title I don't know what it is.

The next search was even more problematic. Apart from selecting the wrong database, the student did not know how to approach the search. Not only did she experience difficulty in her approach, the system also did not make it easy, because of slow connectivity. Note the tone of frustration and possibly exasperation as she stated:

P: I'm going to click on "E" So under "E" I'm going I'm going to ... education and training. It's still searching. This thing is still searching. Still searching. It is still searching. It is still searching. It's still searching. Searching. Searching I don't know.

7.5.1.2.2 Formulation of search strategy

Students found the formulation of search strategy quite problematic. It should be noted that especially the more junior students, with a few exceptions of seniors had difficulties in this regard. Some of the verbalizations of student participants were:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

R: Say what you are doing.

P: Now I go back to industries in the S.A...engineering. Search again. Go back and start again. (*long silence*). Go back...I go to Academic Search Premier. So I type in ... try to type in engineering and chemical industries ... (*long silence*) Going to select. Gonna click on search suggestion. Then I search again. Click on search.

R: Speak a little bit louder. Whatever goes through your thoughts just speak.

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

P: So I'm going to click on researcher. So I have a new search ... Running the search again. Take note of that when I search. Trying to refine my search. Running the search again. Click again. (*long silence whilst typing*).

It becomes more and more difficult for the student to formulate his search strategy. The researcher prompts:



MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

R: Speak louder

P: Search to see what I find. So I'm going to go back again to see what I can find. (*silence*)

R: Keep on talking.

P: Okay, then I'm going to enter.

The student is now confused because he used the search term “USA” instead of “South Africa”:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

P: I'm checking to see for results for Chemical Engineering in USA. So I keep on searching... (*long silence*) It came up with no results.

R: If you get stuck go on to the next one. Start with your selection. Start doing the next one.

P: I'm searching for that one (*very long silence*). I'm going to ...to search for the next one.

R: Keep on talking. I suggest if you get stuck move to the next one

This student tried to search for the topic without using keywords:

FEMALE: BTECH ENVIRONMENTAL HEALTH: ENVHEALTH1 – PARTICIPANT 12

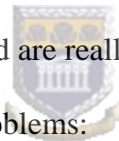
P: Then from there I just type in the article name. Let me see. I'm just gonna type the keywords HIV AIDS. (*silence while typing the keywords*) Keywords ... I'm typing some keywords within the article. So I type in HIV AIDS in South Africa. I'm just gonna type in here. Search
R: Try to talk louder, right, okay that's it!
P: I'm gonna search for these articles which is HIV AIDS in South Africa. So I'm just going to click on EBSCO website. Then I will just go to ... I wanna use that source. I double click there. There is no result for this one.

It seems that student participants had problems with the conceptualization of the term keywords as can be seen from the previous think aloud protocol. Another student had this to say:

MALE: 2ND YEAR BUSINESS MANAGEMENT: BMAN2ND1 - PARTICIPANT 2

P: Going for my next search which is ERIC – Double click on ERIC – still waiting → searching for my keywords – Journal articles...
Keywords are: <Articles dealing with higher education and disadvantaged students> → saying aloud while typing Click on Search.
No results were found for my search.

It should be noted that the keywords used are really the whole search statement. Two other student participants had similar problems:



MALE: 2ND YEAR BUSINESS MANAGEMENT: BMAN2ND1 - PARTICIPANT 2

RA: Keep on trying
P: Searching again
RA: Try to use the keywords
P: Searching with keywords
RA: What are you typing?
P: It's Journal
RA: You have to speak loud
P: Click on <Search>
P: Still no results found
RA: Keep on trying
P: Ok. Search <Journal articles and higher education and disadvantaged students>
RA: Click on Search
P: No results found

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2ND1 – PARTICIPANT 13

P: The keywords ...I'm gonna type my keywords. I think it's internal auditing principles. (typing the keywords). I'm gonna go to search. I'm still waiting for feedback. I got two. I find two. The author is Simon George. Typing this book reviews journal. Scholarly journals and date. Date? What is the date for this one? What is the right one? (*silence*) Just start the search again. Find the search and then keywords.
P: So I go to that fourth one, but now I gonna use PENTECH OPAC. So back ...back ...back...back. I minimize it. Then text of this Pentech library. Double click. Okay, then I'll go to

search for information. I'm still waiting for it. Okay, the book written by author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher. The book written by the author. I click ...I click. My keywords will be author in internal auditing.

Some student participants managed to refine their searches realizing that they had typed in the wrong keywords:

FEMALE: BTECH ENVIRONMENTAL HEALTH: *ENVHEALTHI* – PARTICIPANT 12

P: I need to go back again to shorten my search. First I shorten the keyword, but then I'm just going to erase the keyword. Click ... find it. Two results were found.

MALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2NDI* - PARTICIPANT 2

RA: Keep on trying.

P: Ok. I'll type (Journal ... I click on <Search>. No results found.

I will type higher education and disadvantaged students – click <search>

One page - one found (Reads bibliographic detail)

RA: Read aloud

MALE: 3RD YEAR BUSINESS MANAGEMENT: *BMAN3RDI* – PARTICIPANT 4

RA: What are you typing in?

P: Management techniques for small businesses. I type management techniques and small business and I'm going to search.

P: Now I'm typing "Human Resource Management Higher Institution" I go to search now. The computer is busy searching. It says no results were found on this one. So I must go back. Retype my phrase. Higher Education. I'm searching now "Human Resources Higher Education"

P: I'm going back now. Back. back...back. I go to insert Higher Education now. My phrase now Human Resources and Higher Education. Search. (sigh) Ja man! No results were found on my search. Retype the phrase. Cut management and put management at the back Let see what happens if it goes through the search in Higher Education Management. Nothing. Go back.

MALE: BTECH. MARKETING – *BTECHMARK2* – PARTICIPANT 6

P: Okay, I'll open this researcher (*long silence while reading the question*)

R: Keep on talking

P: Okay, ja, yes I've just opened up the Business Source...

R: Try to speak louder.

P: Ja, now I'm typing the keywords, which they want for this information. Typing in the keywords Marketing Strategies for Students.

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: *ELECENGI* – PARTICIPANT 11

P: Okay, and in here then I'll type the articles that I want. I'll type articles (*typing*) Instead of using symbols I'll use Boolean which are the symbols like "and" "or" I need to type in electrical engineering and I add it to South African Student. Then I go to search. Okay, I do check again. (*typing*) I just type in "Electrical Engineering and South African Student." I click on search.

MALE: 3RD YEAR RETAIL: *RET3RDI* – PARTICIPANT 18

P: I start by underlining my topic. And then I look for some ... for the keywords. I select user...

My keyword here is Industry. Industry and Trade. I'm going to start by industry. I'm gonna double click on Business Source Premier.

This is what a student from UWC had to say:

FEMALE: 1ST YEAR: ARTS 2 - PARTICIPANT 2

R: What are you searching now? Keep on talking!

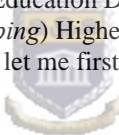
P: Okay, I must choose the word, which I'm going to use. I'm using EBSCO host. As I said before. Pasting it. Taking for a basic search. Then I'm going to ... which search I'm going to do. (Silence) Then I'm clicking keywords, which I'm going to look for. Then my keywords are Higher Education for Disabled ... Disadvantaged sorry. Then going to search. (Silence) It feels that I can't get this information. Then I must type my keywords Higher Education and Disadvantaged Students. (Typing the keywords) Then I'm going to search again. This is my result. I've got the book here. I've got the journals here.

This student participant actually used Boolean operators to reduce the number of search terms and obtained results.

There was no significant difference in the approaches of students on different year levels across the two institutions:

MALE: 2ND YEAR: EDU 1 - PARTICIPANT 7

P: Mmm my keywords will be Higher Education Disadvantaged Student or yes Disadvantaged Student. Let me try these keywords. (*typing*) Higher Education and Disadvantaged Students. Perhaps I can say in South Africa ... no let me first search this one. Then I'm searching now to see if I can get the information.



MALE: 2ND YEAR BUSINESS MANAGEMENT: BMAN2ND1 - PARTICIPANT 2

P: I'm about to go Ebsco Host. Search for my keywords. Business Source Premier

RA: Keep on talking

P: I'm typing Management Techniques & Small Business Management (*typing*)

FEMALE: 3RD YEAR MARKETING: MARK3RD1 - PARTICIPANT 14

P: Yes. Business Search Premier and I double click on the Business Search Premier. Then since I'm looking for journal articles dealing with marketing strategies for students I'm going to write here my keywords, which are "Marketing Strategies and Students (*typing while repeating the keywords*) Marketing. You put in strategies. (*silence*) I have the articles here. You don't need anyone specific?

R: Give the author, title and journal.

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 - PARTICIPANT 10

P: (*Typing of text*). Articles about Chemical Engineering for South African Students. (*repeats article whilst typing*) "Articles of Chemical Engineering for South African students." Then I am going to search... Now I wait.

MALE: 3RD YEAR RETAIL: RET3RD1 - PARTICIPANT 18

P: Sorry, I'm gonna write the keywords ... the keywords now. "Industry" Now I'm scrolling to search for the relevant topic (*searching in silence*).

R: Keep on talking.

P: I'm looking for the most relevant one

FEMALE: 2nd YEAR ARTS: ARTS 1 – PARTICIPANT 1

P: Okay I'm going to search incidence of HIV and AIDS amongst South Africa. I'm going to type HIV and AIDS and South Africa and search. Still search for info. (*Silence*)

FEMALE: 3rd YEAR: ARTS 3 - PARTICIPANT 3

R: You need to search for the information that they ask you to search on Academic Search Premier. The first one.

P: Okay the incidence for HIV and AIDS?

R: Very much. Start again.

P: Okay

P: My topic is the incidence of HIV and AIDS amongst South Africans. Click and search for that.

FEMALE: 3rd YEAR: CHS 1 - PARTICIPANT 4

R: What's your topic?

P: My topic is about ... I've got different topics here that I'm going to search about. The first one is the incidents of HIV and AIDS amongst the white people. And the second one is the journal articles dealing with development psychology. And the third one is the journal article dealing with psychotherapy for students and the fourth one is a book written by Joanne Valiant Cook. I have to find for the title, date of publication, place of publication and the publisher. So I'm going to use this different search strategy to find the information which I need the third one. In the MEDLINE. So I'm going to click on there. On database and then just to find a MEDLINE I can click here at the end.

FEMALE: 1st YEAR: COMMUNITY AND HEALTH - CHS 3 - PARTICIPANT 6

P: I maximize it. Okay so my topic is Physiotherapy for students. That's my search. Okay that's my keywords. Yes that's the relevant keyword I should use. It's the keywords Physiotherapy and students. I'm still waiting for it to open. Still opening up. There... there ... there. Oh! I've searched there. I'm searching through Physiotherapy (typing keywords while repeating it). Is it the right spelling? Physiotherapy and students. Check for me this text please. Now full text. Still searching ... still searching for ... keep trying.

R: Keep on talking

7.5.1.2.3 Search mode

It was important to determine what search mode student participants adopted after they formulated their searches. The IR systems searched presented the searcher with a range of options regarding the choice of interface. In general student participants did not decide on the particular search mode, but searched as the interface presented itself. In some cases, however students selected the field within which to search.

7.5.1.2.3.1 Basic search

Very few students made use of this option. This was quite surprising given that students indicated that they had little experience in searching online IR systems. However, student participants from the Peninsula Technikon when they searched the OPAC automatically searched in the Basic search mode, which was by default.

7.5.1.2.3.2 Advanced search

This option was by default for the OPAC searches at the University of the Western Cape. Significantly, none of the participants switched from Advanced search to Basic search despite the difficulties they faced.

7.5.1.2.3.3 Browsing



It was interesting to note that student participants from the UWC tended to search using the Browse option, especially when searching the OPAC:

FEMALE: 1ST YEAR: ARTS 2 - PARTICIPANT 2

P: Okay, this computer is taking so long. For now I think I have to check for the book written by Clarabell Xoliswa Magopa (*pronounced by participant*) for this information again. For I have to go back to UWC OPAC again cause I've already found the journal now. So I have to check for the book. Oh! This computer is taking so long. Okay I'm going back looking again for UWC catalogue. Now I'm checking for information. Then I'm going to browse. Then I'm using the title ... no the author of the book called Clarabell Xoliswa Maropa.

R: Moropa (*correction by the researcher*)

P: Moropa. First I have to start with the surname Maropa Clarabell Xoliswa. Then I'm going to check now. Then I found something which is similar to my checking but this is not relevant to the person I'm looking for. Marokko States ... no. Not the one I want.

She then decided to abandon the Browse mode of searching:

P: Then I'm going to search. Going to use search now instead of browsing. I have to search for this name in search. Moropa then going to check again. Oh! Nothing on this again. Check on browse again. Okay instead of title let me use author. Then author is Moropa. I type Moropa C.K. then I check again. I've got it here. Moropa C.K.

The student did not find information because she searched within the <Title> field. Instead of still searching under <Search>, she decided to <Browse> again, this time using the <Author> field and found results.

FEMALE: 3RD YEAR: ARTS 3 - PARTICIPANT 3

P: And then I maximize my screen so that I can see clearly. And then I go to browse search. And then I search for the author is which is Clarabell Xoliswa Maropa and then I must type it in there

This student also incorrectly spells the surname of the author and is corrected:

R:Moropa

P: What?

R: Mo...

P: Moropa okay. This is how you write it. (typing the name of the author while repeating it). And then I go to <Go>. Click on research. Oh! then I found Clarabell Edward. Clark A.C and all other stuff and I don't get Clarabell Xoliswa Moropa. And it has identity the title, date of publication, place of publication and the publisher. So I didn't get the author here. And that's all from me.

7.5.1.2.3.4 Search tips

Some student participants from the former Peninsula Technikon tended to search for search tips in the databases they searched, especially if they experienced problems:

MALE: 3RD YEAR BUSINESS MANAGEMENT: BMAN3RDI – PARTICIPANT 4

P: Click tips again. I just did search for examples – search tips. Still busy searching... Now going back. Type in again. I just type in Human Resource in Education – That gives me titles.

P: Try to search again Higher Education. If I do click here. Delete. Delete management. Search the pages for search tips. Search tips. I want to know about Human Resource Management in Higher Education. Always use all words. Use all words. I try to get this now. Resources. Just see what happens. Human Resources in Higher Education. Nee man! Now I will get it. (*typing while repeating the keywords*) Search tips. Here it is. I've got it. Now I was here.

Frustration is now starting to creep in:

MALE: 3RD YEAR BUSINESS MANAGEMENT: BMAN3RDI – PARTICIPANT 4

P: I did put in Higher Education. It says no results were found. (*typing in keywords*) Higher Education. Let's go to search tips. Okay, here it is no articles matching your research for Higher Education.

FEMALE: 1ST YEAR BIOMEDICAL TECHNOLOGY: BIOMEDI - PARTICIPANT 1

P: Okay I'm going to see what Medline is having.- Provide operative medical information on medicine, nursing the history (*reading search tips*) sciences and much more. The medical library of medicine- Medline, allows users to search abstracts from over 4600 current... medical journals. For more information I click on the tips. Now I'm just reading what's on the screen. Sometimes a search can be overly general or over a specific. To fine-tune your search, you can use "and" or "or" and log operation to link your search words together. These operators will help you narrow or broaden your search to more precisely written information you need. If that is too long you can attempt several attempts together using "and" by combining three terms. You can further define your search and reduce the number of results.

FEMALE: BTECH RETAIL BUSINESS MANAGEMENT BTECHRBRI – PARTICIPANT

P: Do you want to try your search again? I have to check for the spelling of my research terms. I'm still looking for my spelling, because they say - no results were found for my search premium article journals. Now I'm searching again to see if I get anything for the information I'm looking for. Again they say no results were found. Okay, I'm searching again. Still no results! (*silence*) I'm trying another. I'm searching. It didn't give me results. (*typing*) "Articles dealing with information about the Clothing Industry" Now, I'm searching. Still no results.

7.5.1.2.4 Finding the information

Search strategy had a profound influence on the successes of finding information. A

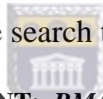
second year student participant had the following to say:

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2NDI – PARTICIPANT 13

P: Let me take this one out. Take that one there and put in. Let's go to search. I'm still waiting for it. Oh! There are about 406. (*silence while reading the options on screen*)

Two students, one a 3rd year and the other a 4th year (B. TECH) found a high level of

recall because they did not coordinate the search terms:



MALE: 3RD YEAR BUSINESS MANAGEMENT: BMAN3RDI – PARTICIPANT 4

P: I just typed in this "human" it was after "resources" and then I just try to put it back. Then I try to minimize my time of searching. I've got ten of 447 articles. My pages are one, two, three, four ... let me see now. I've got Education by Higher Education and Human Resource.

P: At last. Now I'm going back. I got you on Human Resource and Management and Higher Education. That's the phrase I used to get the article about Human Resource Management in Higher Education. Let's go back. Back...back...back.

P: Forward. .forward. Look down if you must go to Eric Use Eric database to search for my journal articles. Click on it. Journal articles... Eric. Eric database. Click on eight. Journal articles dealing with higher education for disadvantaged students. Yes I find it. Yes, I find it. Let's see this one doesn't give this. Oh! boy. Articles dealing with higher education. (*typing and reading something unclear*) This it is. It's journal articles dealing with higher education and disadvantaged students. Here it is. It's teaching and learning strategies. Now... Now, that is the journal articles dealing with Higher Education for disadvantaged students.

P: I type "Management of Finance" and book "Management" (*typing the keywords*) Subject. I want the subject "management." I got one of 33 books. Where is the rest? I see title of the book. Leave that to later.

MALE: BTECH. MARKETING – BTECHMARK2 – PARTICIPANT 6

P: Sixty pages of information and now I'll go to the second one. That is the one of Academic Search Premier (*silence*). Choose the database. I'm just typing up the keyword of journal. It says here the journal article of marketing in South Africa but I'll type the keywords that says "marketing

in South Africa – problems clothing industry” to see if I can find any articles about that. It says no results were found and I will type in “marketing in global industry”

P: Okay, I say here “marketing South Africa” I did find 68 pages. See if this information is relevant.

Although this participant was correct with the author, she seemed to confuse the article title with the journal title:

FEMALE: 3RD YEAR MARKETING: MARK3RD1 - PARTICIPANT 14

P: Anyone of this. Hmm the author for this one is Johnston and N Dawson and Mc Cleans. The journal is “The Brand Coding.” The title is “The Brand Coding” Here it was issued. Volume 116 and it was issued on the sixth of February 2003-that’s the date for it. Okay, that’s the date for the publication of this journal. I’m finished.

P: Okay, I’m clicking back to the menu. I want to know what to do. I first have to double click on this one and I’m going back. I’m going back. I want to do the Eric one, yes. I’m looking for Eric one now. I’m going to double click on it, because I need to search on it. My keywords here are going to be Higher Education and Disadvantaged Students. (*typing while repeating the keywords*) Higher Education and Disadvantaged Students. Search. I only have one article.

This student knew the particular title. Although he was requested to search for an author, he decided to do a title search:

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: Fundamentals of Mass and Heat Transfer. And then I wait... I go to search. The system is searching for the relevant book. It is busy. Then I wait. Okay, then it brings up some result.

When he used the search term “motor” the student did not find hits, but with the USA as the geographical area he realized that the term “automobile” would be more appropriate:

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: I need to look for the next one. Yes, and then ... the next one. Click on academic search. Now I’m looking for articles dealing with Motor Industries in the US. So I go back to Academic search. I have to find Motor Industries in the United States or US Motor Industries... Unfortunately I didn’t get anything... No, this is not exactly what I want. Okay, let me go for automobile, because automobile is all about ...it’s the same. (*typing the keywords*) Let me try this one. Automobile. Let me go for this one in US. Yes, I’ve got this journal here. Advertising Age...journal of Advertising Age, which is published on the second of January 2002, volume seven-issue number one, page ... the information is on page eight. The author is Jim Holliday. (*reading the title*) Automobile Industry and Trade ... I think this is the relevant information about Automobile Industry.

He therefore demonstrated higher cognitive skills. It is however interesting to note that the database (ERIC) recognized the terms as the student participant typed them (cf. Appendix U):

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: I'm looking for Higher Education for disadvantaged students. Okay, Higher Education for disadvantaged students (*typing the keywords*) Search. (*reading keywords*) Higher Education for Disadvantaged – A state report. (*reading the title of the journal*) Financing... I've got to take this one. I go for this one

The student participant retrieved a high recall because his search terms were broad.

However, he did not include the USA in his search strategy. The results were therefore not relevant to the required search.

Although the verbalization of her thoughts did not correspond with how she typed the search statement, the system did yield a result for the following participant:

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENGI – PARTICIPANT 11

P: Okay, I search it under electrical engineering in South Africa and I found two ... one article which is about Europe and South Africa. Then the answer that I got ... is the one that talk about business enterprises and electrical engineering and how it is related to Europe and South Africa

P: Okay, then search now. Okay, it gone into search. I'm gonna search "electronics" okay. I must put in my search, which is electronic (*silence*). I'm still looking for this one. Still searching. Still searching. See what it get (*typing*). Okay, it gives me some information that I'm going to use. Now let's see. Got it!

This student found a high level of recall but decided to choose one record:

MALE: 3RD YEAR RETAIL: RET3RDI – PARTICIPANT 18

P: ...but I think I would choose number one topic. Gonna read. I'm reading an abstract. Must I read the whole abstract? Continue reading.

R: No you can only say who is the author of the article.

The student mentioned the bibliographical details of the article:

P: ... the title of the article is "Operationalising Technology Improvement in Kodak developing"

R: And the source?

P: In General Operational Technology. The date is August 2003. Volume 149, Issue 18, Page 29

FEMALE: 2ND YEAR ARTS: ARTS 1 – PARTICIPANT 1

P: It's still searching. (*Mumbling something unclear*) I have two information here. First break the silence – Arts and HIV AIDS in Kwa Zulu Natal. Secondly a multi sectorial committee in directing HIV and AIDS specifically in intervention in the occupation setting in South Africa. I'm going to take the second one. (*Laughing*) ... (*Silence*)

7.5.1.2.4.1 Recognition of relevant information

Student participants did not always indicate with complete certainty whether records retrieved were relevant. However, it is significant to note their reasoning why records were relevant:

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2NDI – PARTICIPANT 13

P: I'm still looking for journal articles with Higher Education for Disadvantaged Students. Oops! There's this one, which says "Students from Harvard Academic College" I think this one is the relevant one. One that I'm looking for was ... deals with Higher Education for people that are coming from disadvantaged backgrounds. I think it's the relevant one. Let me check from ... page...there about. There are only ten pages.

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2NDI – PARTICIPANT 13

P: Let's see. Leave this out. Then try the search again. It's about Internal Auditing in Higher Education. Articles about Internal Auditing. They are about twenty-three. I think they are relevant because it adds value to the business. I think they are all relevant. I think they are all relevant for me. I think this is the correct one.

MALE: 2ND YEAR BUSINESS MANAGEMENT: BMAN2NDI - PARTICIPANT 2

P: Search – Search completed. 15 pages now – still it's searching for the relevant one.

P: I've chosen number 4 – first class coach (*reads Bibliographic detail*) The title is First Class Coach (*reads Bibliographic details*). Click Search, which is ASP. Double click on Academic Search. Searching for the keywords <Human Resource Management & Higher Education>

MALE: 3RD YEAR BUSINESS MANAGEMENT: BMAN3RDI – PARTICIPANT 4

I got ten articles about small businesses and management. So what we need here – about nine articles on small businesses and global trends, which are in relationship with small businesses workshop on this management techniques. (*Read the info on screen about the articles*) I'm going to choose "management technique" I want... Okay, I've got inventive management techniques. So must I write it down?

P: I've got the book. The business management book. It is written by Niemand Gideon. Name of the book – title is "Business Management" The date of publication is 2002. Place of publication...

He was more successful when refining the search but found a high recall:

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: Let me try another one. We can cut Engineering. Research. I've got it. Lots of topics. It is at least relevant for what I need.

R: Look for the next one.

MALE: BTECH MECHANICAL ENGINEERING – BTECHMECHENG1 – PARTICIPANT 7

P: Okay, now I'm gonna go to Academic Search Premium and I'm gonna search on articles dealing with motor industries in the USA. Okay, this is for mechanical engineering. So now I'm going to type motor industry.

He needed to be reminded to verbalize his thoughts:

MALE: BTECH MECHANICAL ENGINEERING – BTECHMECHENGI – PARTICIPANT 7

R: Keep on talking.

P: Then I go to search. There are ten articles from 129

The student realized that her search strategy was problematic:

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENGI – PARTICIPANT 11

P: Okay...okay still problems that I'm experiencing here. I'll go back. Then I'll scroll ... page down. Okay, let me try to find ... South Africa Student. Let me see what I get. Okay, I got something. I got one here. The title. When was it first issued? ... Education is published and the title ...When was it first issued? Okay.

FEMALE: 2nd YEAR ARTS: ARTS 1 – PARTICIPANT 1

P: Secondly I'm going to use the Eric database. Eric database. I click on Eric database. Double click and okay. Click on okay. Okay on ... and HIV and AIDS in South Africa. Then search. I have five records here. One which is ... Africa for Africa toward quality education for all 1999. Human science research council. I don't need this one. Study of knowledge, attitude, perceptions and ... Regarding HIV and AIDS. Human science research council – Pretoria – South Africa. I'm going to take this one. AIDS preventive education and the life skills training program for secondary schools. Development and evaluation. Human Science research council in South Africa. And I'm going to take this one. The management of AIDS in South African schools. And this one. I'm not going to take one and five. That's my research. I'm going to click at Internet and go to library and library catalogue. Click on browse. Type word or a phrase. HIV and AIDS.

7.5.1.2.5 Failure finding information in the IR systems

Some student participants experienced difficulty in finding information in the systems

searched:

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2NDI – PARTICIPANT 13

P: So I'm gonna go to the third one about ... The search engine I'm gonna use it's Eric. So back...back. Eric. Oh! It's down there! So I'm gonna take this tick from the first one. From the Academic Search and then gonna put a tick next to Eric and then click. Double click okay Eric and then it asks me about journals articles ... journal articles dealing with Higher Education for Disadvantaged Students. It asks me about journals articles about dealing with Higher Education journal. Try Higher Education and then ask again. Disadvantaged Student and put in disadvantaged student. I hope it is correct. Yes, I'm gonna pick search again. Search. Oops! No results were found.

MALE: 2ND YEAR INTERNAL AUDITING – INTAUD2NDI – PARTICIPANT 13

P: The search is wrong. "Articles about... Just try to put class in between internal auditing and higher education institutions. Let's go to search again. Ah! No results were found. (*reading*) Articles about Internal Auditing of Higher Education Institutions.

MALE: BTECH. MARKETING – BTECHMARK2 – PARTICIPANT 6

P: Now I'm moving to ERIC (*silence*). It says journal articles dealing with Higher Education for disadvantaged Students but I will type Higher Education and Disadvantaged Students to see if I can find any relevant information. It says sorry no results found in the search.

MALE: BTECH. MARKETING: BTECHMARK1 – PARTICIPANT 5

P: Go back again. Switch my keywords. Try my search now.

RA: What are you typing?

P: Journal keywords (*typing while repeating keywords*).

RA: Speak louder.

P: Click on search. Say still no results found.

FEMALE: 3RD YEAR MARKETING: MARK3RD1 - PARTICIPANT 14

R: Go to the next one.

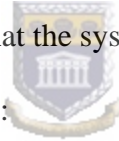
P: Oh! The next search... Academic Search Premier. Going to look for Academic Search Premier now. Looking for South African Clothing Industry. (*typing while reading the keywords*) No results were found for my search. Look and see. Look again. (*typing other keywords*) Look again. Ah! I must first search. I'm still searching. For the South African Clothing Industry. I have no results

FEMALE: 3RD YEAR MARKETING: MARK3RD1 - PARTICIPANT 14

P: Okay, I think South Africa the Clothing Industry. Then search. No results were found in your search. Click. (*typing in silence*) I did marketing and design in South Africa. Since design is meaning – I was maybe thinking of Clothing Industry. Going through designing things. Then I'm going to the Eric now? The next one.

R: Say what you are doing. Speak louder.

This student was under the impression that the system did not understand him, not realizing that he typed in a host of words:



MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: Now the system doesn't know any of my items. So I have to go back first and click on the icon that says full text. And then I'm going to search again. So I wait and it doesn't come up with any results. So I have to go back again and check if there are any journals on this particular topic. So I click on journals. And then I type the same topic again.

The context of fulltext means articles with the full text and not typing in the full text of the search statement. The student certainly does not realize this and carries on:

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: Articles about Chemical Engineering (*repeat*) Articles about Chemical Engineering for South African Students. And then I go to search. The system is searching. Are there any results? The system doesn't come up with any of the results. So I'm kind of convinced that there are no such articles.

From the foregoing verbalization the student was convinced that the problem lies with the system and decided to do the next search:

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: So now still under Academic Search Premium – I’m going to search for this article. I’m going to search for articles dealing with chemical engineering industry in South Africa. I’m just going to clear this. What I want ever typed before. And then enter my new text. I’m going to type (*typing while repeating the title*) “Articles dealing with chemical engineering Industry in South Africa (*repeating*) Chemical Engineering Industries...Industries ...in South Africa. So then I keep search. And then I wait for the system to search for more results. The system doesn’t come up with any.

He decided to follow the same procedure as with the previous search:

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: So then I’m going to go back and try full text. So that the system can search for each and every word that I’ve typed. Then I click searching. Then I wait. The system doesn’t come up with any results.

This student changed the syntax of the search statement:

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

R: All right! Let’s go.

P: Okay, I’m gonna visit number one.

R: Speak louder!

P: I’m using the Academic Search Premier. I’m looking for anything that can help me to find articles dealing with chemical engineering in South Africa. (*typing*) So I typed South Africa Mechanical Engineering. No results were found here. Let me search again



Note the student’s response regarding the selection of an author although there is no indication in the transaction logs in Appendix 21:

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: No! I haven’t found an article yet, but I’m still searching for ... Now, I’ve just changed the author of the search so that I can do it again. Still no results have been found. No results have been found in your search.

The system did not yield any results:

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENGI – PARTICIPANT 11

P: It’s giving me some problems. I’ll keep on trying it. Okay, I still try to get it again. (*typing in the keywords*)

However, the student still struggled to find information:

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENGI – PARTICIPANT 11

P: Well I’ll go back again and try to search it again under students and search again. (*silence while reading the data on screen*)

R: Carry on talking!

P: Okay, since I’m dealing with problems in South Africa Students. Okay, then I’ll try it to see what student give me. Okay, still trying. No results found.

MALE: 3RD YEAR RETAIL: RET3RD1 – PARTICIPANT 18

R: Go to number two. Keep on talking.

P: I'm doing Academic Search Premier. I'm searching for keywords in Clothing Industry in South Africa

P: I'm using Academic Search Premier. I double click. I'm checking it on newspaper. I'm writing the keywords.

R: What are you typing?

P: I'm typing keywords. I'm typing South Africa and Clothing Industry. I'm clicking search. The answer is "no results were found for your search"

P: I'm going to start... I'm clicking... clothing. I'm starting with clothing industry. I'm clicking search. The answer is no result is found.

P: I'm going back again to try something again. I'm clicking. I type South African Clothing in South Africa. I'm clicking search. No results were found for your search. Moving back again. Now I'm going to try something again. Find it in clothing industry. I'm not erasing Clothing Industry. I made a mistake. I have to rectify my mistake.

The student then decided to search under newspapers, which made her search more

irrelevant:

FEMALE: BTECH RETAIL BUSINESS MANAGEMENT BTECHRBRI – PARTICIPANT

P: Now I'm trying the newspaper because from the articles I don't get this information. Now I'm searching one on the newspapers. Still no results were found in my search ...search. Use the journal articles. (*Silence*) I'm still looking for this article because I ... now... I use the newspaper because I won't get the journal articles. (*silence*) I'm going to expand my search to full text. I am searching. No results were found.

R: Okay, try the next one. Do the next topic.

P: I'm going to clear this topic so that I can type in my next topic. I choose Eric. I'm going back and start my search again. Now I'm going to Eric to research on it. Under topic I had to look for journals dealing with Higher Education for Disadvantaged Students. I'm going to type the title – topic of the research. (*typing*) journal articles dealing with Higher Education for Disadvantaged Students. I'm going for full text because I need more information and terms. Then I'm going to search. They ask me...

P: They say no results were found for my search premier. Check the spelling. What's wrong? (*reading something on the screen*) Looking for my search again. (*something unclear because of loud, ongoing conversation in background*) I'm trying to search again. They say again no results. No results were found on my search. What now? (*reading something unclear*) (*silence*) I'm going to expand my search for full text search. It will give me some information. (*silence*) Okay, I'm going to clear this and think I'm gonna try full text. (*silence and typing*)

R: Speak louder.

P: Higher Education for Disadvantaged Students. Now I'm going to try research. No journal articles. It still says no results found.

R: You can do the next one.

P: Now I'm going to go to OPAC

P: I'm going to Pentech OPAC to search for a written book. I'm going to search. No results. I'm going to start again.

Note how this first year student also types in the full search statement without using keywords:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

Then I click on search. Then go down the page. (*reading*) Articles on chemical engineering in South Africa. No results there.

R: Speak up as you are thinking

P: Okay, chemical engineering industry in South Africa... (*repeat*) So there is no result.

Student participants from the UWC who failed to find information from the IR systems they searched were:

MALE: 1ST YEAR: LAW 2 - PARTICIPANT 13

P: I'm going to click to Legal Resources. Now I'll find the page I'm going to and look for Labour Relations Act in South Africa (*scrolling down and reading softly*). I'm...now...Labour Relations. Seems I'm facing some problems (*reading*). Ah...Come on. I'm still struggling to find Labour Relations. Now I'm back with the page of Butterworths still. So now I'm looking for Labour Relations. Ah eish! So I'm going to click to Labour Law Library. I'm waiting. So I'm clicking to Advanced Search. So now I'm going to type the name Labour Relations (*typing*). I'm finding some problems now. So I made a mistake now (*typing without talking*).

P: Yo! I'm getting lost now. Now I'm going to try number two. I don't know if I'm doing this right. Now I'm looking for Basic Conditions of Employment Act.

R: Keep on talking



The student is struggling to get to the information that he needs:

P: This is getting complicated now. Now I'm going to Advanced Search. Ja, I'm looking for the Basic Conditions of Employment Act. Still looking. So I'm typing <Basic Conditions of Employment Act>. I don't know if I found this Act because I see something, maybe... I clicked to Employment Equity Act of 1998. So now I'm going back to Library Catalogue. So I'm closing this page. So I'm going to Library Catalogue. Still waiting. Library Catalogue. So, Internet Explorer.

R: Keep on talking

He switches to the next search but experiences more problems:

P: Now I'm in Library Catalogue. Now I'm still looking for mmm
So I'm going to number three now. So I'm looking for Journal articles dealing with Euthanasia and the Law. Now I'm going to the Library Catalogue. So I'm going to click on Search. So I only know the name. So I'm going to click to Search. Now I'm going to type the keywords. Now I'm typing <articles dealing with Euthanasia and the Law>. And now I'm going to click to Go. Ah didn't find any. So I'm going to try another keyword. So I'm going to try <Journal> (*types*). I'm waiting. I'm still waiting. No, I didn't find anything.

He decides to search the OPAC:

P: So now I'm going back to UWC OPAC. So I'm browsing the screen. I'm going to click to Back. Also going to click to Back again. Because I'm looking for UWC OPAC.

Frustration is building up:

P: So I'm going to search for the book by Fiona J. Ogle. So I'm going to click to search. Now, Now I'm going to click to...I'm looking for the author now. I'm going to type the name of the author. I'm typing (*types the name of the author*). Okay. I'm still typing her name. Ogle. Now I'm going to click to <Go>. I'm still waiting. Now I'm going to look for the author. I don't find it. I made a mistake. I'm on another page now. I made a mistake. So, now I'm in Library Catalogue. Now I'm going to click to Browse. Now I'm going to type the name Ogle (*types*). Now I click to <Go>. I'm waiting for the page. Ja, I'm still waiting for the page...I'm waiting. So now I'm going to... (*sighs*). Now I don't know what to do.

P: So now I'm going back. So...mmm I'm clicking to Library Catalogue. I'm waiting...So now I found the page...Library Catalogue. So now I'm still reading Library Catalogue. Hey now I give up...I give up.

One of the student participants from the Science Faculty struggled among three databases:

MALE: 3RD YEAR: SC 1 - PARTICIPANT 18

P: I've got Emerald. Topic provided here is Academic Source Premier, Business Source Premier. I'm looking at one that must have Academic Source Premier. The original business news. More information. That source whatever. I don't think I will be able to find my topic here. I think I'm going to leave this. I cannot find the information I'm looking for.

7.5.1.2.6 Problems with thinking aloud



Some student participants experienced problems with thinking aloud:

MALE: 1ST YEAR MECHANICAL ENGINEERING MECHENG 1 - PARTICIPANT 15

R: Speak up as you are thinking.

P: Still no records. So I type – try to type.

Motor Industry and USA (*types*). Click search.

Again find no records

R: Whatever goes through your thoughts – just speak.

P: (*reads tips*)

P: <Motor Industry & Engineering> I click on Search again. Still searching.

R: Speak louder.

P: Ok. Still searching (*Long pause*).

R: Carry on talking.

P: The aim is to find the author of the book (*Long pause*)

R: Carry on talking. Just speak louder.

P: (*Very little verbalization*)

R: Carry on talking – say what you're thinking.

P: Go to ASP. Then go back

R: Keep on talking.

P: EBSCO

R: Keep on talking

P: Searching (*long pauses*)

There was little verbalization of his thought processes. This prompted the researcher to ask him to speak louder and to carry on thinking aloud. This problem got worse as he failed to search on all the required databases:

MALE: 1ST YEAR MECHANICAL ENGINEERING *MECHENG 1* - PARTICIPANT 15

P: Open ERIC. To search for the author

(Participant mostly stares at the screen with uncertainty).

R: Keep on talking

P: This is not working.

R: Ok. I suggest if you get stuck go to the next one. Go to the last one.

P: This is the last one.

R: Ok.

P: Ok. I'm searching. *(Stares at screen)*

R: Ok time is up now. Ok. Thanks.

MALE: BTECH MECHANICAL ENGINEERING – *BTECHMECHENGI* – PARTICIPANT 7

This particular student participant spoke softly and had to be prompted most of the time to speak louder:

P: Now I'm going to do Academic Search Premium. Now I'm gonna put the title. Article about ... article dealing with mechanical engineering in South Africa.

R: Louder.

P: Try mechanical engineering. *(typing in silence)* Now I'm going to search.

R: Carry on talking!

P: Okay, now there is one article found.

MALE: BTECH. MARKETING: *BTECHMARKI* – PARTICIPANT 5

This student participant had a 100% search success rate but a 0% relevancy rate. Some of his problems are illustrated thus:

RA: Keep on talking.

P: Search for the text. Fifteen pages found. Still searching for the relevant one. Choosing number four.

The research assistant encouraged him to carry on talking while searching for the topic:

RA: Keep on talking.

P: Now search which is Academic Search Premium. Double click on Academic Search. Searching for the keywords Human Resources Management and Higher Education not finish yet. Higher Education.

RA: What are your keywords?

P: Typing in my keywords, which is Management in Higher Education. *(silence)*

RA: Talk as you're typing.

P: Typing my keywords, which are Human Resource Management and Higher Education. Click on search.

P: Going for my third search. Choose Eric. Double click on Eric. Still searching. Searching for my keywords. Journal articles dealing with Higher Education for Disadvantaged Students. Keywords are “articles dealing Higher Education for Disadvantaged Students (*typing while repeating the keywords*) Click on search.

FEMALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND2* – PARTICIPANT 3

R: Speak loud.
P: I’m looking for articles for ...articles about Human Resource Management.
R: Say what you typing. Keep on talking.
P: Okay, it’s in Management. (*typing in silence*)
R: Can’t you speak louder?
P: Okay, I’m going to search. I wrote the wrong keywords. Go to correct it. I type in management. Okay, then click on search. No results were found.
P: I’m gonna use Academic Search Premier. We can use the journal
R: Keep on talking

FEMALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND2* – PARTICIPANT 3

R: Speak louder.
P: I’m not sure. (reading the question again and looking at the screen) I go to OPAC.
R: Keep on talking.
P: A book written by an author in the subject area that you are currently studying. (*repeats the information*) Go back again.

The student finally gave up indicating that she did not know how to approach the problem further.



FEMALE: 2ND YEAR ARTS: *ARTS 1* – PARTICIPANT 1

This student had to be reminded most of the time to talk:

P: (*laughing*) Still searching. Journal searching. (*Long silence*)
R: Keep on talking!
P: It’s still searching. (*Silence*) Okay, I click on UWC custom database. It’s still searching.
R: Keep on talking!
P: Okay I’m going to search incidents of HIV and AIDS amongst South Africa. I’m going to type HIV and AIDS and South Africa and search. Still search for info. (*Silence*)
R: Keep on talking.

The student however had problems with bandwidth. The system was quite slow at this stage and this may have been the reason for his silence:

R: Keep on talking.
P: Still searching. Still searching. It’s still searching. Still searching. Still searching. Still searching.
R: Keep on talking!
P: Still searching. It is still searching. Okay I’m going to search journal articles dealing with the Higher Education for Disadvantaged Students. So my keywords are Education and Students ... disadvantaged and student. Click on the keywords. Searching. Education and ... (*typing while repeating the keywords*) (*silence*) Search again. I search. I click on quick search.
R: Keep on talking!
P: Okay. (*Silence*)

7.5.1.3 Information retrieval system effectiveness

Student participants experienced problems with bandwidth. Although this should not necessarily be ascribed to system ineffectiveness, this was perceived by most of the participants.

7.5.1.3.1 Database searches

It is significant to note how student participants approached database searches:

MALE: 3RD YEAR BUSINESS MANAGEMENT: *BMAN3RD1* – PARTICIPANT 4

P: Okay, click on Academic search Elite. I just double click now. Still searching... I just double click now. Still searching. It gives me ... I'm looking for my articles "Human Resource Management"

This student participant now gave a final attempt to search for the required information and concluded that the library did not have the information:

MALE: 2ND YEAR CHEMICAL ENGINEERING: *CHEMENG2* – PARTICIPANT 10

P: Try to go back again. Try chemical engineering again. And then click search. The system doesn't come up with anything. So actually this tells me that there are no such articles in this library... because the system doesn't have any.

P: I'm going to search for journal articles dealing with Higher Education for disadvantaged students. Now this is the text that I'm going to type here. (*Typing while repeating the article title*) Journal articles dealing with Higher Education for disadvantaged students. And then I'm going to try a search. The word back in the system doesn't bring up any results.

P: So what I'm going to do? I'm going to go back, but still under the same text "journal articles dealing with higher education for disadvantaged students" I'm going to try and search (*silence*). I'm going to try the same text again. What I can do? What I can do? I'm going to try... It gives me time to type all this. I'm going to repeat ... And then I'm going to paste it here. After that I'm going to try to search again. And I'm going to try to search again under search under journals. Yet again the system doesn't bring up anything. So this actually tells me that the system once again doesn't have anything. Now I try to go down. Search and then wait and see what it has to tell me. There are no results again. So there are no results under this text. Now it convinces me that there are no such journals.

This student decided that the system was taking too long to produce results:

FEMALE: 1ST YEAR: COMMUNITY AND HEALTH - *CHS 3* - PARTICIPANT 6

P: This is taking so long. I'm going to check the second one. Okay second one ... second one. I'm going to do the ... Okay the journal about the development ... the movement of psychology ... it's on academic research database. This is so long. Oh! it's so slow.

R: Keep on talking...

P: Okay. It's taking so slow. Okay let me remind myself again. I'm doing a research about HIV and Aids amongst white people. I'm going to make my search through the database of Medline. I'm looking there for the relevant records. Oh! it's taking long. Maybe let me go search for the second one.

7.5.1.3.2 OPAC searches

Searches on the OPAC's of both institutions' libraries were quite difficult, but more so at the UWC:

FEMALE: 2nd YEAR ARTS: ARTS I- PARTICIPANT 1

P: I didn't find this author. I typed in the middle name Klarabel Xoliswa Magopa and I ... the same name but no Magopa here. I didn't find anything.

R: Try again!

P: (silence) Let me just click on ... Xoliswa Magopa. No. No.

R: Keep on talking!

P: Searching. The author... Magopa. It's still searching. I didn't find this. I know the title of the book. Maybe I can find it. I believe so.

R: Keep on trying...

P: Okay. Author ... publisher. Author ... author ... author. (Typing something in silence)

P: Okay I typed in the same name Magopa Xoliswa Clarabell then search. Still searching. Searching. (Silence) I'll try again. (Retyping the name of the author) and go and searching. No Magopa here. Magopa PT. No Magopa KC.

Apart from not spelling the name of the author correctly the student enters her search terms incorrectly.

FEMALE: 3rd YEAR: CHS I - PARTICIPANT 4

P: And then I can go to number four which I'm going to use a UWC OPAC to search my information. Then the topic is a book written by Joanne Valiant Cook. I can give you article, date of publication, place of publication and the publisher. So I can click here to the start and programme. And then Internet Explorer. Click here again. So I'm going to take this book that was written by this guy here and then I can click here to the library. And then ... I'm waiting now. Click to the library catalogue as I'm going to use UWC OPAC. And then go to the browse. And then as I'm going to use an author I can select here and click here to the author. And write this one ... the author. (typing the name of the author) and then I try to click here to the go. And then I can find this author here. I didn't find this. It's not here to this. This book is not and then I'll try to ... written by Cook Valiant. Try to start with the surname. Then go back again. Back. And then browse. Author ... starts with the surname of this guy J. V and then go. I didn't find this man Cook. J.V. Cook. (something unclear was read) I didn't find him again. Identify the title, the date of the publication, place of publication and the publisher. So what can I do? Let me try once more. Let me try again. Type Cook comma V.J. Then go here. Still waiting. Here it is. I find this Cook. The first one ... which is not this one that I want. And then it is not that one

It is interesting to note that the student did find a record in Browse mode but recognized that it was not the one she needed:

P: Maybe I go back again. Let me go back again. Try again Cook. (retyping the name of the author) And then go. Try again. Maybe I can find this now. Valiant Cook is not there and I don't know the title of the book. So I don't think that they know that ... here that you had this book. I want Cook. Then I can go back again. What can I try to us again? The author. Let me try again the last one. When they come similar results I know that ... so I did find the last information. So but I'm trying another search strategy which is what? Which one? There is no other search strategy. Let me search that one again and then I click where? Since I'm going to use UWC OPAC I have to use a library catalogue. But it didn't come today. The information that I want. And then search. Let me click on research. Author ... I try again. (typing the name of the author) Click and then go. Maybe I can find information.

Although this participant indicated verbally that she searched the OPAC the online transaction was not captured. She also did not find the record. Sometimes student participants just gave up on a search and proceeded to the next topic:

MALE: 2ND YEAR: CHS 2 - PARTICIPANT 5

P: Still researching here. Okay my last topic... my last one. Searching the last one. My last topic is use UWC OPEC to search for the following. A book written by Joanne Valiant Cook. Identify the title, date of publication, place of publication and publisher. So I'm going to Internet explore. Internet explore. Ja, Internet explore and click library. Click library catalogue there. Okay click by library catalogue. Looking for access searching a specific catalogue mainly by clicking here. Where's is it? Where's is it? Okay I'm going to database. That's the UWC library and search. And type ... No go back. Go to browse. Browsing and type the word or phrase. Type the topic. That's it. Type the word Valiant T. Cook. Say the author. Say the author. Then let me go search. Why does this thing of Cook not go? Okay going back. Going to get the book. What's the title of the book? Title of the book ... okay title of the book. Still looking for the author. Next page ... next page. Next page ... next page. J.O. No not this page. Previous page. Let's go to previous page and previous page ... previous page. Not wanting that. Going up. Next page. Hey! It's hard to get this book. It's not easy to get the book on the computer research. You have to be patient ... patient if you want to get the book as quick as possible okay. Okay. No ...no. I'm trying to get this book. To get this book. Where are you now? Where are you? Joanne Valiant Cook. Ja that's the author ... the author. Go to click. Still searching. Next page ... next page ... next page ... next page. Yo! (sighing) I'm looking ... looking ... looking.

Some students experienced problems which were mostly due to incorrect spelling:

MALE: 2ND YEAR: EDU 1 - PARTICIPANT 7

P: From there I'll search a book written by Patricia Kulbow. I will find the article date, publication, place of publication and the publisher. Okay, let me go to main ...or library ja. And then check ... (*reading something unclear*) Okay, What now? Okay, library catalogue okay then let me choose. Let me click Browse to see what comes to that (*whispering something unclear*) Let me go back again. Browse again. Takes time. Let me click on page, title, let me write of the author, Patricia Kulbow (*typing in the author*) Okay, let me type the author. Let me click author and click go (*whispering something unclear*). Let me go to Patricia Kulbow. Double click.

The student misspells the surname of the author. He is clearly frustrated:

P: God what am I going to do now? Let me check on Education what ... Get so tired. Patricia -----
- This is not the one. Let me go back. Back again. Title of the book. Okay, search for the book. Let me try again (*typing new keywords*). Allright. I'll check if I can get the title of this book. Let me go

(*whispering something unclear*). No this is not the book I'm looking for. Oh! God! The page... (*silence*) What am I doing here? Okay, let me try another one. ----- Just to see if I cannot get it in this way. Let me write the author Patricia again. Let's see what I'll get here. Okay, This is the author ----- author. And click book. No! I can't find the ----- What's going on. I think I have to get some help cause I've been trying ----- tried to go to the library where I can get some librarians to help me because I've been trying ... Oh! I don't get this information. Maybe the author is not in the catalogue. This one.

Exasperation and frustration were clearly present in some cases:

MALE: 3RD YEAR: EMS 1 - PARTICIPANT 10

P: What I'm going to do now, I'm looking for UWC OPAC. Then I am searching for the book ... okay. Then I click. Then I go back to UWC library and then go library catalogue. I need OPAC right now okay. I'll go for search. There it is. I'm typing now the name of the author. I don't know if I'll get this book, but I'll type. This thing is taking a long time (*typing*). And I don't have time right now. I'm submitting my keywords. I don't know my keywords. I need somebody to help me. Where am I going to get this person? I don't know. (*cassette error*) I don't get this book. I don't get this author. Let me try again. Try and search again. Okay, I don't understand this. This author is supposed to be here. Suppose to get this book. I hope I'll get it. I click on books. I'll click on go. Still there are no sources. Then I'll start again okay. Click on search again. Now I'll use the name of the author and the title of the book. ---I'll just see if it's a valid search, but this thing is stressing me. (*typing*) I don't know what is happening, but I'll get it. I'll make sure that I'll get it. I'll make sure that I'll get it. But I don't have much time. Still not getting it. What am I going to do now? Start again and search again okay. Let me start from the first thing, No ... no ... no this is not going to work.



The student initially entered the search terms incorrectly with little verbalization, but then refined the terms to find results for her search:

FEMALE: 1ST YEAR: COMMUNITY AND HEALTH - CHS 3 - PARTICIPANT 6

P: Now I go to the UWC OPAC. I just double click here. Go to the library again. This one is very easy actually. I go to the OPAC. Find the library catalogue. I enlarge it. Still waiting for it to open. Okay, I'm searching for a book here. This book I know. The book is written by Joanne Valiant Cook. So I know the author. Then the name of the author I go to browse and I type in the name of the author.

Sometimes there were long pauses during searching:

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

P: I do the last one. I'm busy with the last one.

R: Are you doing it using the OPAC?

P: (*very long silence*)

This silence suggested that the student did not understand how to search the OPAC

Some other student participants had to be reminded to speak louder:

FEMALE: 3RD YEAR MARKETING: MARK3RDI - PARTICIPANT 14

P: Okay, I'm going to the Business Source Premier

R: Just speak louder.

P: I'm going to open the Pentech OPAC. I'm going back again. I can't go back here. Okay, now I'm going to close this one first before I go to ... Then I open OPAC and say Pentech. Double click on Pentech.

She seemed to have difficulty in opening the PENTECH page:

P: No!! What's happening over here? I always have this problem here. I see

Another student found it difficult to open the PENTECH page:

MALE: BTECH MECHANICAL ENGINEERING – BTECHMECHENG1 – PARTICIPANT 7

P: I need to go to PENTECH OPAC. Where is PENTECH OPAC?

R: It's on the desktop. Over there! Click again.

P: This is complicated is very complicated. Go back again. Okay, now I'm with Pentech. Now I entered the main menu. Okay, I'm gonna go to database. Then click over here. Here I see a menu Technikon and messages. Then I go to Pentech OPAC and click one. Okay, I'm gonna go to search.

FEMALE: 3RD YEAR MARKETING: MARK3RDI - PARTICIPANT 14

P: Subject and then search. The subject area in which you are currently studying. Here they ask "journal. Then we just say "marketing". Let me just say the subject title which is marketing. I don't have the article.

She was aware of a title that she had been using before. Note how she searched for this particular book:



FEMALE: 3RD YEAR MARKETING: MARK3RDI - PARTICIPANT 14

P: I'm looking for this book "Direct Marketing in South Africa".

Although she knew the title of the book she used the subject field search for marketing and found two records (cf. Appendix U).

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: So what I'm going to do now? I'm going to search for a book that I used (*repeat*) I'm going to search for a book that I used ... a book that I've used for my course. I click and search and wait for the system. Now I'm going to type under words... I'm going to try to type the title of the book or I'm just going to...to try to type (*repeat*) to try and type the title of the book again.

This student selected a title, which he already was familiar with instead of an author:

MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: Then go to the last one. The feature I'm going to use is OPAC. Where? Okay, I'm going to search. I'm looking for it... I'm looking for strength of materials ... here. The title of the book "Strength of materials for technicians".

R: Keep on talking

P: No I don't get this book here. So I think I have to try it by author. Have to find it by author. Try to find it using the author. Okay, author. (*typing while saying something unclear*) Search. Okay, author. Go ... (*saying something unclear*) Ja! Here it is.

7.6 Conclusion

The data presented in this chapter clearly show that student participants from both institutions had a number of problems. Some students had difficulty in expressing themselves verbally, while others failed to formulate search strategies. The verbalization of searches was also problematic while students had to search. Although indicating what they were doing at the time of searching, these verbalizations did not correspond with the online transactions. It was evident that especially those student participants who failed to find information, had a high level of frustration. The retrieval process was made more difficult by the bandwidth problems experienced at the time of their searches.



CHAPTER EIGHT

DATA ANALYSIS AND INTERPRETATION

8.1 Introduction

Chapter 7 of this study yielded a vast amount of data, which manifested some of the problems identified by Ruth (1997) and Sayed (1998). However, the qualitative nature of this study highlighted the kinds of problems students of so – called historically disadvantaged backgrounds face in their quest for academic literacy. In this regard before an analysis of the presented data can be given, the context needs further discussion.

8.2 Historical contextualization of historically disadvantaged students



There have been major debates on how to resolve the problem of student learning especially in the electronic age. One of the arguments put forward is that students of higher learning need to be computer literate. Another viewpoint is that students need to be information literate. My contention is that although both computer literacy skills and information literacy skills are necessary, students also need to be academically literate. Despite knowing how to use computers and in certain instances how to search, historically disadvantaged students in this study had cognitive difficulties, especially on how to formulate search strategies and deciding which information was relevant.

Relevance of course was restricted to one particular way of searching for information. Since students who participated in this study only had to make use of *Basic* searches using the Boolean <and> operator, I assumed it to be the easier method than say truncated searches and *Advanced* searching. However, it became clear that students' understanding of search strategy formulation certainly did not match the way the IR system was set up. To some students the <and> operator was perceived as broadening a search. As Losee (1998: 59) points out, "...an informal natural language notion of "and" ...suggests that by **anding** [emphasis in the original] terms to the query, one is adding additional ways a document could be retrieved, that it is broadening the search, when it is always the case that **anding** terms narrows the search." This is precisely the kind of problems some students had. A closer look at how students from the respective institutions behaved is necessary. Furthermore, these students' searching skills should also be understood within the framework of the cognitive paradigm in information retrieval. Since this study approached this particular paradigm within Belkin's ASK theory, the results within the framework of the latter needs closer attention.

8.3 Belkin's ASK theory

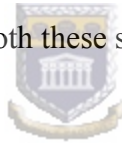
Students' searches were characterized by a general approach at both institutions. There are certain similarities with Belkin's model. However, while Belkin adopts a linear approach, students in this study tended to search in a more cyclical or circular fashion. Figure 11 illustrates this approach.

Student participants manifested certain behavioural states during the search process. Since students were not required to report on their mental or cognitive states after searching, the figure depicts the search process during searches. The states are identified as conceptual, anomalous / anxiety, cognitive, transitory and uncertainty. However, the cognitive state was often transformed into uncertainty and vice versa. For this reason I refer to this model as CACTUS (Conceptual, Anomalous / anxiety, Cognitive, Transitory and Uncertainty when searching). I need to indicate that this particular model cannot be generalized with all students from higher education institutions. With this statement comes the realization that information retrieval processes are rather complex.

Student search patterns were not linear as would be expected. While Belkin's model commences with an anomalous state of knowledge, student participants in this study had a conceptual approach. Belkin's premise was of course that searchers have a particular image of the world. Before they can realize that they have information needs, their anomalous state of knowledge (ASK) changes to some conceptual state with each iteration with the IR system. Although there was some anomalous state with the participants in this study, their searching commenced with an initial conceptual state. Students could not formulate keywords properly as seen from Chapter 7. In some cases this brought about an anomaly. This anomaly in most cases translated into some anxiety.

A reason for this anxiety can be summarized as students' awareness of the video camera and the fact that they had to think aloud. Coupled to this was the time frame within which they had to complete their searches. However this state of anxiety factor also had to do

with the inability of student participants to find the desired or any information. However, this anxiety quickly disappeared but tended to resurface as students progressed with searches. Student participants experienced conceptual problems even before they embarked on their searches. Sometimes these conceptual problems were followed by what I refer to as an uncertainty state. Although this uncertainty was not there for the entire search process, it certainly manifested itself at various stages. This is the reason for the oval shape of the circle. This conceptual problem was also followed by what Belkin would call an ASK or anomalous state of knowledge. This anomalous / anxiety state also manifested itself if students did not understand either how to formulate search strategies or use the IR system. However, this anxiety did not necessarily always follow the conceptual state. The anxiety state would sometimes precede the conceptual state. As with Belkin's findings with the ASK, both these states became less of a problem with each interaction.



In this study I found that student participants had some understanding upon searching, especially when the system yielded zero hits. During this search stage, some cognitive state started to develop. Some students realized that they typed in wrong keywords or spelled search terms incorrectly. Because of this, a transition took place. However, sometimes students transformed their uncertainties into states of cognition and vice versa.

Although not all students were successful upon repeated searches, a realization of their anomalies was soon discovered. It should be mentioned that students often found

difficulties understanding the fundamental operations of the IR systems searched. A brief analysis follows in the next section.

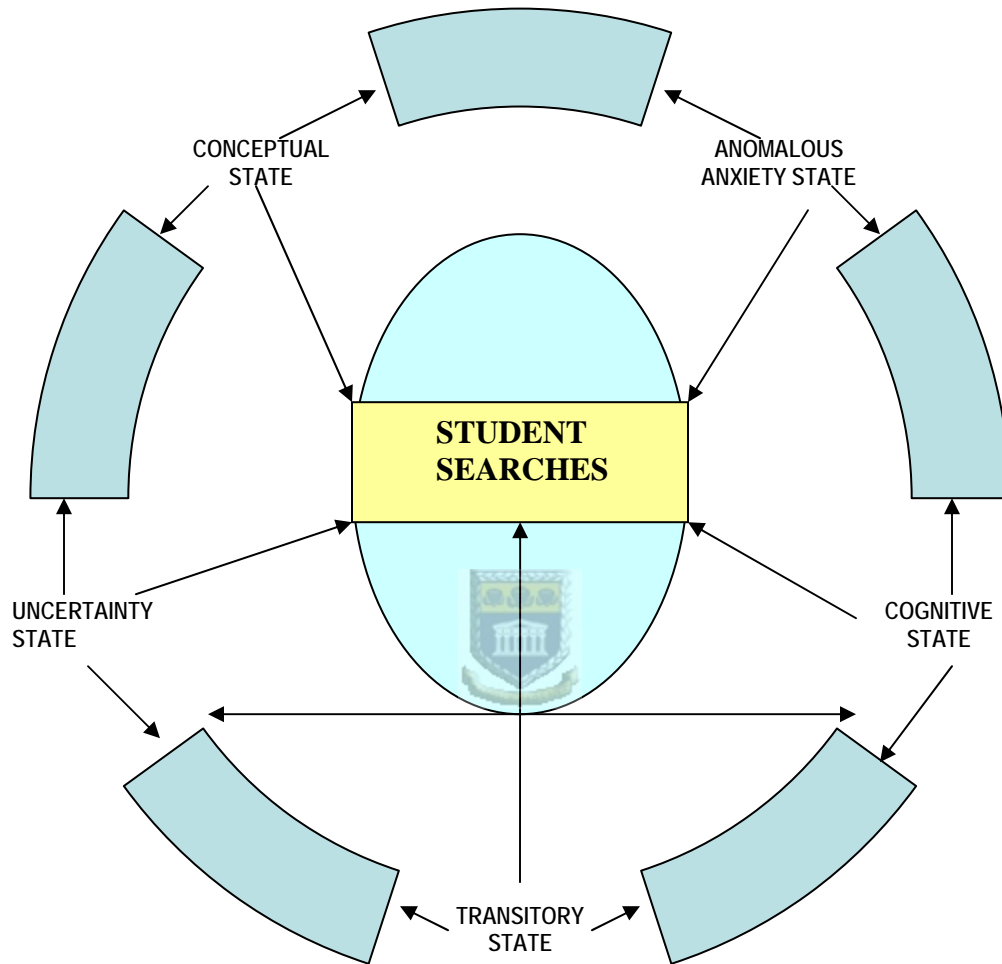


Figure 11: CACTUS - model of student searches

8.4 Information retrieval system effectiveness

Searching IR systems presented difficulties to students as was clear in Chapter 7. A typical problem area was the interface presented to the searcher. Since the interface in most databases was often cluttered with information, this presented major problems. None of the systems had iterative features, like one would find with an automatic teller machine (ATM) used by banking facilities for instance. In the case of the OPACs, the system at UWC presented more problems, given that the interface was *Advanced* search by default. The user, if presented with difficulties had to decide to use the *Basic* search option. The searcher was not explicitly informed by the system to perform such operation. This was indeed a limitation with all the systems. In the following two sections some examples of student participants' behaviour during searching at the two institutions are given.



8.4.1 University of the Western Cape

The fact that the student participants from the University of the Western Cape performed poorly in their searches begs for a closer look at their performances. It is first of all apparent that students had a problem with the slowness of especially the EBSCOHOST databases. Students were clearly frustrated with the bandwidth problems they experienced. Although this was an experimental situation, the bandwidth problem was a real one, which certainly manifested itself quite strongly. As one student stated:

P: I'm going to do Eric database. I'm going to click on "E" So under "E" I'm going I'm going to ... education and training. It's still searching. This thing is still searching. Still searching. It is

still searching. It is still searching. It's still searching. Searching. Searching I don't know. Still searching. Still searching. Still searching. Still searching. It's still searching. It's still searching.

R: Keep on talking.


P: Still searching. Still searching. It's still searching. Still searching. Still searching. Still searching.

R: Keep on talking!

P: Still searching. It is still searching. Okay I'm going to search journal articles dealing with the Higher Education for Disadvantaged Students. So my keywords are Education and Students ... disadvantaged and student. Click on the keywords. Searching. Education and ... (*typing while repeating the keywords*) (*silence*) Search again. I search. I click on quick search.

Although bandwidth problems have a lot to do with ICT infrastructure, it does not rule out the possibility that students were put off by slow responses from the IR systems searched. Another student exclaimed:

P: It's slow ... slow ... slow... slow. Must now. I want Medline, but it's still searching. It's so very slow. But now this is not Let me this. I'm searching for ... I'm going to type my keywords. My keywords are HIV AIDS amongst the white people. HIV and AIDS and white people okay. (Typing the keywords while repeating it)

Keyword retrieval may not be the most appropriate way of teaching students to search for information in databases and OPACs.  Students had conceptual problems with the concept of keywords. In addition they tended in most cases to make use of natural language searching as is evident from the following search:

P: Higher Education for Disadvantaged Students in South Africa. Let me click here. (*Repeating keywords*) Where? (*Whispering something unclear*) Journal of Higher Education. I click here. It seems as if I did not find the relevant information. Try other key words to see if I can get any information. Let me see Disadvantaged Students in South Africa (*typing while repeating keywords*). Maybe I can use Higher Education (*typing while repeating keywords*). Right now let me search again. The thing tells me the operation is not a valid. That means the database is not searching for it.

This is clearly a conceptual state. Notice the question "Where?" This is immediately followed by a cognitive state where the student indicates "Try other key words to see if I can get any information." Since the search strategy is problematic, the system naturally does not yield information. The student's conclusion is that the system is not searching for the information.

The cases below illustrate what students understood by the concept of keywords:

FEMALE: 2nd YEAR ARTS: ARTS 1 – PARTICIPANT 1

P: Still searching. It is still searching. Okay I'm going to search journal articles dealing with the Higher Education for Disadvantaged Students. So my keywords are Education and Students ... disadvantaged and student. Click on the keywords. Searching. Education and ... (*typing while repeating the keywords*) (*silence*) Search again. I search. I click on quick search.

FEMALE: 1ST YEAR: ARTS 2 - PARTICIPANT 2

R: What are you searching now? Keep on talking!

P: Okay, I must choose the word, which I'm going to use. I'm using EBSCO host. As I said before. Pasting it. Taking for a basic search. Then I'm going to ... which search I'm going to do. (*Silence*) Then I'm clicking keywords, which I'm going to look for. Then my keywords are Higher Education for Disabled ... Disadvantaged sorry. Then going to search. (*Silence*) It feels that I can't get this information. ...Keywords me. (*Silence*) Then I must type my keywords Higher Education and Disadvantaged Students (*Typing the keywords*). Then I'm going to search again. This is my result. I've got the book here. I've got the journals here.

MALE: 2ND YEAR: CHS 2 - PARTICIPANT 5

P: Let's go back. Let's go back to ... This is not all I got that what I need to search for. Click on back. (Reading something unclear) Search MEDLINE. Let's go there to Academic, Lisa ...okay ...okay ... Just a minute. Click on MEDLINE. I'm still searching for what they got there. Find it in MEDLINE. I want the journal article ... journal article dealing with developmental psychology. (*Typing while repeating the keywords*). Click there. Click on search. Click search. Go ... go ... go come on. No results found for your search premium.



As can be seen these are 1st and 2nd year students. Librarians from the University of the Western Cape pointed out this problem. However, the problem seems more complicated. In the interviews with students, some found Google searches easier because they did not need to use keywords. Despite the high level of recall with Google searches, students indicated that they found the search engine more user – orientated. Of course Google searches would yield a higher level of recall, but relevance may suffer as a consequence. This was clear in some of the cases where student participants tried to search the Google search engine (Appendix V). The problem with relevance was also student participants' interpretation of what constituted relevance.

Anomalies occurred as alluded to earlier when students experienced ignorance in terms of what to do. In certain instances students were overwhelmed by the mere prospect of searching for information:

R: What's going through your mind?

P: It is opening now? I don't know what is opening.

R: Talk...

P: Okay I'm clicking help to look what is happening because I don't know. It doesn't open

FEMALE: 3RD YEAR: CHS 1 - PARTICIPANT 4

P: I think I made a little bit mistake. So I go back and then... Where? Let me check here. (Saying something unclear) I'm looking for the Academic Search database. Let me try at the main library again. I'm a little bit confused actually. And then I want to search about the MEDLINE. I can start here at the database and then I'm trying the electronic journal and then can go to the end. No, click again. Click again. And then I click here to the end to find the MEDLINE.

MALE: 2ND YEAR: CHS 2 - PARTICIPANT 5

P: I'm ready. My first ... my topic is the incidents of HIV and AIDS amongst white people. I'm going to Internet explore. Click Internet explore. Go to library. Go to electronic resource. Go to database. I'm looking for HIV ... HIV AIDS. Where's "H"? Where is "H"? HIV AIDS (something unclear was said) HIV AIDS held action in nursing academic here. That's the HIV ... that's the HIV. Let me go to my procedure. According to this book. Ja! I got it. HIV Education. Click there. Okay ... okay.

RA: Keep on talking!

P: I'm going ... go. I got the ...

RA: Speak loud!

P: Okay let me get topic. I get HIV AIDS here but it not sure it's quite right because they don't take me to my topic that I'm looking for. But I try to click there.



FEMALE: 1ST YEAR: CHS 3 - PARTICIPANT 6

P: Oh! My God! I cannot find this And I have to go back. No, what's wrong now? Give me Journal database. I'm still waiting. I'm searching for HIV and AIDS. HIV AIDS and white people. I'm searching again and hoping this time is going sure. Because the first time it didn't.

MALE: 2ND YEAR: EDU 1 - PARTICIPANT 7

P: Now seems as if I have some difficulties. I don't know. Let me first check. What am I going to do now? I'm going back. Emerald and other database. Let me click here on Eric database and click okay. Ja! Here it comes. It's Eric database. Let me check what to do. Higher Education for Disadvantaged Students in South Africa. Let me check Education for disadvantaged students. Education (*unclear*) Takes a long time. Okay.

FEMALE: 3RD YEAR: EDU 2 - PARTICIPANT 8

P: I still wait for the thing to open up searching. Search for the book. Oh! I've opened the wrong thing. Go back and do it again. Okay it has to come. It's going to come in library catalogue.

MALE: 3RD YEAR: EMS 1 - PARTICIPANT 10

P: I'm submitting my keywords. I don't know my keywords. I don't get this book. I don't get this author. Let me try again. Try and search again. Okay, I don't understand this. This author is

supposed to be here. Suppose to get this book. I hope I'll get it. I click on books. I'll click on go. Still there are no sources. Then I'll start again okay. Click on search again. Now I'll use the name of the author and the title of the book. ---I'll just see if it's a valid search, but this thing is stressing me. (*Typing*) I don't know what is happening, but I'll get it. I'll make sure that I'll get it. I'll make sure that I'll get it. But I don't have much time. Still not getting it. What am I going to do now?

MALE: 4TH YEAR: LAW 1 - PARTICIPANT 12

P: Now I'm looking for an (*unclear*). I'm getting confused. Let me just go back. Let me try again. Let's find it. (*Silence*) Go back. Trying to (*mumbling something unclear*) Okay again. (*Silence*) (*Something unclear was said*) (*Silence*) Same page. I don't know why I can't find it. Click here again. (*Silence*)

MALE: 1ST YEAR: LAW 2 - PARTICIPANT 13

P: I'm...now...Labour Relations. Seems I'm facing some problems (*reading*). Ah...Come on. I'm still struggling to find Labour Relations. Now I'm back with the page of Butterworth still. So now I'm looking for Labour Relations. Ah eish! So I'm going to click to Labour Law Library. I'm waiting. So I'm clicking to Advanced Search. So now I'm going to type the name Labour Relations (*typing*). I'm finding some problems now. So I made a mistake now (*typing without talking*).

R: Keep on talking

P: Yo! I'm getting lost now. Now I'm going to try number two. I don't know if I'm doing this right. Now I'm looking for Basic Conditions of Employment Act.

MALE: 1ST YEAR: LIS 2 - PARTICIPANT 15

P: I think there is something wrong with this. I think ... I think it's my keywords is wrong. Let me go. I'm going to try other keywords like Student and South Africa. I think I'm going to be right now. Still looking for the ... Ooooh! I get it. I found it. I found it ... I found it what I'm looking for. Higher Education Institutions in South Africa. Erica. I think I'm going to choose one of this (*Making sounds*) I did find exactly what I want. I'm going to repeat it again because I just struggle ... Where is that I'm looking for? I'm looking for? I think I'm going to choose ... I'm going to choose ... Oh! The Eric ... These are the things that Eric Lisa..... has written. The article about Erica Lisa has written. Your Eric. I'm going to choose this one... the first one. Oh! no this is South Africa.

FEMALE: 2ND YEAR: LIS 3 - PARTICIPANT 16

P: Okay, so I don't know. I'm not sure if I did something wrong but I'll click out there to see what is wrong. Okay. (*Something unclear was said*) No it is not working ... I'll have to search for the second topic. What I am going to do for the second topics. I'm just gonna change the title because I have to use the same instructions. So now I'll be searching ... Oh no! I have to use database. So I have to take out of there. Okay, I'm clicking exit so I want to go the Lisa database I'll click start again, program WINSPUR 4.1. Now I'm going to click start and double click on Lisa okay. And then I again ... click database again. And then I'm going to search for the topic. Journal articles dealing with the origin of information science. (*Typing while repeating the keywords*) Then I click search and ...

MALE: 3RD YEAR: LIS 4 - PARTICIPANT 17

P: I'm searching ... Search for Eric. Waar is dit? [*Where is it?*] I don't know? Waar is Eric? [*Where is Eric?*] Okay. Why I don't I get the results here? I go to start number two cause it doesn't give me the results that I want. So I'm going to go to premium search. Double click.

MALE: 3RD YEAR: SC 1 - PARTICIPANT 18

P: Where should I go now? I'm checking for something that will bring me back where I can type the website I'm looking for or to search. Something is wrong. EBSCO host. I'm searching now for EBSCO host. In here I'm getting what's contained in the ... like search ... Internet search ... WWW. So I'll go to this website and see what I can get. I'm in the EBSCO host in the Information I'm getting there is ... information ... general information okay. And just another information about the library. I'll click on the general information to see what I can get. (Silence)

An analysis of all the above cases illustrates an anomalous / anxiety state. It is noteworthy that all these participants acknowledged that there was something wrong in either their way of searching or the fact that the IR system was not responding to the request. In addition some students seemed to get 'lost' in switching between IR systems. This is clearly unfamiliar territory to them. It reinforces the notion that students do not really search databases.

As indicated earlier, there were also cognitive difficulties. This had much to do with students' basic understanding of which information was relevant to their search questions:

FEMALE: 3RD YEAR: ARTS 3 - PARTICIPANT 3

P: Electronic resource databases and search for the Academic research. Academic ... I'm looking for journal articles dealing with sociology. And I click on go to look for "J" And then journal access. This is the information that I get. There is no relevant information. Okay dealing with sociology. Is about journals Human Social sciences and general sciences. No one about sociology. And then I close this thing and go and go to start again.

FEMALE: 1ST YEAR: CHS 3 - PARTICIPANT 6

P: Still searching ... still searching ... still searching. Open up. It's opening up ... opening up. It's taking long. It's taking long. It's kind of slow. Okay ... okay ... okay. Okay, when I found this article ne ... I'll look for the relevant information. I'll look for the relevant journals On the search database ... on the journals database or computer or the databases provided here. I'll look for key..... that are relevant to my topic. Databases about the development of psychology. It's taking long. I'm still waiting. It's taking long, but I hope it's going to show. Oh! There ... there ... there it is. Let me see. The first journal here is about trying to fix the development in voluntary Developmental psychology. Okay there is something about development psychology for me there.

FEMALE: 4TH YEAR: LIS 1 - PARTICIPANT 14

P: I've got five relevant information in South Africa. So I'll click on ... I'll look at the relevant one ... the perception and beliefs of HIV AIDS. I'll click on that one and also the prevention oflife skills training for secondary school. That is not that much relevant.

FEMALE: 2ND YEAR: LIS 3 - PARTICIPANT 16

P: There we go. It appears UWC database. So I'll double click on it. Now I'm waiting for it to finish research. Okay now it stopped. It doesn't look like it's searching. Okay still searching. All right, now I have to type in my title. Journal articles dealing with theories of information retrieval. Search ... research. So journal articles (*typing keywords while repeating it*). This is a long title. And then I click on search. Now I'm going to go to finish researching. All right, it's going faster than before. And then what ... Subjects containing ...journal. So I knew the title was too long. So it did not appear. My search keywords are the whole title. Suppose to type in the word journal. So they give me a list of things that contain the word journal. So now I would have to go through all of them to see if any of them are being of good use. But it doesn't look like it does. Journal...Journal of commerce. Farm Journal. No there isn't any relevant to what I was looking for.

MALE: 3RD YEAR: LIS 4 - PARTICIPANT 17

P: So I'm going to use LISA of the databases. ... So I'm gonna go to LISA because ... first going to close this one. Okay. I want to go to LISA. This thing is suppose to go because I want to use LISA now. I want to use LISA. Clear it. Search it. Random search now and search again the separation command. (*Something unclear was said*) Where's LISA? Where's LISA ja! Get LISA. So I must use journal articles dealing with auditing of information science. Journal dealing with the auditing of information science. So I'm going to type my keywords. Let see. Journal ... information ... I type information science. Click on that. There are no records matching your search. Check the spelling, your search term and if necessary retype it. (*Something unclear was said*) Spelling ... articles (*retyping the keywords while saying it*) Search. That's it. I've got it. Articles ... there are a number of it. Sixty- eight records. So I'm going to check now which is relevant to my topic. So that I get relevant information I want. Let's see. Go to read. (*Something unclear was read*) That's it. I think this one can give me the relevant information I need.

There was certainly little difference in the difficulties experienced by students on different year levels. Despite students' verbalizations that retrieved information was relevant, the actual searches showed otherwise (Appendices V and Y). Verbalized thoughts did not always manifest itself in information search behaviour.

8.4.2 Peninsula Technikon

Some of the former PENTECH'S students had similar problems with conceptualization.

Although librarians pointed out that students were taught how to identify keywords and formulate search strategies, these were not forthcoming:

FEMALE: 1ST YEAR BIOMEDICAL TECHNOLOGY: *BIOMEDI* - PARTICIPANT 1

P: My search – journal article dealing with Higher Education for Disadvantaged ... Ok! I'll just write journal article for Higher Education for Disadvantaged Students. Click that. Okay, (*typing while repeating the keywords*) “dealing with Higher Education. I just space Education so that the search is not too long. (*Typing*) Higher Education for Disadvantaged Students. I'm first writing my search then I click on search.

Other students were faced with similar problems:

MALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND1* - PARTICIPANT 2

P: Going for my next search which is ERIC – Double click on ERIC – still waiting → searching for my keywords – Journal articles

Keywords are: <Articles dealing with higher education and disadvantaged students> → saying aloud while typing Click on Search.

No results were found for my search.



FEMALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND2* – PARTICIPANT 3

P: Articles dealing with Higher Education for Disadvantaged Students.

Click on EBSCO. Okay, I can go to Eric. Okay, journal article dealing with Higher Education for Disadvantaged Students. (*Repeating keywords*)

MALE: BTECH. MARKETING: *BTECHMARK1* – PARTICIPANT 5

P: I'm typing “management and small business management” (*long silence while typing keywords.*) Search (*silence*)

RA: Keep on talking.

MALE: BTECH. MARKETING: *BTECHMARK2* – PARTICIPANT 6

P: Ja, now I'm typing the keywords, which they want for this information. Typing in the keywords Marketing Strategies for Students by (*something unclear was said*) Thomas. Information...ja I type it. I get it. Sixty pages of information and now I'll go to the second one.

P: Search for the text. Fifteen pages found. Still searching for the relevant one. Choosing number four. “First Class (*something unclear was said*) Search Management Today” by Ainsley. (*Something unclear was said*)

FEMALE: BTECH RETAIL: *BTECHRBRI* – PARTICIPANT 8

P: Okay, I'm searching again. Still no results! (*Silence*) I'm trying another. I'm searching. It didn't give me results. (*Typing*) “Articles dealing with information about the Clothing Industry” Now, I'm searching. Still no results.

MALE: 1ST YEAR CHEMICAL ENGINEERING STUDENT: CHEMENG 1 – PARTICIPANT 9

P: Then I type in “chemical engineering in South Africa (*drawn out silence whilst typing the keywords*). Then I click on search. Then go down the page. (*Reading*) Articles on chemical engineering in South Africa. No results there.

FEMALE: 1ST YEAR ELECTRICAL ENGINEERING: ELECENGI – PARTICIPANT 11

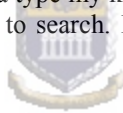
P: I just type in “Electrical Engineering and South African Student.” I click on search. It’s giving me some problems. I’ll keep on trying it. Okay, I still try to get it again. (*Typing in the keywords*) Okay, I search it under electrical engineering in South Africa and I found two ... one article which is about Europe and South Africa. Then the answer that I got ... is the one that talk about business enterprises and electrical engineering and how it is related to Europe and South Africa.

FEMALE: BTECH ENVIRONMENTAL HEALTH: ENVHEALTHI – PARTICIPANT 12

P: Let me see. I’m just gonna type the keywords HIV AIDS. (*Silence while typing the keywords*) Keywords ... I’m typing some keywords within the article. So I type in HIV AIDS in South Africa. I’m just gonna type in here. Search. There is no result for this one. I need to go back again to shorten my search. First I shorten the keyword, but then I’m just going to erase the keyword.

MALE: 2ND YEAR INTERNAL AUDITING: INTAUD2NDI – PARTICIPANT 13

P: Okay, and then the thing that I love to see is “the articles dealing with internal auditing principles” The keywords ... I’m gonna type my keywords. I think it’s internal auditing principles. (*Typing the keywords*) I’m gonna go to search. I’m still waiting for feedback. I got two. I find two.



FEMALE: 3RD YEAR MARKETING: MARK3RDI - PARTICIPANT 14

P: Yes. Business Search Premium and I double click on the business search premium. Then since I’m looking for journal articles dealing with marketing strategies for students I’m going to write here my keywords, which are “Marketing Strategies and Students (*typing while repeating the keywords*) marketing... You put in strategies. (*Silence*) I have the articles here. You don’t need anyone specific.

Again the concept of keywords was difficult to interpret by students. Although claiming to know what the concept of keywords entailed, the search strategy formulation showed otherwise (cf. Appendices **U** and **Y**). This is the same conceptual problem as identified with the participants from the University of the Western Cape.

As stated earlier this conceptual problem would lead to some realization that there is an anomaly:

P: Okay, I’m going to search (*something unclear was said*) I wrote the wrong keywords. Go to correct it. I type in management. (*Silence*) Okay, then click on search. No results were found.

Not having found results the student regresses into a state of uncertainty:

R: Speak louder.

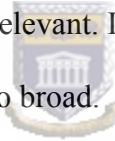
P: I'm not sure. (*Reading the question again and looking at the screen*) I go to OPAC.

R: Keep on talking.

Some students could make a transition from a state of uncertainty to cognitive:

P: Okay, click on Academic search Elite. I just double click now. Still searching... I just double click now. Still searching. It gives me ... I'm looking for my articles "Human Resource Management" Now I'm typing "Human Resource Management Higher Institution" I go to search now. The computer is busy searching. It says no results were found on this one. So I must go back. Retype my phrase. Higher Education. I'm searching now "Human Resources Higher Education" Still no results were found in this one. Searching for associations. (*Something unclear was said*). I need to go back. Click tips again. I just did search for examples – search tips. Still busy searching... Now going back. Type in again. I just type in Human Resource in Education – That gives me titles. Twenty books and two articles. Then we go back (*something unclear was said*) Go back. I'm just retyping my phrase.

This was a 3rd year student. She read the search tips from the IR system. She finds some results but realizes that they are not all relevant. It is clear why the results would not be relevant because the search terms are too broad. The student certainly realizes this and decides to retype her search terms. The student had to do some thinking to refine her search. She was certainly not prompted by the system to do so (cf. Appendix F).



A student participant doing the B.Tech degree indicated:

P: Typing my keywords, which are Human Resource Management and Higher Education. Click on search. Search completed. Four pages. Selecting that one. Say what I'm looking for. Typing the data (*something unclear was said*) I click on it. Date of issue 96- 05-04 (*silence while reading the data*) Click again... Eric. Going for my third search. Choose Eric. Double click on Eric. Still searching. Searching for my keywords. Journal articles dealing with Higher Education for Disadvantaged Students. Keywords are "articles dealing Higher Education for Disadvantaged Students" (*typing while repeating the keywords*) Click on search.

RA: Keep on talking.

P: Still looking. No results were found for your search.

RA: Keep on trying.

P: Go back again. Switch my keywords.

P: Click on search. Say still no results found.

Realizing that the search terms may be problematic, the student decides to “switch keywords” However, this does not prevent the system from yielding no results. The student experiences conceptual problems although thinking his actions through.

As stated some students experienced an anomalous state:

P: This is complicated is very complicated. Go back again. Okay, now I’m with Pentech. Now I entered the main menu. Okay, I’m gonna go to database. Then click over here. Here I see a menu Technikon and messages. Then I go to Pentech OPAC and click one. Okay, I’m gonna go to search. Okay, I’m gonna search it up in the book ... okay journal which is ... Start with materials.

This was a B. Tech student. He clearly experienced a problem in trying to find the path which would lead him to the desired database. He experiences conceptual problems as well, not knowing whether to search for a book or journal article.



Another B. Tech student experienced an anomaly coupled with anxiety as is clear from the verbalization:

P: I’m going to clear this topic so that I can type in my next topic. I choose Eric. I’m going back and start my search again. Now I’m going to Eric to research on it. Under topic I had to look for journals dealing with Higher Education for Disadvantaged Students. I’m going to type the title – topic of the research. (Typing) journal articles dealing with Higher Education for Disadvantaged Students. I’m going for full text because I need more information and terms. Then I’m going to search. They ask me... They say no results were found for my search premium. Check the spelling. What’s wrong? (*Reading something on the screen*) Looking for my search again. I’m trying to search again. They say again no results. No results were found on my search. What now?

Her anxiety is followed by some cognition that her search terms may have been wrong:

P: I’m going to expand my search for full text search. It will give me some information. (*Silence*) Okay, I’m going to clear this and think I’m gonna try full text.

Students on higher year levels experienced less cognitive difficulty:

MALE: 2ND YEAR BUSINESS MANAGEMENT: *BMAN2ND1* - PARTICIPANT 2

P: I’m typing Management Techniques & Small Business Management (typing) Search – Search completed. 15 pages now – still it’s searching for the relevant one. I’ve chosen number 4 – first class coach (*reads Bibliographic detail*) The title is First Class Coach (*reads Bibliographic details*).

MALE: BTECH. MARKETING: BTECHMARK1 – PARTICIPANT 5

P: Search for the text. Fifteen pages found. Still searching for the relevant one. Choosing number four. “First Class (*something unclear was said*) Search Management Today” by Ainsley. (*Something unclear was said*)

MALE: BTECH. MARKETING: BTECHMARK2 – PARTICIPANT 6

P: Okay, I say here “marketing South Africa” I did find 68 pages (*something unclear was said*) See if this information is relevant. Now I’m moving to Eric. (*Silence*) It says journal articles dealing with Higher Education for disadvantaged Students but I will type Higher Education and Disadvantaged Students to see if I can find any relevant information. It says sorry no results found in the search.

MALE: 2ND YEAR CHEMICAL ENGINEERING: CHEMENG2 – PARTICIPANT 10

P: The system is searching for the relevant book. It is busy. Then I wait. Okay, then it brings up some result. Record one of the (*Something unclear*). So it seems it has some books under this topic.

MALE: 2ND YEAR INTERNAL AUDITING: INTAUD2ND1 – PARTICIPANT 13

P: Let’s see. Leave this out. Then try the search again. It’s about Internal Auditing in Higher Education. Articles about Internal Auditing. Take this family journal in Internal Auditing. It gives me twenty- three. Source ... Quality audience- that’s the name of journal or article (*something unclear was said*) I think they all relevant. They are about twenty-three. I’m searching I used Internal auditing in The most I think they are relevant because it adds value to the business. I think they are all relevant. I think they are all relevant for me. I think this is the correct one.



MALE: 3RD YEAR MECHANICAL ENGINEERING: MECHENG3 – PARTICIPANT 17

P: I think this is the relevant information about Automobile Industry. Now I’m going to that. The third one. (*Repeat*) the third one. I’m looking for Higher Education for Disadvantaged Students. Okay, Higher Education for disadvantaged students (*typing the keywords*) Search. (*Reading keywords*) Higher Education for Disadvantaged – A state report. (*Reading the title of the journal*) Financing... I’ve got to take this one. I go for this one. – Education Opportunities – Increasing opportunities in Higher Education for Disadvantaged children... students. The topic of this one is matching ... is relevant.

MALE: 3RD YEAR RETAIL: RET3RD1 – PARTICIPANT 18

P: I’m looking for the most relevant one, which is boldly highlighted. but I think I would choose number one topic. And I go to ... go through it. And I want to find out whether I can get something. Gonna read. I’m reading an abstract. Must I read the whole abstract? Continue reading.

8.5 Conclusion

The IR systems searched in this study were designed for keyword searching. It is significant that despite instructions to students to identify keywords and then search using

the Boolean <and> operator, there appeared to be a problem from some to do so. It seems therefore that a different approach needs to be adopted with information skills training.

Table 15 summarizes the problems students experienced. It should be noted that students across year levels experienced these problems as indicated by the ticks (√).

TABLE 15 PROBLEMS STUDENTS EXPERIENCED

<i>LEVEL</i>	<i>ANXIETY / ANOMALY</i>	<i>BANDWIDTH</i>	<i>COGNITION</i>	<i>CONCEPTUALISATION</i>	<i>KEYWORDS</i>	<i>UNCERTAINTY</i>
1 ST	√	√	√	√	√	√
2 ND	√	√	√	√	√	√
3 RD	√	√	√	√		√
4 TH (B.TECH)	√	√	√	√		√



Student participants experienced problems irrespective of year level as indicated in Table

15. Third and fourth year students had fewer problems with keyword searching.

However, there was no significant difference in the difficulties experienced across year levels.

In chapter 9 a conclusion to this study is given. Towards the end of the chapter certain recommendations are made.

CHAPTER NINE

CONCLUSION AND RECOMMENDATIONS

9.1 Introduction

The overall purpose of this study was to ascertain the information –seeking skills of students from historically disadvantaged backgrounds within the Western Cape, South Africa. Two fundamental questions were whether the UWC and the former PENTECH information retrieval systems meet the academic information needs of its undergraduate students and how historically disadvantaged undergraduate students interact with these systems.



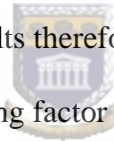
Despite responses from librarians from the former PENTECH and the UWC that students received information skills training, certain anomalies seemed evident. The findings of this study seem to suggest that the problem with searching starts with a lack of understanding of what is expected when students receive assignments from academics. In addition students could not formulate search strategies properly with IR systems often not yielding results or yielding irrelevant hits. A conclusion to the study is given in the next section and is followed by recommendations including ongoing research in this area.

9.2 Conclusion to the study

The findings of this study reveal that the problems that undergraduate students from particularly disadvantaged backgrounds face are still far from resolved. Despite the fact that both the studies of Ruth (1997) and Sayed (1998) revealed a problem with student learning, it seems that not much has been done to address this. Whilst student learning in the information age includes basic computer literacy, the results of this study albeit of a limited number of students, demonstrate a need for students to have more than these basic skills. All the participants in this study had computer literacy skills. However, it was clear that these skills were limited to knowing how to use computer peripherals like a keyboard and mouse. Computer literacy skills are therefore not enough to ensure academic literacy. Students also need to have information literacy skills. Although the study did not concentrate on information literacy skills in depth, it certainly underscored students' lack of these important skills.

Belkin's theory, despite being a useful framework for trying to understand how information seekers search for information can certainly not be applied rigidly within a context where students' cognitive skills are lacking. Whilst Belkin seems to suggest that searchers often have a linear approach to searching, has an ASK phenomenon, the findings of this study suggest that students have a more cyclical approach and had some anxiety with the ASK.

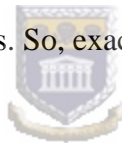
The major findings of this study reveal that student participants across disciplines in the various faculties from both the former PENTECH and the UWC lack certain fundamental skills. These skills, which are important for decision – making, include assignment comprehension, selection of appropriate key words and the formulation of a search strategy, when searching online IR systems. What was also quite prevalent was an uncertainty principle among student participants in their encounter with the online databases. This uncertainty principle stems from a lack of guidance and collaboration among the important role players in the academic life of the student. One thinks in particular of the roles of academics and librarians. The findings are therefore more evidence of a lack of a culture of information skills development. It is also clear that students are not exposed more to online databases, which are important tools in today’s ever growing information age. The results therefore seem to suggest that the lack of resources is not necessarily the overriding factor which prevents students from having access to online databases. It is precisely the under utilization of information skills and collaboration among academics and librarians that stifle students in becoming information literate.



Certain objectives were put forward in Chapter 1 of this study. Amongst these was to ascertain students’ ability to understand the meaning of an assignment topic. It was clear that students had difficulty in understanding what was expected of them. The mere fact that they found the topic difficult to understand simply made the effort to search for the desired information even more difficult. Another objective was to gain an understanding of the roles of faculty and subject librarians at both institutions under investigation. It was

clear that the methods they employed to teach students how to search online IR retrieval systems, was not effective enough. The brief tutorial that the researcher employed with the participants in this study resembled librarians' methods of instruction to students. A third objective was to gain an understanding of how students understood existing IR systems at both institutions.

Existing information retrieval systems at both institutions proved equally problematic. Not only were the interfaces of the IR systems difficult to grasp, there were also problems with bandwidth. Access to online databases was rather slow. This brought about large measures of frustration. Answers to both research questions in Chapter 1 suggest that student participants perceived IR systems at both institutions as ineffective and that they found it difficult to search these systems. So, exactly how can these issues be addressed?



9.3 Recommendations

9.3.1 Towards transformation in South African Higher Education

The higher education sector in South Africa is still grappling with fundamental and necessary transformation issues. These transformation issues relate to equitable redistribution of resources, equitable access and student development (Education Policy Unit, 1994: 25). The higher education institution's library must of necessity create an environment where educational techniques are improved. This calls for user-friendly information technologies or user-centred design of information systems.

The user – centred design focuses on the ways that information retrieval systems meet the information needs of the user (Allen, 1996: 14). Information retrieval system interfaces must be designed by taking into account its users (Marchionini, 1995; Large, Tedd & Hartley, 2001). In addition to these the need for changes in the library approach to instruction and training cannot be overemphasised. According to Lancaster and Sandore (1997: 29), a number of important factors have interacted to bring about these changes, namely:

- technological innovations
- cognitive and behavioural learning theories as the foundation of instruction programs
- the information literacy movement
- integration of educational theory and practice



The question that begs is: To what extent has both the University of the Western Cape and the Cape Peninsula University of Technology (Bellville campus) library staff taken these factors into account? A brief look at each factor should suffice.

It is important that institutions of higher learning that cater for the needs of historically disadvantaged students acquire new information technologies that are specifically designed for these students. Despite the argument that students should adapt to IR systems that are used on a global level, the reality is that special skills are required to achieve this. For this reason, librarians, academics and other role players in academic development at both the institutions in this study should build into their instructional

programmes cognitive and behavioural learning theory. Indeed information skills instructions should not only be the task of the librarian but a joint venture.

Although the University of the Western Cape has since 2004 embarked on information literacy instruction to students, the support from academics has not been very strong as reported by librarians. It is not clear whether the library at the former Peninsula Technikon had any formal training in information searching in place. Librarians from this institution also reported a rather poor support from academics.

Certainly information literacy instruction should be a campus – wide and perhaps credit – bearing programme. In other words, it should be compulsory for all students to attend these training sessions at least on the 1st year level. Assessment should then be made at the end of each year during the student's academic career. However, it needs to be stated that this task requires the full support of management at all levels in the institutions. This support should not only be measured in monetary terms. e.g. budgetary issues but also with regards to capacity building such as staff training. Capacity building should then integrate learning theory and practice.

9.3.2 Redistribution of resources

The ANC led South African Government has since 1994 grappled with the problem of a redistribution of resources. In chapter one of this study I alluded to this redistribution of resources with particular reference to institutions of higher education. Policy had to be

established to bring about this redistribution. The Government had to decide on best practices to accomplish this. A report produced by the Council on Higher Education (CHE) in South Africa highlighted the South African Government's plan to restructure the higher education landscape by way of mergers. The view was expressed that "[r]estructuring the higher education system, as part of the process of redressing the legacies of apartheid and transforming South African higher education, has been an imperative of higher education discourse since the early 1990" (South Africa, Council on Higher Education, 2004:30). It seems that some other factors emerged that changed emphases in policy issues. Student numbers dropped, apart from some historically disadvantaged institutions experiencing financial problems. There emerged urgency for a more radical approach to restructuring. The focus moved to restructuring through mergers (South Africa, Council on Higher Education, 2004: 31).



Mergers were certainly not met favourably in certain higher education institutions. As Jansen (2003: 28) pointed out:

...all the proposed mergers in South African higher education proceeded despite intense political resistance from various constituencies. This requires explanation, for it has not been uncommon in other cases of state – mandated mergers that the designated partners decided not to pursue the merger, and either to continue as separate institutions or to delink after the merger.

Jansen (2003:28) argued against resource dependency theory that claims "...organisations engage in mergers as a result of the threat of diminishing resources." His contention is that from a study conducted among five imminent mergers, it was found that "...institutions resist even when the benefits for both the institutions and the wider

society when resources are shared, expertise consolidated and deficits reduced are clear” (Jansen, 2003:28).

Elsewhere the outcomes of mergers are questioned. Eastman and Lang (2001:252) stated that it is “...even more difficult to measure the success of mergers in the higher education sector, in which agreement on basic goals is lacking and the very concept of institutional performance remains controversial.” However, Eastman and Lang (2001:253) admit:

The environments in which higher education is offered today are changing rapidly and profoundly. To the extent that universities and other institutions can anticipate those changes, merger is likely to be among the strategies by which they respond.

From the two viewpoints above it seems that mergers are not necessarily the answer to addressing fundamental problems. In the first case the argument is that the outcomes of mergers “...are contingent on the political forces” governing the merged institutions. To Jansen (2003:37) these forces operate on governmental as well as institutional level. He refers to the former as macro – politics and the latter as micro – politics.

The second viewpoint is that the external environment of higher education institutions influences their development and that any significant change in a merger “is bound to threaten the supply of resources to some types of institutions” (Eastman and Lang, 2001: 252).

Although the object of this study is not about mergers, students’ development will certainly be affected by the outcomes of mergers. Although the University of the Western Cape has not formed a merger with any other institution, the former Peninsula Technikon

has. However, the South African Government's plan for higher education will affect both institutions. This will have some effect on student development and equitable access to higher education. My recommendation is that more emphasis should be placed on student development in both institutions regarding information skills development despite the now CPUT (Bellville campus) being in an apparent stronger position after the merger with the former CAPETECH. Both the issues of student development and equity in higher education are dealt with in the next sections.

9.3.3 Equitable access to HE

Unless concerted efforts are made to transform the schooling system of historically disadvantaged communities in South Africa, access to higher education institutions will become more restricted. Equitable access in a South African context would refer to access to historically disadvantaged students, which includes non – white students. Female students are also regarded as having been disadvantaged in the past. However, since the main objective of this study was historically disadvantaged students irrespective of gender, this context will suffice.

Heller in **Conditions of access ... (2002: xi)** stated that from a North American point of view:

Providing financial assistance for college is not enough to ensure that lower – income students attend and succeed in a college or university. Academic and social factors also play a role in preparation for and persistence in higher education.

With students from lower – income groups in South Africa in general and in the Western Cape Province in particular, this statement certainly holds water. Since this study has more to do with academic preparedness, the issue of financial aid will not be discussed here, although I agree with the argument that without adequate finances academic well – preparedness is not sufficient (Fitzgerald and Delaney, 2002:17).

Breneman and Merisotis (2002:126) stated that socioeconomic status and pre-college academic performance correlate quite strongly with the fact that lower – income students tend to attend lower – quality elementary and secondary schools. However, the authors also argue that disadvantaged students’ social interaction with peer groups and faculty, have a positive effect on persistence (Breneman and Merisotis, 2002:127).



In some countries on the African continent universities have striven towards an identity of their own. Makgoba and Seepe in **Towards an African identity... (2004: 15)** argued that:

The cornerstone of an African university must be intellectual humility, the celebration of doubt, the acknowledgement that what we know is but an approximation of what is or could be, that everything before us is nothing but an unfinished story that can still be changed, shaped and authored.

One wonders to what extent this unfinished story encompasses the equitable access of students to higher education institutions. There is no clear idea as to how equitable access in terms of students can be achieved. As Jansen (2003:38) stated:

The motivation of government for pushing mergers in the first place had very little to do with equity, notwithstanding official policy claims and expectations. It had everything to do with costs and, more directly, the reduction of costs.

Should these statements be true then attempts in the past to decolonize South African society will have been fruitless. Claims to a true African university structure cannot really become a reality if the needs of students who come from historically disadvantaged backgrounds are not addressed. More than 25 years ago, Wandira (1977:7) argued that a “[u]niversity which does not enjoy international acceptance of its standards, prejudices the academic future of its most promising graduates.” This is a challenge to the historically disadvantaged institution that places a high premium on standards but has to at the same time cater for the ill – prepared students. The concept of historically disadvantaged may even be a misnomer particularly in the light of many unresolved social and economic problems. Many South Africans still live in abject poverty and lack the necessary skills for development. Despite this reality both institutions studied in this dissertation have to find ways of addressing the issue of student skills development. Indeed student skills development in particular information searching skills development epitomizes equitable access to higher education.

9.3.4 Student skills development

For students to become academic literate more emphasis should be placed on collaboration among academics and librarians. Although both the University of the Western Cape and the then Peninsula Technikon seek ways to improve students’ skills by using one or other method for teaching these skills, it remains clear that these methods do not seem to have the desired effects. The lack of some uniform method of teaching information skills invariably has implications for students’ searching behaviour.

The University of the Western Cape library has recently launched a user education programme, which amongst others focuses on an orientation of the library especially for 1st year students. Whilst this is a noble gesture and effort it remains to be seen to what extent students will receive hands – on training.

What is perhaps lacking is a basic understanding of cognitive and behavioural theories especially in information retrieval. Librarians themselves need to be equipped with knowledge of these theories. According to Kuhlthau (2005) the development of the user – centred approach to an understanding of information seeking behaviour can greatly contribute to such knowledge. Johnstone, Tate and Bonner (2004) argued, “[a] human – centered view of information processing examines the roles humans play in translating received information into action.” It is therefore important that students develop the necessary skills to make judgements on information that they retrieve for relevance.

The librarian’s role as intermediary should not be overemphasized. Although the librarian is perceived to be in a more advanced position with regards to information searching, the student should be in a better position to make relevance judgements. However, since students in this study demonstrated a problem with identifying what is constituted as relevance, there arises a need for collaborative information – seeking. In the words of Wilson (2000), information seeking as well as searching and use of information should be “...associated with the different stages of a goal – directed problem – solving process, the

stages being: problem recognition, problem definition, problem resolution, and (where needed) solution statement.”

For students to obtain information – seeking skills, certain other mechanisms need to be in place. Although this study was limited up to the stage of cognition on the part of the student participant with regards to relevant information, development strategies should be in place for academic literacy.

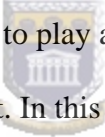
Academic literacy would invariably relate to students’ ability to assemble a number of relevant records and assimilate these instead of assimilating information from academics only. However, students need to be developed and supported academically. This will certainly not be achieved just by ensuring computer literacy skills. As stated earlier in this research, although computer literacy is an important skill, it is merely a means to an end. Although both the University of the Western Cape and the former Peninsula Technikon have Writing centres for some academic support, these do not seem to play a significant role. In any event, the Writing centre would only assist students towards the final analysis of their essays and not so much during the process of information searching. This is a limitation because such a valuable resource is under utilized. Towards the end of this chapter I recommend how the Writing centre could play a more meaningful role in the institution.

Could it be expected from academics to support students with academic development? It seems highly unlikely as Jeff Lever (1999) argued in a position paper when he stated

“...the expected infusion of academic development expertise throughout the staff has failed to materialize...”

Boughey (2002: 67) argued that academic development staff mostly assisted students with language development and study skills. Since a “...shift in the understanding of ‘disadvantage’ ...” they were now required to “...assist *staff* [italics in the original] with curriculum development, assessment and teaching “(Boughey, 2002: 67). She carried on and stated:

The majority of these academic support practitioners had been employed on the basis of their expertise as teachers, and many thus lacked the status conferred by postgraduate qualifications as well as the experience to be able to move to a role involving the development of academic staff as educators (Boughey, 2002: 67).

However, academics and librarians need to play a more collaborative role for desired outcomes regarding student development.  In this regard academics themselves should know how to search for information in relevant IR systems. They should then encourage students to make use of online IR systems instead of just relying on prescribed texts and/or regurgitating classroom lectures.

9.3.4.1 ICT skills development

There is an argument that “...utilization of ICT in HE can help students to learn more effectively” (Nomdo, 2004: 205). This argument may be true to some extent. It is certainly advantageous to adopt new technologies for teaching and learning, but being unable to utilize these technologies to effectively search for relevant information may

pose a problem. Information literacy is in any event not dependent on computer literacy. Nomdo (2004: 211) acknowledges that it is not enough to inform students about particular ICT skills. Educators themselves need to have these skills, thereby offering assistance because they are informed. Apart from acquiring ICT skills, students who have English as a second or third language, should receive additional attention. Here the Writing centres at the two institutions can play a meaningful role. There is also the foundation year programme, English for Educational Development (EED), offered at UWC, which should be compulsory campus – wide. In terms of the importance of acquiring higher cognitive skills, Warren (2002: 87) argued:

[T]he assumption is that learning in higher education is a complex social and cognitive process of discovering and mastering – perhaps even contesting – the knowledge – making rules and practices, values and roles that characterize the disciplinary cultures of the various fields of study. In contrast to the supposition that learning occurs automatically or by example, it is recognized that study in higher education entails the need to become familiar with the specialist concepts, theories, methods and writing conventions of specific subjects. Students bring varying cognitive, linguistic, knowledge and cultural resources to the learning situation. Hence they need to be guided or assisted – in ways appropriate to their potential – to develop the critical and communicative skills and the conceptual repertoires that will enable them to deal with academic tasks.

Despite this being a constructivist viewpoint it holds a fundamental truth that students need to become critical thinkers in order to make informed decisions in their academic and societal lives. It is therefore imperative that a collaborative approach is adopted with computer-, information –, and academic literacy at the two institutions.

As stated earlier, academic staff also needs to be able to search online systems. To this end Leask (2004: 347) argued that “[i]t is therefore important that academic staff development assists staff to effectively and strategically utilize the online tools that are

available to assist learners in achieving desired internationalization outcomes without being seduced into using technological tools for their own sake.” Although this has more to do with ICT applications in teaching and learning especially with internationalization in mind, the fundamental principle is skills development of both students and academics.

9.3.4.2 From a developing to a developed student populace

Figure 12 illustrates collaboration among the three important role players. It is imperative that academics and librarians should give student support in a collaborative way. Librarians and academics should therefore have a communications network. This network should however also include students so that regular feedback is given of their progress regarding academic literacy.



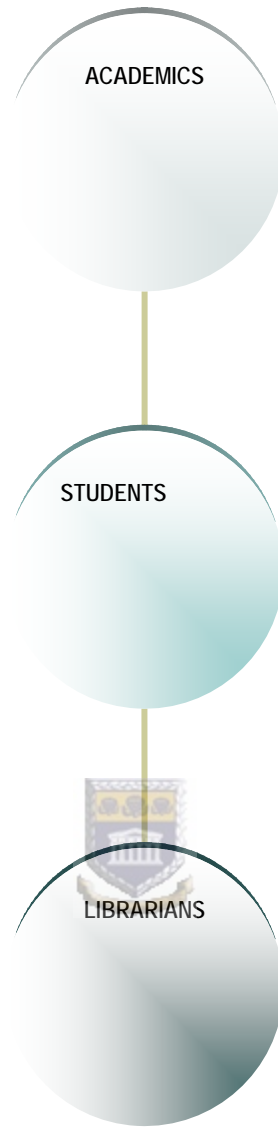


Figure 12: Collaboration among main role players

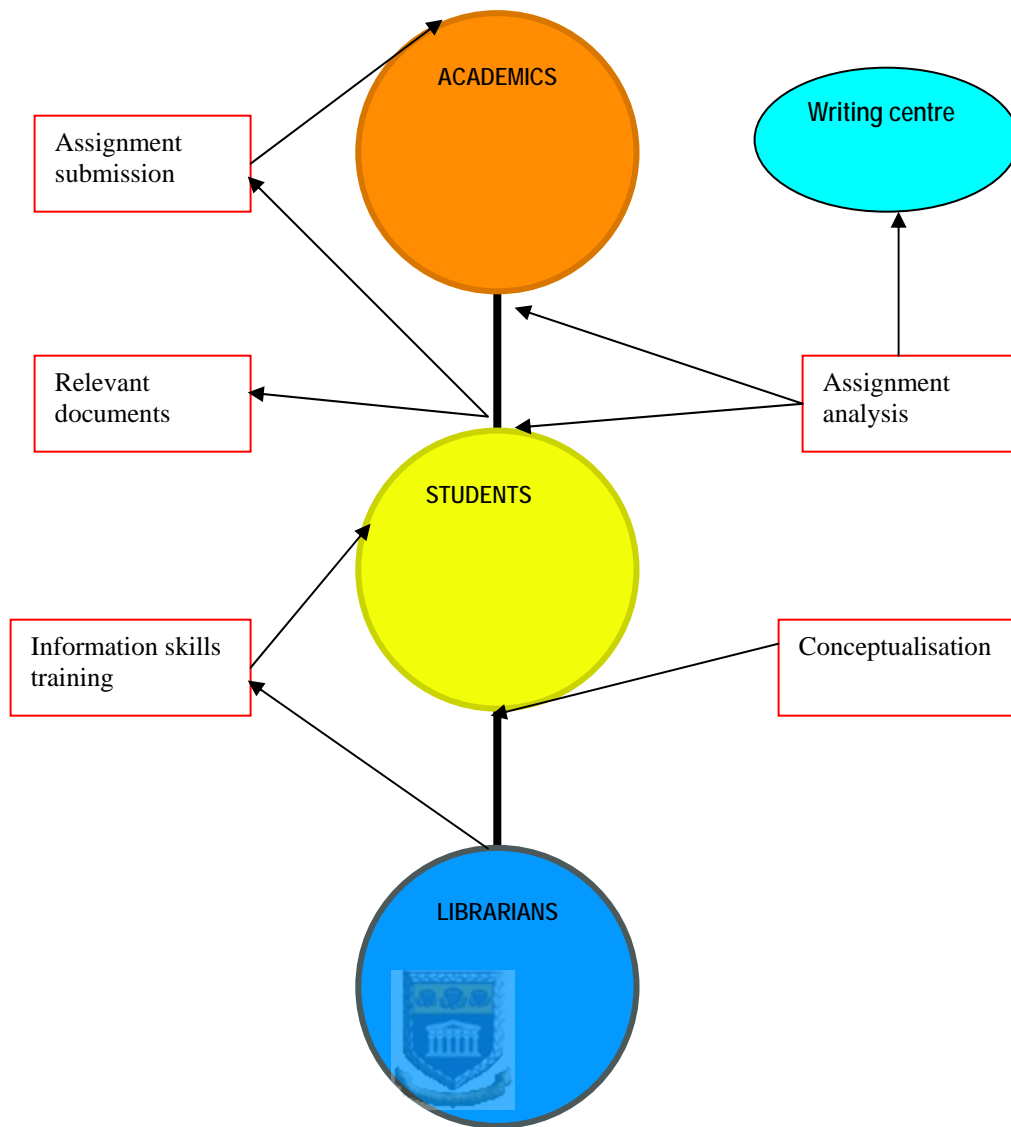


Figure 13: Framework for collaboration

The collaborative networking should include five factors, which I refer to as problem identification, analysis of the problem, conceptualization, training and solutions to the problem. Figure 13 illustrates these factors.

Academics should identify problem areas of students particularly when the latter have to make use of IR systems for assignment information. The assignment should be analysed with the student as well as the Writing Centre depending on its gravity. Academics will therefore refer the student to the Writing Centre if there is a need for an understanding of

an assignment topic. The student would then be required to conceptualize what is expected from the assignment topic. There should be constant feedback to the academic who would inform the librarian about what is expected from the student. The librarian should then check with the student if the latter correctly conceptualized what is expected. The student is then given hands – on training in online searching. This training should also include an understanding of which IR system to search for relevant information. The student should then be in a position to find a solution to the problem, that is, find relevant information for the assignment. The academic would then check to see whether the student could synthesize the sources meaningfully with the submission of the assignment.

9.3.5 Adaptation of Information Retrieval Systems



Both institutions subscribe to information retrieval systems that require searching skills, which would retrieve relevant information. Apart from search engines on the Internet, these systems require keyword searching.

The interviews with librarians revealed that it was expected of students and other users of databases at the UWC and the former PENTECH to search as the systems were structured. What were certainly not taken into account were the levels of difficulty that especially the interfaces of these systems presented to the students in this study (cf. Appendices U and V). Interfaces should be set to <Basic search> mode instead of <Advanced search> by Default. Before investing in IR systems the libraries from both institutions should take into account the difficulty level that these systems present to their

student populace. The selection of IR systems should be a collaborative effort. Figure 14 illustrates collaboration between the institution's library and other role players regarding IR systems selection.

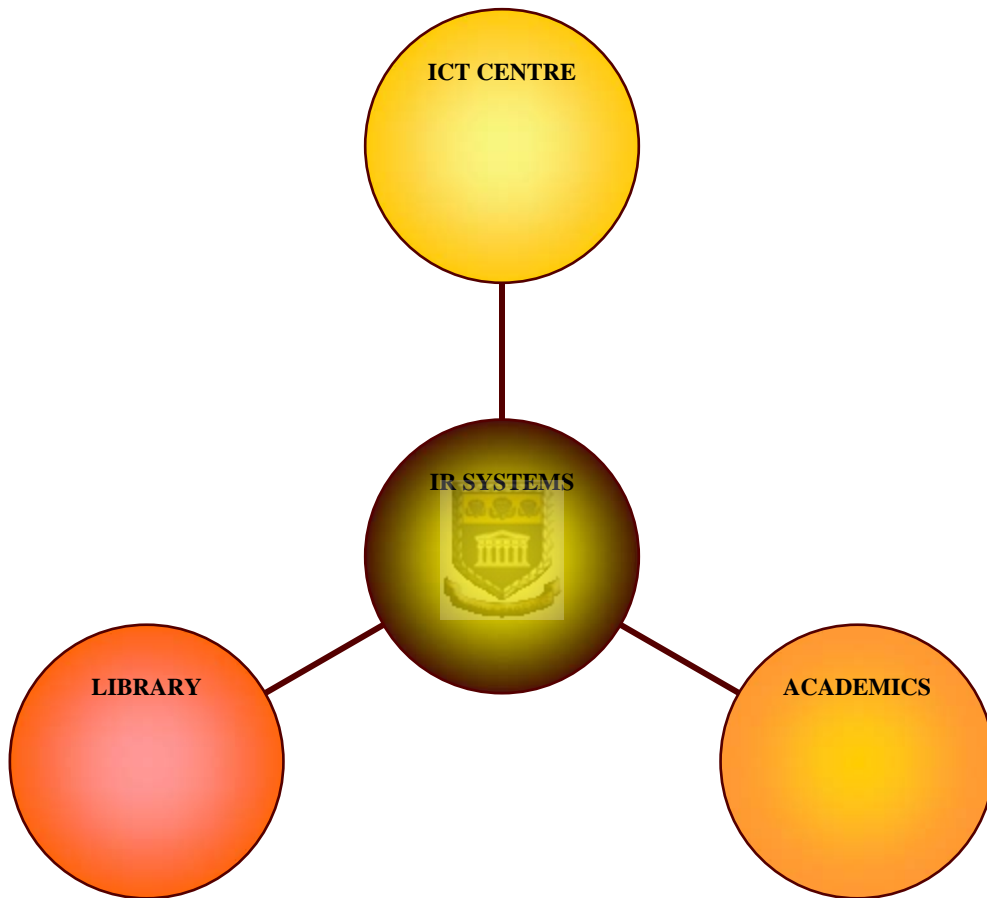


Figure 14: Collaboration regarding IR systems selection


The selection of IR systems must be accompanied by knowledge of students' weaknesses. However, it should be borne in mind that these systems should address the needs of the campus community in general. For this reason, ICT specialists, librarians and academics should collaborate with the selection of IR systems. A new innovation worth pursuing is FOIOTI (Finder of Information on the Internet) as a tool for instruction to undergraduates. Although FOIOTI deals with information searching using Internet search engines, it may be useful given that student participants in this study when not finding information in the expected IR systems resorted to the Internet with more disastrous results. According to Weideman (2005: 16) FOIOTI "was designed to hide the technicalities of search engine operators and the construction of the search query from the user." Weideman seems to suggest that even with natural language searching the user may be assisted by the program so that relevant information is retrieved.



9.4 Further research

This study was conducted under controlled conditions where student participants were expected to search for information using topics given to them. Despite the use of online monitoring and videotapes, certain limitations became evident. One of these was students' inability to think – aloud at all times while they were searching for information. It was not altogether possible to understand why students were searching in any particular fashion. Further research should concentrate on thinking skills as well. Collaborative research is possibly what is needed. Such collaboration can include behavioural scientists, information scientists, linguists and information workers.

It would be useful to see what the outcomes of students' searching skills and behaviour would be from a longitudinal point of view. Research in a natural setting should indicate students' progress. Students would therefore be monitored while doing searches on information retrieval systems for actual assignments. This will be naturalistic. However, this kind of observation will of necessity be quite obtrusive. The obtrusiveness of the observation itself may have some effect on students' natural ability while searching for information. Although unobtrusive observation can be applied, caution should be used regarding ethical issues. Students will invariably have to be informed about their being observed for research purposes.

Information skills training should also become credit – bearing. In other words, students should be credited for attending training sessions as well as completing particular modules. The library at the University of the Western Cape  seems to be on the right track with their user education programmes but more emphasis should be placed on a correlation between the outcomes of the information skills training and students' academic performance.

Students should be encouraged to search for information elsewhere on the campus instead of physically going to the library. Information technology should not only be useable by students but also useful. Bandwidth problems should be reduced to the minimum if not eradicated altogether. The ideal is to change students' information – searching behaviour.

9.5 Conclusion

The University of the Western Cape and the now Cape Peninsula University of Technology (Belville campus) have come a long way since the abolition of apartheid. However, the end of apartheid did not necessarily signal the beginning of computer -, information -, and academic literate students in South Africa, particularly those from disadvantaged institutions. Post apartheid South Africa was rather faced with ill – prepared students. There was therefore a need for students to acquire these skills, which are obviously necessary in the information age.

Despite attempts by librarians to teach these skills to students, their methods need to be questioned. Librarians tend to demonstrate to students how to search for information. This certainly is useful but not effective. Training of the skills mentioned would require a concerted effort from librarians and academics. Librarians need to know how to deal with student search problems. The librarian’s knowledge should also encompass some intuitive knowledge, that is, a proactive liaison with academics to understand the kinds of problems students face.

In his introduction to **(Plato: Protagoras and Meno, 1956: 113)** Guthrie speaks of the true stages of knowledge as being:

- unconscious knowledge
- opinion or belief

It is precisely Plato's contention that knowledge of a certain kind may be present in our minds without our being consciously aware of it. Such a state of mind may be illustrated from the familiar experience of ordinary forgetfulness. Knowledge should be stable and lasting. This is not always the case with opinions, which can be false. As opinion is an insecure cognition given that the mind can contain false opinions, knowledge must be true; otherwise it is not knowledge (Plato: Protagoras and Meno, 1956: 113). Librarians should therefore move away from the notion of opinion.

There is much that can be achieved at HDI's generally, but in particular, to move away from a school approach to learning - talk of classes, homework, prescribing texts, the production of readers, and lecturers' use of texts. A more concerted effort from the major stakeholders to provide a climate conducive to student growth is probably the ideal. It is hoped that with this study a platform can be provided (depending on its outcomes) towards this ideal. The university library must of necessity therefore create an environment where educational techniques are improved. This calls for user-friendly information technologies or user-centred design of information systems. Yucht (1999: 30) stated it aptly that students need to be helped "...to develop the skills and abilities they will need to function in the global information marketplace."

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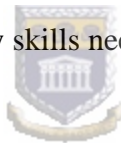
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APPENDIX A

INTERVIEW SCHEDULE: FACULTY LIBRARIANS: UWC
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FACULTY LIBRARIAN

1. How often do students search online systems?
2. How do students interact with online systems?
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3. What kind of information skills training do you offer?
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4. Do students always understand the assignment topic?
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.....
5. What kind of support do academics (lecturers) give?
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.....
6. What strategies do students use when searching for information online?
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.....
7. Which are the online services that the UWC library subscribes to which students have access to?
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8. How do students decide on the choice of an online service?
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.....
9. Would you say that the online system interfaces address the academic needs of your students?
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APPENDIX B

INTERVIEW SCHEDULE: SUBJECT LIBRARIANS: PENTECH
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SUBJECT LIBRARIAN

1. How often do students search online systems?
2. How do students interact with online systems?
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3. What kind of information skills training do you offer?
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4. Do students always understand the assignment topic?
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5. What kind of support do academics (lecturers) give?
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.....
.....
6. What strategies do students use when searching for information online?
.....
.....
7. Which are the online services that the PENTECH library subscribes to which students have access to?
.....
.....
.....
.....
8. How do students decide on the choice of an online service?
.....
.....
9. Would you say that the online system interfaces address the academic needs of your students?
.....

APPENDIX C

INTERVIEWS: UNDERGRADUATE STUDENTS AT UWC AND PENTECH
--

1.

Male	
Female	

2.

Year level:	1st		2nd		3rd		4 th	
-------------	-----	--	-----	--	-----	--	-----------------	--

3. What is your strategy when given an assignment by a lecturer?

.....

4. Which sources in the library do you make use of when searching for information?

.....

4.1 Would you say that the information found in these sources are always relevant to your assignment topic?

Yes		No		Sometimes	
-----	--	----	--	-----------	--

4.2 If sometimes, how much percentage of the time?

4.3 If no, please explain why not?

.....

5. Do you conduct your own online information searches?

Yes		No	
-----	--	----	--

5.1 If yes, how often?

5.2 If no, who conducts them for you?

6. Have you received training in using online information retrieval systems?

Yes		No	
-----	--	----	--

6.1 If yes, on which year level?

APPENDIX D

PILOT STUDY

USING ERIC AND LISA

1. Click on START
2. Click on PROGRAMS
3. Click on WINSPIRS 4.01
4. Click START to open WINSPIRS 4.01
5. Double click on the relevant DATABASE
6. Click OK

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database as highlighted by steps 1 to 6 (You must actually say this aloud).
- I will do a Basic search using the AND Boolean operator, that is, HIV and AIDS and South Africa. I am actually typing the relevant keywords in now. The number of relevant documents is-----

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

SEARCH#1 Journal articles dealing with higher education for disadvantaged students in South Africa

Use the **LISA** database to indicate the number of relevant records (hits) for the following:

SEARCH#2 Journal articles dealing with the origin of Information Science

USING EBSCOHOST AND EMERALD

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **Electronic resources and databases**
4. Click on the relevant database service, that is **EBSCOHOST** or **EMERALD**

ASSIGNMENT

Using the talk aloud method, find relevant records (hits) for the following in a relevant database service such as **EBSCOHOST** as well as **EMERALD**:

SEARCH#3 Journal articles dealing with Business management in South Africa

SEARCH#4 Journal articles dealing with strategic planning for managers



APPENDIX E

UWC: FACULTY OF ARTS PARTICIPANTS

USING ELECTRONIC DATABASES

ERIC

1. Click on **START**
2. Click on **PROGRAMS**
3. Click on **WINSPIRS 4.01**
4. Click **START** to open **WINSPIRS 4.01**
5. Double click on the relevant **DATABASE**
6. Click **OK**

EBSCOHOST, EMERALD AND OTHER DATABASES

7. Click on **INTERNET EXPLORER**
8. Click on **LIBRARY**
9. Click on **ELECTRONIC RESOURCES AND DATABASES**
10. Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**



OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

11. Click on **INTERNET EXPLORER**
12. Click on **LIBRARY**
13. Click on **LIBRARY CATALOGUE**
14. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR ARTS PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **INFOTRAC** database to indicate the number of relevant records (hits) for the following:

- The incidence of HIV/AIDS among South Africans.

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Sociology.



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by **Claribel Koliswa Maropa**. Identify the title, date of publication, place of publication and the publisher.

APPENDIX F

UWC: FACULTY OF CHS PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

4. Click on **INTERNET EXPLORER**
5. Click on **LIBRARY**
6. Click on **LIBRARY CATALOGUE**
7. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**



ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR CHS PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **MEDLINE** database to indicate the number of relevant records (hits) for the following:

- The incidence of HIV/AIDS among white people.

SEARCH#2` Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Developmental Psychology.



SEARCH#3 Use the **SCIENCE DIRECT FULLTEXT** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Physiotherapy for students.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by Joanne Valiant Cook. Identify the title, date of publication, place of publication and the publisher.

APPENDIX G

UWC: FACULTY OF EDUCATION PARTICIPANTS

USING ELECTRONIC DATABASES

ERIC

1. Click on **START**
2. Click on **PROGRAMS**
3. Click on **WINSPIRS 4.01**
4. Click **START** to open **WINSPIRS 4.01**
5. Double click on the relevant **DATABASE**
6. Click **OK**

EBSCOHOST, EMERALD AND OTHER DATABASES

7. Click on **INTERNET EXPLORER**
8. Click on **LIBRARY**
9. Click on **ELECTRONIC RESOURCES AND DATABASES**



Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

10. Click on **INTERNET EXPLORER**
11. Click on **LIBRARY**
12. Click on **LIBRARY CATALOGUE**
13. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR EDUCATION PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students in South Africa

SEARCH#2 Use the **ACADEMIC SEARCH PREMIER** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the origin of Western Education

SEARCH#3 Use **INFOTRAC FULLTEXT** under **UWC** Custom database to indicate the number of relevant records (hits) for the following:

- Journal articles about women in higher education in South Africa

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by Patricia K. Kubow. Identify the title, date of publication, place of publication and the publisher.

APPENDIX H

UWC: FACULTY OF EMS PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

4. Click on **INTERNET EXPLORER**
5. Click on **LIBRARY**
6. Click on **LIBRARY CATALOGUE**
7. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**



ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR EMS PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **BUSINESS SOURCE PREMIER** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Business management in South Africa.

SEARCH#2 Use the **ACADEMIC SEARCH PREMIER** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with strategic planning for managers.



SEARCH#3 Use **INFOTRAC FULLTEXT** under **UWC Custom** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with economic systems of developed countries.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by Pranab K. Bardhan. Identify the title, date of publication, place of publication and the publisher.

APPENDIX I

UWC: FACULTY OF LAW PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**



ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR LAW PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **BUTTERWORTHS NEXIS LEXIS ONLINE**

database to find the following Acts (Laws). Give the date and number of the Act:

- The Labour relations Act of South Africa.

SEARCH#2 BUTTERWORTHS NEXIS LEXIS ONLINE

- The Basic Conditions of Employment Act of South Africa.



SEARCH#3 Use the **ACADEMIC SEARCH PREMIER** database to

indicate the number of relevant records (hits) for the following:

- Journal articles dealing with euthanasia and the law.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by Fiona Jane Ogle. Identify the title, date of publication, place of publication and the publisher.

APPENDIX J

UWC: FACULTY OF ARTS: LIBRARY SCIENCE PARTICIPANTS

USING ELECTRONIC DATABASES

ERIC AND LISA

1. Click on **START**
2. Click on **PROGRAMS**
3. Click on **WINSPIRS 4.01**
4. Click **START** to open **WINSPIRS 4.01**
5. Double click on the relevant **DATABASE**
6. Click **OK**

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**



Click on the relevant database, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR LIBRARY SCIENCE PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students in South Africa.

SEARCH#2 Use the **LISA** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the origin of information science.



SEARCH#3 Use **INFOTRAC FULLTEXT** under **UWC Custom** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with theories of information retrieval research.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A famous glossary written by Leonard Montague Harrod. Identify the title, date of publication, place of publication and the publisher.

APPENDIX K

UWC: FACULTY OF SCIENCE PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT



As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is, talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR SCIENCE PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **MEDLINE** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the incidence of HIV/AIDS among white people.

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Inorganic Chemistry.



SEARCH#3 Use the **SCIENCE DIRECT FULLTEXT** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Euclidian geometry.

SEARCH#4 Use **UWC'S OPAC** to search for the following:

- A book written by George B. Arfken. Identify the title, date of publication, place of publication and the publisher.

APPENDIX L

PENTECH: BIOMED PARTICIPANT

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is, talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR BIOMED PARTICIPANT

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **INFOTRAC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the incidence of HIV/AIDS among South Africans

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the SARS virus.

SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX M

PENTECH: MARKETING PARTICIPANT

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR MARKETING PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **INFOTRAC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with marketing strategies for students

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about marketing in the South African clothing industry



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX N

PENTECH: MECHANICAL ENGINEERING PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR MECHANICAL ENGINEERING PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with mechanical engineering in South Africa

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the motor industry in the USA



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX O

PENTECH: MANAGEMENT PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is, talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR MANAGEMENT PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **INFOTRAC** database to indicate the number of relevant records (hits) for the following:

- Journal articles about management techniques for small businesses

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about human resource management in higher education



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX P

PENTECH: CHEMICAL ENGINEERING PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR CHEMICAL ENGINEERING PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the Chemical engineering industry in South Africa.

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about human resource management in higher education



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX Q

PENTECH: INTERNAL AUDITING PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR INTERNAL AUDITING PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

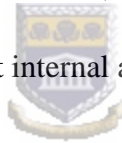
NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **BUSINESS SOURCE** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Internal auditing principles

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about internal auditing of higher education institutions.



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX R

PENTECH: RETAIL PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR RETAIL PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **BUSINESS SOURCE** database to indicate the number of relevant records (hits) for the following:

- Journal articles about trade and industry.

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about the clothing industry in South Africa.



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX S

PENTECH: ELECTRICAL ENGINEERING PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR ELECTRICAL ENGINEERING PARTICIPANTS


BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with Electrical engineering for South African students

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about  Electrical engineering.

SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.

APPENDIX T

PENTECH: ENVIRONMENTAL HEALTH PARTICIPANTS

USING ELECTRONIC DATABASES

EBSCOHOST, EMERALD AND OTHER DATABASES

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **ELECTRONIC RESOURCES AND DATABASES**

Click on the relevant database service, e.g. **EBSCOHOST** or **EMERALD**

OPAC (ONLINE PUBLIC ACCESS CATALOGUE)

1. Click on **INTERNET EXPLORER**
2. Click on **LIBRARY**
3. Click on **LIBRARY CATALOGUE**
4. Click on **ACCESS SEARCH SPECIFIC CATALOGUING MENU BY CLICKING HERE**

ASSIGNMENT

As you perform searches as outlined in the questions and topics below, please try to verbalize your thoughts, that is talk aloud, starting with the formulation of your search strategy. A brief example follows:

Topic: The incidence of HIV/AIDS in South Africa

- My keywords are HIV, AIDS and South Africa
- I will select the relevant database. (You must actually say this aloud).
- I will do a Basic search using the **AND** Boolean operator, that is, **HIV** and **AIDS** and **South Africa**. I am actually typing the relevant keywords in now. The number of relevant documents is-----
- I will use the following relevant ones (read out aloud)
- The author is....., The title is....., The source is.....

EXERCISES FOR ENVIRONMENTAL HEALTH PARTICIPANTS

BELOW ARE THE EXERCISES FOR THE DATABASES AS INDICATED

NOTE: *Talk aloud as you are doing the search, indicating the author, title, journal and date.*

SEARCH#1 Use the **HEALTH SOURCE** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with the incidence of HIV / AIDS in South Africa.

SEARCH#2 Use the **ACADEMIC SEARCH** database to indicate the number of relevant records (hits) for the following:

- Journal articles about the SARS virus.



SEARCH#3 Use the **ERIC** database to indicate the number of relevant records (hits) for the following:

- Journal articles dealing with higher education for disadvantaged students.

SEARCH#4 Use **PENTECH'S OPAC** to search for the following:

- A book written by an author of the subject area in which you are currently studying. Identify the author, title, date of publication, place of publication and the publisher.


APPENDIX U


PENTECH: SEARCH STRATEGY FORMULATION


PARTICIPANT	DATABASE	SEARCH	SEARCH STRATEGY	RESULTS	
BIOMED 1	MEDLINE #1	HIV /AIDS among South Africans	None	None	
	ASP #2	SARS virus	None	None	
	ERIC #3	Higher education for disadvantaged students	journalarticle article <dealing with < h, edua	None	
	ERIC #3		education for disadvantaged students	None	
	OPAC #4	Author of subject of participant	fundamentals of microbiology (Selects <all fields>)	5 records	
BMAN2ND 1	BSP #1	Management techniques for small business	Management techniques and small business	15 records	
	ASP #2	Human resource management in higher education	Human resource management and higher education	4 records	
	ERIC #3	Higher education for disadvantaged students	Articles dealing with higher education and disadvantage students	None	
BMAN2ND 1	ERIC #3	Higher education for disadvantaged students	Journal articles and higher education and disadvantage students	None	
			Journal articles and higher education and disadvantage students	None	
			Higher education and disadvantage students	1 record	
	OPAC #4	Author of subject of participant	Operation management (Selects <author> field)	None	
			OPERATIONS (<i>Deletes and retypes</i>)		
			operation and management (Selects <subject> field)	None	
			Production operational management (Selects <author> field)	None	
			Marketing (Selects <author> field)	36 records	
	BMAN2ND 2	BSP #1	Management techniques for small business	management techniques small business	None
				management for small business	None
			articles about management for small business	None	
ASP #2		Human resource management in higher education	human resource management in higher education	None	
			human resource management	None	

			articles	
			<Search Tips>	
			PENTECH's page for <Support>	
	ERIC #3	Higher education for disadvantaged students	higher education for disadvantaged student for higher education	None
			articles for disadvantage student in higher education	None
			Checks <Search Tips> e.g. Boolean, Wildcard (?), Truncation (*)	
	OPAC #4	Author of subject of participant	principles of management (Selects <title> field)	None
BMAN3RD 1	BSP #1	Management techniques for small business	Management techniques and Small Business	10 records
	ASP #2	Human resource management in higher education	Human Resource Management and High Education	None
			Human resource and High education	None
			Clicks <hints>	
			<Search Tips>	
			Resource human and education	2 records
			Human resource and education	447 records
			resource and management and high education	None
			resource and high education management	None
			<Search Tips>	
			<Basic Search Tips> <All words>	
PARTICIPANT	DATABASE	SEARCH	SEARCH STRATEGY	RESULTS
BMAN3RD 1	ASP #1	Human resource management in higher education	Human Resource and High education	None
			Human resource and management and education	94 records
			Human resource and management and higher education	9 records
	ERIC #3	Higher education for disadvantaged students	Articles and higher education and disadvantaged students	6 records
	OPAC #4	Author of subject of participant	Management (Selects <subject> field)	23 records
			Management (Selects <all fields>)	2064 records
			Business management (Selects <title> field)	146 records
BTECHMARK 1	BSP & ASP #1	Marketing strategies for students	Marketing strategies students	None
			Marketing strategies	23014 records
	ASP #2	Marketing in the	None	None


		South African clothing industry		
	ERIC, BSP & ASP #3	Higher education for disadvantaged students	higher education (Types in <Journal> field)	None
			higher education	246300 records
	OPAC #4	Author of subject of participant	international marketing (Selects <author> field)	None
			strategic management (Selects <author> field)	None
			strategic management (Selects <title> field)	59 records
BTECHMARK 2	BSP #1	Marketing strategies for students	marketing strategies and students	66 records
	ASP #2	Marketing in the South African clothing industry	marketing and south African clothing industry	None
			Marketing and clothing industry	112 records
			Marketing and South Africa	68 records
	ERIC #3	Higher education for disadvantaged students	higher education and diaadvantaged students	None
			higher education and disadvantaged students	460 records
	OPAC #4	Author of subject of participant	Marketing (Selects <all fields>)	530 records
BTECHMECHENG 1	ASP #1	Mechanical engineering in South Africa	Mechanical Endginnering	None
			Mechanical Engineerings	1 record
	ASP #2	Motor industry in the USA	Motor industry	129 records
			Mechanical Endginnering	None
	OPAC #4	Author of subject of participant	strength of materials (Selects <all fields>)	36 records
			Clicks record #2 < Drotsky, Johannes Godfried>	
BTECHRBR 1	BSP #1	Journal articles about trade and industry	ARTICLES ABOUT TRADE INDUSTRY	None
	ASP #2	Clothing industry in South Africa	Articles about tthe clothing industry in South Africa (Clicks <Full text>)	None
			Clicks under Publication type: <Periodical>	None
			Articles about the clothing industry in South Africa (Clicks <Full text>)	None
			Articles that have information about the clothing industry in South Africa	None
			Highlights <Periodical>	
			Highlights <Newspaper>	
			Articles that have information	None

			about the clothing industry in South Africa	
			Articles about Trade Industry	None
	ERIC #3	Higher education for disadvantaged students	Looking to Journal articles dealing with higher education for disadvantaged students (Clicks <Full text>)	None
			Highlights <Journal articles>	None
			What is the the disadvantage for (Deletes)	
			Which are the articles that deals about higher education for disadvantaged student?	None
	OPAC #4	Author of subject of participant	Clicks PENTECH'S Library page	
			Clicks <Gateways to...>	
			Tries to login student number	
			System displays an error message (Particular gateway only for staff)	
			Clicks on PENTECH's library catalogue	
			Authers of Retail Business Management (Selects <author > field)	None
			W – Authers (Retail)	
			Error displayed	
CHEMENG 1	ASP #1	Chemical engineering for South African students 	Articles about chemical Engineering for South African students	None
			Highlights <Full text>	
			Articles about chemical Engineering for South African students	None
			Types under Journal: <Articles about cemical Engineering For South African Students>	None
	ASP #2	Chemical engineering industry in South Africa	Articles dealing with the Chemical Engineering Industry in South Africa	None
			Articles dealing with the Chemical Engineering Industry in South Africa	None
			Highlights <Periodical>	
			Chemical Engineering Industry in South Africa	None
	ERIC #3	Higher education for disadvantaged students	Journal Articles dealing with higher education for disadvantaged students	None
	OPAC #4	Author of subject of participant	Fundamentals of heat and mass transfer (Selects <All fields>)	
			Opens <Aleph Services>	
			Closes and ends session	
CHEMENG 2	ASP #1	Chemical	hiv and aids in south Africa	

		engineering industry in South Africa	<i>(Clears the search terms)</i>	
			chemical engineering for south African students	None
			articles about chemical engineering for south African students	None
			Clears the search terms	
			Types <stunts> Deletes <stunts>	
			articles about chemical engineering for south African students	None
			south African chemical engineering students	None
			Chemical engineering in south Africa	None
			chemical engineering students in south Africa	None
			chemical engineering students and south Africa	2 records
	ASP #2	Chemical engineering industry in South Africa	chemical engineering industry and south African	None
			chemical engineering industry south African	
			Cuts <chemical engineering> to read <industry south African>	
			Pastes after <south African> to read <industry south African chemical engineering>	
			Cuts <industry> and pastes after <engineering> to read <south African chemical engineering industry>	
			Cuts <south African> and pastes after <engineering> to read <chemical engineering south African industry>	
			Adds <and> between <south African> and <industry> to read <chemical engineering south African and industry>	None
			Cuts <south African> and pastes before <chemical engineering> to read <south African chemical engineering and industry>	
			Adds <and> after <African> to read < south African and chemical engineering and industry>	None
			Deletes <and> Deletes <industry>	
			Types <industries> to read <south African chemical	None

			engineering industries>	
			Cuts <south African> and pastes after <industries> adding <in>	
			Reads <chemical engineering industries in south Africa>	None
			Deletes <in> and replaces with <and>	
			Reads <chemical engineering industries and south Africa>	None
	OPAC #4	Author of subject of participant	Types <Coulson and Richardson> (Selects <author> field)	1 record
	ASP #2	Chemical engineering industry in South Africa	chemical engineering industries south Africa <i>(Highlights <Search> but then aborts)</i>	
			Clicks <Google.com>	
			South African chemical engineering industry	43900 records
ELECENG 1	ASP #1	Electrical engineering for South African students	articles and electrical engineering and south African students	None
			electrical engineering and south African students	None
			Deletes <...ineering> to read <electrical eng and south African students>	None
			Electrical engineering and south Africa	1 record
			southafrican students	None
			southafrican learners	None
			south African students	None
			engineering and south african and students	4 records
	OPAC #4	Author of subject of participant	electrical engineering (Selects <subject> field)	None
			Clears search terms	
			digital systems (Selects <subject > field)	None
			Engineering	85 records
	OPAC #4	Author of subject of participant	electronics (Selects <Subject> field)	None
			ericsson (Selects <Subject> field)	None
			electrical engineering (Selects <Subject> field)	None
			electrical machines (Selects <Subject> field)	1 record
			electrical machines (Selects <Subject> field)	None
ENVHEALTH 1	H / SOURCE #1	incidence of HIV / AIDS in South Africa.	incidence of HIV/AIDS and South Africa	1 record
			Deletes </AIDS> to read	2 records

			<incidence of HIV and South Africa>	
			Deletes <incidence of> to read <HIV and South Africa>	52 records
	ERIC #3	Higher education for disadvantaged students	SARS VIRUS	None
	H / SOURCE #1		dealing with SARS virus	
			Deletes <virus> to read <dealing with SARS>	None
			dealing with SARS virus	None
	OPAC #4	Author of subject of participant	Science (Selects <subject> field) No words adjacent	7 records
			Selects a record <Howie, Sarah> with title <Mathematics and science literacy...>	
INTAUD2ND 1	BSP #1	Internal auditing principles	internal auditing principles	2 records
			Adds <article +> to read <article + internal auditing principles>	None
			Deletes <article +>	
			Clicks <Back>	
			Selects record #2 with title <Swedish Public Authorities to follow IIA standards>	
			Clicks <Back>	
	ASP #2	Internal auditing of higher education institutions	internal auditing of high\er education institutions - deletes \	None
			Adds <+> between <auditing> and <higher> to read <internal auditing + higher education institutions>	None
			Deletes <institutions>	None
			Retains search term <internal auditing> - Deletes the rest	23 records
	ERIC #3	Higher education for disadvantaged students	Journals + higher education + disadvantaged students	None
			Deletes <Journals +> and <+>. Adds <and> to read <higher education and disadvantaged students>	460 records
	OPAC #4	Author of subject of participant	author + internal auditing	
			Deletes <+> to read <author internal auditing>	
			Selects <author> field	None
MARK3RD 1	BSP #1	Marketing strategies for students	marketing students and students	
			Deletes <students and students> to read <marketing>	

			Adds <strategies and students> to read <marketing strategies and students>	78 records
	ASP #2	Marketing in the South African clothing industry	South African clothing industry and marketing	None
			marketing and South African clothing industry	None
			Adds <and> between <South African> and <clothing industry> to read <marketing and South African and clothing industry>	None
			Deletes <n> from <African>	None
			Adds <design> to read <marketing and South Africa and clothing industry design>	3 records
	ERIC #3	Higher education for disadvantaged students	higher education and disadvantaged students	1 record
	OPAC #4	Author of subject of participant	Marketing (Selects <subject> field)	2 records
MECHENG 1	ASP #1	Mechanical engineering in South Africa	MECHANICAL ENGINEERING AND SOUTH AFRICA	2 records
	ASP #2	Motor industry in the USA	MOTOR INDUSTRY AND USA	None
			Adds <ENGINEERING> to read <MOTOR INDUSTRY AND USA ENGINEERING>	None
			MOTOR INDUSTRY ENGINEERING AND USA	None
			USA AND MOTOR INDUSTRY ENGINEERING	None
	ERIC #3	Higher education for disadvantaged students	Clicks <More information>	
			Clicks <Definition of fields>	
			Opens EBSCOhost	
			Clicks <Gateways to restricted databases>	
			Clicks <Students>	
			Types student number	
			Login failed message displayed	
	ASP #2		MECH ENGINEERING MOTOR INDUSTRY AND USA	None
			MECHANICAL ENGINEERING MOTOR INDUSTRY AND USA	None
			Opens GOOGLE search engine	
			MOTOR INDUSTRY ENGINEERING AND USA	None
			Clicks a hyperlink <IHS Global>	


			Types <MOTOR INDUSTRY ENGINEERING AND USA>	
			Selects United States (<i>The Website deals with Global engineering</i>)	None
			Browses countries again	
			Selects <United States minor outlying islands>	None
MECHENG 2	ASP #1	Mechanical engineering in South Africa	mechanical engineering and south Africa	2 records
	ASP #2	Motor industry in the USA	motor industry and USA	None
	ERIC #3	Higher education for disadvantaged students	high education and diszvantage	
			Retypes <diszvantage> to read <disadvantaged>	None
	OPAC #4	Author of subject of participant	preculculus for mecheng maths (Selects <title> field)	None
			Clicks on <Request Permutation>	
MECHENG 3	ASP #1 (Opens BSP)	Mechanical engineering in South Africa	south african mechanical engineering	None
			mechanical engineering in south African	None
			mechanical engineering	997 records
	ASP #2	Motor industry in the USA	united states motor industry	1 record
			motor industry in united states	None
			automobile industry in the united states	158 records
	ERIC #3	Higher education for disadvantaged students	higher education for disadvantaged students	5 records
	OPAC #4	Author of subject of participant	strenght of materials (Selects <title> field)	None
			Clicks on Request Permutation	
			Types <drotsky, j.g> (Selects <title> field)	None
			Finds index of a/z list of authors, titles,etc	
			Clicks <drotsky>	
			Finds a record with the title <strength of materials for technicians>	
RET3RD 1	BSP #1	Journal articles about trade and industry	Highlights <Periodical> under <Publication Type>	
			Types <Inustry> but retypes <Industry and trade>	132007 records
	ASP #2	Clothing industry in South Africa	Highlights <Newspaper> under <Publication Type>	
			South Africa and clothing industry	None


			Clothing industry and South Africa	None
			Clothing in South Africa	None
			Highlights <Periodical>	
			Clothing industry and South Africa	3 records
	ERIC #3 – (<i>Still using ASP</i>)		Higher education and disadvantaged students	None
			Higher education and disadvantaged students	29 records
			Clicks <Peninsula Technikon>	
			Clicks <Gateways to restricted databases>	
			Clicks <Students>	
			Enters student number	
			Failed login	
			Closes and ends session	




APPENDIX V

UWC: SEARCH STRATEGY FORMULATION

PARTICIPANT	DATABASE	SEARCH	SEARCH STRATEGY	RESULTS
ARTS 1	INFOTRAC #1	Incidence of HIV/AIDS among South Africans	hiv and aids and south Africa	2 records
	ERIC #3	Higher education for disadvantaged students	hiv and aids and south Africa	5 records
	OPAC #4	A book written by Claribel Koliswa Moropa	SOCIOLOGY (Selects <Browse> option) - Selects <Title> field	
			Clicks <Sociology: an introduction> in Browse mode	4 records
			Clicks <Electronic Journals>	
			Selects EMERALD fulltext	
			EDUCATION AND DISADVANTAGED AND STUDENTS	
			Selects <all fields (excluding fulltext)>	
			Selects <Advanced Search>	
			EDUCATION AND DISADVANTAGES AND STUDENTS ((<i>All typed in the first row</i>))	
			Clicks <Quick Search> (<i>Significantly, the participant does not Click on <Go></i>)	
			Opens <Browse>	
			EDUCATION AND STUDENTS	
			Slow response from system	
	OPAC #4		Opens UWC OPAC	
			Advanced search (<i>This is by default</i>)	
			Clicks <Browse>	
			Selects <Author> field	
			Types <Claribel Kholiswa Maropa>	
			Browses through list	None
			Types <Claribel K. Maropa> - (<i>Deletes</i>)	
			Types <Maropa, Claribel Kholiswa>	None


			Types <Maropa, K. C>	
			Selects <Publisher> field	
			Types <Claribel Kholiswa Maropa>	None
			Selects <Author> field	None
			Types <Maropa Caribel Kholiswa>	None
ARTS2	ASP #2	Journal articles dealing with Sociology	higher education for disadvantaged students	None
			higher education and disadvantaged students	28 records
	OPAC #4	A book written by Claribel Koliswa Moropa	Selects <Browse>	
			Types <Moropa Claribel Koliswa>	
			Selects <Title> field	None
			Retypes <Moropa C K>	
			Selects <Author> field	2 records
	ERIC #3	Higher education for disadvantaged students	HIV and AIDS among South Africans	None
			HIV AIDS AND South Africa	3 records
ARTS3	OPAC #4	A book written by Claribel Koliswa Moropa	Clicks <Browse>	
			Selects <Author> field	
			Types <claribel kholiswa moropa>	None
			Selects <Title> field	
			Types <claribel kholiswa maropa>	None
			Selects <clarinet and saxophone experience> (<i>This is obviously irrelevant to the search</i>)	
			Goes back to <Browse> index	
			Types <Moropa, Claribel Koliswa>	
			Selects <Title> field then changes to <Author> field	2 records
CHS1	MEDLINE #1	Incidence of HIV/AIDS among white people	None	None
CHS2			Clicks <Electronic Resources>	
			Clicks on <HIV/AIDS and EDUCATION>	

			Clicks on <Electronic Resources>	
			Clicks on <Databases>	
			Clicks AIDSEARCH database	
	MEDLINE #1	Incidence of HIV/AIDS among white people	journal articles dealing with developmental psychology	None
			Types <journal articles> on 1 st row with <default fields>	
			Types <dealing with> on 2 nd row with <default fields>	
			Types <developmental psychology> on 3 rd row with <default fields>	None
			Clicks EMERALD database	
			Deletes URL	
			Types at domain address <journal articles dealing with physiotherapy for students>	759 pages (<i>These are websites</i>)
			Retypes <journal articles dealing with physiotherapy for students south Africa>	220 pages (<i>Again, these are websites</i>)
	OPAC #4	A book written by Joanne Valiant Cook	Clicks <Browse>	
			Selects <Title> field	
			Types <Joanne valiant cook>	None
CHS3	MEDLINE #1	Incidence of HIV/AIDS among white people	HIV AIDS AND WHITE PEOPLE	None
	ASP #2	Journal articles dealing with Developmental Psychology	Types <Developmental Psychology>	1003 records
	Science Direct # 3	Journal articles dealing with Physiotherapy for students	PHYSIOTHERAPY AND STUDENTS	10 records
	OPAC #4	A book written by Joanne Valiant Cook	Clicks <Browse>	
			Selects <author> field	
			Types <Cook, Valiant Joanne>	None
			Retypes <Joanne Viliant Cook>	None
			Types <Cook, J. V>	2 records


EDU1	ERIC #1	Higher education for disadvantaged students in South Africa	higher education and disadvantaged students	115 records
			Retypes <disadvantaged students in South Africa and higher education>	None
			Deletes the search term <higher education>	
			Types <education and...> to read <disadvantaged students in South Africa education and>	None
			Types <higher education and disadvantaged students and in south Africa>	None
	OPAC #4	A book written by Patricia K. Kubow	Browses A/Z index	
			Selects <Author> field	
			Types <Patricia K Kulbow>	None
			Types <patricia k>	None
			Types <women in higher education in south Africa>	
			Selects <Title> field	None
			Types <Patricia K Kulbow>	
			Selects <Author> field	None
EDU2	ERIC #1	Higher education for disadvantaged students in South Africa	Types <higher education for disadvantaged students in south Africa>	None
			Deletes <in>	None
			Types < higher education for disadvantaged students in south Africa>	None
			Retypes <higher education for disadvantaged students in south africa>	None
			Checks Thesaurus, specifically the Permuted index	
			Clicks on <higher> as permuted term in the index	69805 records
EDU3	ERIC #1	Higher education for disadvantaged students in South Africa	Types <hiv/aids in south africa>	None
			Deletes <south africa> to read <hiv/aids in>	None
			Types <hiv/aidsin south africa>	None
			Types <hiv/aids south africa>	None
			Highlights search term #5 <africa>	2176 records

			Highlights search term #3 <aids>	4485 records
	ASP #2	Journal articles dealing with the origin of Western Education	Highlights different fields without clicking, e.g. author, title, etc	
			Types under Find: <hiv/aids>	
			Selects <Subject> field	
			Response from system is slow	
			Adds <and south africa> to read <hiv/aids and south africa>	
			Again, response from system is slow	
	OPAC #4	A book written by Patricia K. Kubow	<Advanced Search> opens by default	
			Clicks <Basic Search>	
			Selects <subject field>	
			Types <hiv/aids in south Africa>	None
			Clicks <Library Catalogue>	
			Again, <Advanced Search> by default	
			Types <hiv/aids> 1st row with <subject field> selected	
			Types <south africa> 2nd row with <subject field> selected	
			Selects <Basic Search>	
			Selects <Author> field	
			Types <zakes mda> (Not required)	7 records
			<i>(Interesting that the system reads the 1st name of the author as well as last name as entry points)</i>	
EMS1	BSP #1	Business management in South Africa	Types <strategic management>	2039 records
			Clicks <Scholarly journals> (These are not articles)	1672 records
	OPAC #4	A book written by Pranab K Bardhan	<Advanced Search> opens as default	
			Types <prinab k bardhan>	
			Selects <Yes> for <words adjacent?>	None
			Closes	
			Opens <Library Catalogue>	

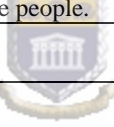
			<Advanced Search> as default opens again	
			Types <pranab k. bardhan>	
			<Yes> for <words adjacent?>	None
			Types <pranab k. bardhan> on 1 st row with <all fields> selected	
			Types <business resource premier> on 2 nd row with <all fields> selected	None
			Finds title list with regards to journals	
			Browses for <strategic management>	
			Clicks <Browse>	
			Clicks Title <Student BMJ>	
			Looks at details for this journal (NB <i>This is obviously irrelevant to this particular search</i>)	
			Clicks <Systematic Biology> (Again, <i>this is a journal title</i>)	
			Clicks <British Journal of addiction>	
	OPAC #4		Clicks <Library Catalogue>	
			<Advanced Search> as Default opens	
			Selects <All fields>	
			Types <Strategic planning for managers>	4 records
			Checks availability status	
			Attempts to place a request for the item although it is on the shelf	
			Opens <Library Catalogue>	
			Again, < Advanced Search> as Default opens	
			Types <economic systems of developed countries>	
			Selects <All fields> and <Yes> for <Words adjacent?>	None
			Retypes <economic> (<i>notices mistake</i>) to read <economic systems of developed countries>	None
			Deletes search terms	
			Types in 1 st row <pranab k. bardhan>	None
	BSP #1		Selects <Standard Search>	
			Types <journal articles dealing with strategic planning managers>	None

			Types at <Publication>: < journal articles dealing with strategic planning managers>	None
			Clicks at <Published date>: <Jul. Yr. <1999.....2002>	None
EMS2	OPAC #4	A book written by Pranab K Bardhan	<Advanced Search> as Default opens	
			Selects <All fields>	
			Types <strategic plannind>	None
			Types <strategic> 1 st row with <No> for <Words adjacent?>	
			Types <planning> 2 nd row with <No> for <Words adjacent?>	
			Slow response from OPAC	615 hits for <strategic>
				2050 hits for <planning>
				282 records for strategic planning (in all fields)
	OPAC #4		<Advanced Search> as Default opens	
			Selects <all fields>	
			Types <economic systems>	83 records
			Selects <author> field	
			Types <Pranad k>	None
			Selects <Author> field	
			Types <K pranad>	2 records (Interesting given that the author's last name is the access point)
LAW1	Butterworths Nexis Lexis Online	The Labour relations Act of South Africa	<Advanced Search> opens as Default	
			Types <Google> at address	
			Opens Google	
			Types <butterworhts>	
			Opens <Google Search>	182 records containing the term <Google>
			Clicks links <New Arrivals – Sep 2002>	
			Deletes UWC at domain address	
			Types <google>	182 records containing the term <google>

			Clicks <Google search appliance (hardware)>	14838 records
			Types <butterworths>	10 records containing the term <butterworths>
			Clicks <library learning resources>	
			Types <butterworths nexis online>	None
			Clicks <library learning resources>	
			Deletes the URL	
			Types <ww.ananzi.co.za>	
			Types under Search: <butterworths>	77 records
			Opens <Lexis-Nexis Butterworths>	
			Clicks <Legal Citator>	
			Browses	
			Clicks <Judgments>	
			Prompt from system for a password	
			Clicks <South African legislation>	
			Browses links to S A legal resources	
			Clicks <Acts Online>	
			Opens <Gazette Watch>	
			Types <Labour>	
			Clicks <Acts of Labour>	
			Opens <Programs>	
			Opens UWC website	
			Clicks on <Academic>	
			Clicks on < Faculties and Departments>	
	ASP #3	Journal articles dealing with euthanasia and the law	Types at Find: <euthanasia law> (Selects <Standard search>)	220 records
	OPAC #4	A book written by Fiona Jane Ogle	<Advanced Search> opens as Default	
			Selects <Author> field, <No> to <Adjacent words?>	
			Types <Fiona jane ogle>	None

			Repeats the same search with <Yes> to <Words adjacent?>	None
			Types <fiona>	None
LAW2	Butterworths Nexis Lexis Online	The Labour relations Act of South Africa	Clicks <Butterworths Lexis Nexis direct	
			Browses	
			Highlights <Labour Law Library>	
			Closes and ends session	
LIS1	ERIC #1	Higher education for disadvantaged students in South Africa.	Types <hiv and aids and south Africa>	5 records
	LISA #2	Journal articles dealing with the origin of information science.	Types <hiv and aids and south Africa>	2 records
	OPAC #4	A famous glossary written by Leonard Montague Harrod	<Advanced Search> opens as Default	
			Selects <Browse>	
			Selects <Title> field	
			Types <hiv and aids and south Africa>	None
			Selects <Author> field	
			Types <leornarmontague harrod>	None
			Retypes <Leonard montague harrod>	None
			Selects a record <Mcfarland, G K> (irrelevant to the search)	
LIS2	ERIC #1	Higher education for disadvantaged students in South Africa.	Types <disadvantages and the student and suoth africa>	None
			Types <HIGHER EDUCATION FOR DISADVANTAGED STUDENT AND SUOTH AFRICA>	None
			Types <EDUCATION DIS AND ADVANTAGES AND STUDENT AND SOUTH AFRICA>	None
			Types <STUDENT AND SOUTH AFRICA>	268 records
	LISA #2	Journal articles dealing with the origin of information science.	Types <ORIGIN AND INFORMATION SCIENCE>	107 records
	INFOTRAC #3	Theories of information retrieval research	Clicks <UWC Custom Database>	

			Types <THOERIES AND INFORMATION SCIENCE>	None
			Types <JOURNAL ARCTICTLE DEALING WITH THE OROIGIN AND INFORMATION SCIENCE>	System yields a list of Journals (This is clearly based on the 1st term <Journal>)
	OPAC #4	A famous glossary written by Leonard Montague Harrod	Clicks <Browse>	
			Selects <Title> field	
			Types <HARROD L M>	Finds a match <Harrod's Librarians' glossary...>
			Selects <Author> field	
			Types <HARROD LEONARD MONTAGUE>	7 records
LIS3	ERIC #1	Higher education for disadvantaged students in South Africa.	Types <Higher education for disadvantaged students in South Africa>	None
	LISA #2	Journal articles dealing with the origin of information science.	Types <Journal articles dealing with the origin of Information Science>	None
	INFOTRAC #3	Theories of information retrieval research	Clicks <UWC Custom Database>	
			Types <Journal articles dealing with theories of information retrieval research>	System yields a list of subjects with the first term <Journal>
	OPAC #4	A famous glossary written by Leonard Montague Harrod	<Advanced Search> opens as Default	
			Selects <Author> field	
			Types <Harrod, Leonard Montague>	None
			Clicks on <Browse>	
			Selects <Author> field	
			Types <Harrod, Leonard Montague>	7 matches
LIS4	ERIC #1	Higher education for disadvantaged students in South Africa.	Types <higher education for disadvantaged students in South Africa>	None
			Types <higher education students for disadvantaged>	None
			Clicks search term #1 <higher> which yields 89805 records	

			Types <students in South Africa>	None
			Types <education for disadvantaged in S.A>	None
			Types <LISA>	1360 records
			Retypes <journal information science>	None
			System prompts the searcher to check for spelling	
			Types <ARTICLES WITH INFORMATION SCIENCE>	63 records
			Types <Internet Explorer>	12 records
			Types <EBSCOHOST, EMERALD>	
			Clears search terms	
	OPAC #4	A famous glossary written by Leonard Montague Harrod	Browses A/Z index	
			Selects <Author> index	
			Types <HARROD, L M>	7 entries
SC1	MEDLINE #1	Incidence of HIV/AIDS among white people.	Types under Find: <incidence of hiv/aids among white people>	None
			Opens Google	
			Types <Ebscohost>	System yields 132000 sites
			Types under Google <journal articles dealing with Euclidean geometry>	
			Closes	
SC2	MEDLINE #1	Incidence of HIV/AIDS among white people.	Clicks on MEDLINE database	
			Clicks on EBSCOhost web	
			Very slow response	
			Closes and ends session	
SC3	MEDLINE #1	Incidence of HIV/AIDS among white people.	Clicks on MEDLINE (Ebscomed)	
			Types at Find: <AIDS / HIV in South Africa>	None
			Retypes <AIDS>	98667 records
			Types <AIDS and South Africa>	None
	ASP #2	Journal articles dealing with Inorganic	Types <Inorganic Chemistry> in <Title> field	57 records

		Chemistry		
	SCIENCE DIRECT #3	Journal articles dealing with Euclidian geometry	Under <search for a journal title> types <Euclidean geometry>	None
	OPAC #4	A book written by George B. Arfken	Selects <Author> index	
			Types word/phrase: <George B. Arfken>	None
			Clicks the entry <George Brown>	



APPENDIX W

PENTECH SEARCHES

Participant	IR system	sysrel	partrel	sysrel \cap partrel	sysrel - partrel	partrel - sysrel
BIOMED 1	MLINE#1	23	0	0	23	0
	ASP#2	113	0	0	113	0
	ERIC#3	266	0	0	266	0
	OPAC#4	10	5	5	5	0
BMAN2ND 1	BSP#1	132	15	15	117	0
	ASP#2	20	4	4	16	0
	ERIC#3	266	1	0	266	1
	OPAC#4	254	36	0	254	36
BMAN2ND 2	BSP#1	132	0	0	132	0
	ASP#2	20	0	0	20	0
	ERIC#3	266	0	0	266	0
	OPAC#4	254	0	0	254	0
BMAN3RD 1	BSP#1	132	10	10	122	0
	ASP#2\$1	20	2	2	18	0
	ASP#2\$2	20	447	20	0	427
	ASP#2\$3	20	94	20	0	74
	ASP#2\$4	20	9	9	11	0
	ERIC#3	266	6	6	260	0
	OPAC#4\$1	254	23	23	231	0
	OPAC#4\$2	254	2064	254	0	1810
	OPAC#4\$3	254	146	146	108	0
	BTECHMARK 1	BSP#1	339	23014	339	0
	ASP#2	115	0	0	115	0
	ERIC#3	266	246300	266	0	246034
	OPAC#4	2	59	2	0	57
BTECHMARK 2	BSP#1	339	66	66	273	0
	ASP#2\$1	115	112	112	3	0
	ASP#2\$2	115	68	68	47	0
	ERIC#3	266	460	266	0	194
	OPAC#4	2	530	2	0	528
BTECHMECHENG 1	ASP#1\$1	34	0	0	34	0
	ASP#1\$2	34	1	1	33	0
	ASP#2\$1	84	129	84	0	45
	ASP#2\$2	84	1	1	83	0
	ERIC#3	266	DNS	DNS	NA	NA
	OPAC#4	98	36	36	62	0
BTECHRBR 1	BSP#1	18964	0	0	18964	0
	ASP#2	6	0	0	6	0
	ERIC#3	266	0	0	266	0
	OPAC#4	98	0	0	98	0
CHEMENG 1	ASP #1	3	0	0	3	0
	ASP #2	89	0	0	89	0
	ERIC#3	266	0	0	266	0
	OPAC#4	85	0	0	85	0
CHEMENG 2	ASP#1	3	2	2	1	0
	ASP#2	89	0	0	89	0
	ERIC#3	266	0	0	266	0
	OPAC#4	85	1	1	84	0
ELECENG 1	ASP#1\$1	1	1	0	1	0
	ASP#1\$2	1	4	1	0	3
	ASP#2	4319	DNS	DNS	NA	NA
	ERIC#3	266	DNS	DNS	NA	NA
	OPAC#4\$1	3	85	3	0	82
	OPAC#4\$2	3	1	1	2	0
ENVHEALTH 1	H/S#1\$1	236	1	1	235	0
	H/S#1\$2	236	2	2	234	0
	H/S#1\$3	236	52	52	184	0
	ASP#2	89	DNS	DNS	NA	NA
	ERIC#3	266	0	266	0	0

	OPAC#4	15	7	7	8	0
INTAUD2ND 1	BSP#1	30	0	0	30	0
	ASP#2	1	23	1	0	22
	ERIC#3	266	460	260	6	200
	OPAC#4	2	0	0	2	0
MARK3RD 1	BSP#1	339	78	78	261	0
	ASP#2	115	3	3	112	0
	ERIC#3	266	1	1	265	0
	OPAC#4	2	2	2	0	0
MECHENG 1	ASP #1	34	2	2	32	0
	ASP #2	84	0	0	84	0
	ERIC#3	266	0	0	266	0
	OPAC#4	98	DNS	DNS	NA	NA
MECHENG 2	ASP #1	34	2	2	32	0
	ASP #2	84	0	0	84	0
	ERIC#3	266	0	0	266	0
	OPAC#4	98	0	0	98	0
MECHENG 3	ASP #1	34	997	34	0	963
	ASP#2\$1	84	1	1	83	0
	ASP#2\$2	84	158	84	0	74
	ERIC#3	266	5	5	261	0
	OPAC#4	98	1	1	97	0
RET3RD 1	BSP#1	18964	132007	18964	0	113043
	ASP#2	6	3	3	3	0
	ERIC#3	266	DNS	DNS	NA	NA
	OPAC#4	98	DNS	DNS	NA	NA

sysrel = Relevant records retrieved with the <and> Boolean operator

partrel = Relevant records retrieved by the participant

sysrel ∩ *partrel* = Retrieved records matched by the system and the participant

sysrel - *partrel* = Records which the participant missed

partrel - *sysrel* = Records which the participant retrieved that were not relevant to the Boolean search



APPENDIX X

UWC SEARCHES

Participant	IR system	<i>sysrel</i>	<i>partrel</i>	$sysrel \cap partrel$	<i>sysrel - partrel</i>	<i>partrel - sysrel</i>
ARTS 1	ITRAC#1	23	2	2	21	0
	ASP#2	10017	DNS	DNS	NA	NA
	ERIC#3	266	0	0	266	0
	OPAC#4	2	0	0	2	0
ARTS 2	ITRAC#1	23	DNS	DNS	NA	NA
	ASP#2	10017	0	0	10017	0
	ERIC#3	266	0	0	266	0
	OPAC#4	2	2	2	0	0
ARTS 3	ITRAC#1	23	DNS	DNS	NA	NA
	ASP#2	10017	DNS	DNS	NA	NA
	ERIC#3	266	DNS	DNS	NA	NA
	OPAC#4	2	2	2	0	0
CHS 1	MLINE#1	58	0	0	58	0
	ASP#2	3182	DNS	DNS	NA	NA
	S/DIR#3	12	DNS	DNS	NA	NA
	OPAC#4	2	DNS	DNS	NA	NA
CHS 2	MLINE#1	58	0	0	58	0
	ASP#2	3182	DNS	DNS	NA	NA
	S/DIR#3	12	DNS	DNS	NA	NA
	OPAC#4	2	0	0	2	0
CHS 3	MLINE#1	58	0	0	58	0
	ASP#2	3182	1003	1003	2179	0
	S/DIR#3	12	10	10	2	0
	OPAC#4	2	2	2	0	0
EDU 1	ERIC#1	9	115	9	0	106
	ASP#2	3	DNS	DNS	NA	NA
	ITRAC#3	4	DNS	DNS	NA	NA
	OPAC#4	1	0	0	1	0
EDU 2	ERIC#1	9	69804	9	0	69795
	ASP#2	3	DNS	DNS	NA	NA
	ITRAC#3	4	DNS	DNS	NA	NA
	OPAC#4	1	DNS	DNS	NA	NA
EDU 3	ERIC#1	9	0	0	9	0
	ASP#2	3	0	0	3	0
	ITRAC#3	4	DNS	DNS	NA	NA
	OPAC#4	1	0	0	1	0
EMS 1	BSP#1	3	2039	3	0	2036
	ASP#2	126	DNS	DNS	NA	NA
	ITRAC#3	20	DNS	DNS	NA	NA
	OPAC#4	2	0	0	2	0
EMS 2	BSP#1	3	DNS	DNS	NA	NA
	ASP#2	126	DNS	DNS	NA	NA
	ITRAC#3	20	DNS	DNS	NA	NA
	OPAC#4	2	2	2	0	0
LAW 1	B/LEX #1	1	0	0	1	0
	B/LEX #2	1	DNS	DNS	NA	NA
	ASP#3	537	220	220	317	0
	OPAC#4	1	0	0	1	0
LAW 2	B/LEX #1	1	0	0	1	0
	B/LEX #2	1	DNS	DNS	NA	NA
	ASP#3	537	DNS	DNS	NA	NA
	OPAC#4	1	DNS	DNS	NA	NA

LIS 1	ERIC#1	9	0	0	9	0
	LISA#2	107	0	0	107	0
	ITRAC#3	12	DNS	DNS	NA	NA
	OPAC#4	7	0	0	7	0
LIS 2	ERIC#1	9	268	9	259	0
	LISA#2	107	107	107	0	0
	ITRAC#3	12	0	0	12	0
	OPAC#4	7	7	7	0	0
LIS 3	ERIC#1	9	0	0	9	0
	LISA#2	107	0	0	107	0
	ITRAC#3	12	0	0	12	0
	OPAC#4	7	7	7	0	0
LIS 4	ERIC#1	9	0	0	9	0
	LISA#2	107	DNS	DNS	NA	NA
	ITRAC#3	12	DNS	DNS	NA	NA
	OPAC#4	7	7	7	0	0
SC 1	MLINE#1	58	0	0	58	0
	ASP#2	12	DNS	DNS	NA	NA
	S/DIR#3	13	DNS	DNS	NA	NA
	OPAC#4	6	DNS	DNS	NA	NA
SC 2	MLINE#1	58	0	0	58	0
	ASP#2	12	DNS	DNS	NA	NA
	S/DIR#3	13	DNS	DNS	NA	NA
	OPAC#4	6	DNS	DNS	NA	NA
SC3	MLINE#1	58	98667	58	0	98609
	ASP#2	12	57	12	0	45
	S/DIR#3	13	0	0	13	0
	OPAC#4	6	0	0	6	0

sysrel = Relevant records retrieved with the <and> Boolean operator

partrel = Relevant records retrieved by the participant

sysrel \cap partrel = Retrieved records matched by the system and the participant

sysrel - partrel = Records which the participant missed

partrel - sysrel = Records which the participant retrieved that were not relevant to the Boolean search

APPENDIX Y

UWC: TRANSACTION LOGS

PARTICIPANT 1 ARTS1

DURATION OF SEARCH: 40 MIN

- Clicks on LIBRARY
- Opens INFOTRAC database
- Slow response from system
- Clicks UWC Custom database
- Clicks <Start Searching>
- Types <hiv and aids and south Africa>
- System yields 2 records
- Selects record #2 with the title <A multi-sectorial committee...>
- Closes
- Opens WINSPIRS 4.01
- Opens ERIC DATABASE
- Slow response
- Clicks <Search>
- System yields 5 records
- Closes
- Clicks <Library Catalogue>
- Opens UWC OPAC
- Selects <Browse> option
- Types <SOCIOLOGY>
- Selects <Title> field
- Clicks <Go>
- Clicks <Sociology: an introduction> in Browse mode
- Finds 4 records
- Selects the record <Sociology: an introduction> by Christopher Bates Doob
- Closes
- Clicks <Electronic Journals>
- Clicks <E> in Grid of A/Z databases
- Selects EMERALD fulltext
- Slow response time
- Selects <Quick Search>
- Types <EDUCATION AND DISADVANTAGED AND STUDENTS>
- Selects <all fields (excluding fulltext)>
- Selects <Advanced Search>
- Types <EDUCATION AND DISADVANTAGES AND STUDENTS> (*All typed in the first row*)
- Clicks <Quick Search> (*Significantly, the participant does not Click on <Go>*)



- Opens <Browse>
- Types <EDUCATION AND STUDENTS>
- Clicks <Go>
- Slow response from system
- Closes
- Opens UWC OPAC
- Opens at Advanced search (*This is by default*)
- Closes
- Clicks <Browse>
- Selects <Author> field
- Types <Claribel Kholiswa Maropa>
- Clicks <Go>
- Browses through list
- Cannot find a matching record
- Clicks <Back>
- Deletes search terms
- Types <Claribel K. Maropa>
- Deletes
- Types <Maropa, Claribel Kholiswa>
- Clicks <Go>
- System yields no records
- Resets
- Types <Maropa, K. C>
- Resets
- Selects <Publisher> field
- Types <Claribel Kholiswa Maropa>
- Clicks <Go>
- System yields no records
- Selects <Author> field
- Clicks <Go>
- System yields no records
- Types <Maropa Caribel Kholiswa>
- Clicks <Go>
- System yields no records
- Closes and ends session



PARTICIPANT 2 ARTS2

DURATION OF SEARCH: 60 MIN

- Opens WINSPIRS 4.01
- Highlights ERIC database via WINSPIRS
- Cannot open ERIC
- Clicks <Help>
- Closes <Help>

- Still has difficulty in opening ERIC
- Closes and repeats
- Opens WINSPIRS 4.01
- Clicks ERIC database
- <OK> button is not highlighted
- Stops at <OK>
- Clicks <Help> again
- Closes
- Closes WINSPIRS 4.01
- Opens Internet Explorer
- Opens UWC Library page
- Selects <Electronic Databases>
- Clicks Academic Source Premier (ASP)
- Selects EBSCOhost Text only
- Opens ASP
- Slow response
- Types <higher education for disadvantaged students>
- Clicks <Search>
- Slow response
- System yields no records
- Closes
- List of databases
- Types <higher education and disadvantaged students>
- Clicks <Search>
- System yields 28 records
- Selects record #1 with the title <'Stingy' grant could be reused to help disadvantaged students>
- Selects print and clicks (*no response; printer not connected*)
- Clicks <Back>
- Opens UWC OPAC
- Selects <Browse>
- Types <Moropa Claribel Koliswa>
- Selects <Title> field
- Clicks <Go>
- No match found
- Clicks <Search>
- <Advanced Search> as default opened
- Types in 1st row <Moropa,>
- Clicks <Back>
- Retypes <Moropa C K>
- Clicks <Go>
- Selects <Author> field
- System yields 2 entries for Moropa, C K
- Clicks record #1
- Clicks <Back>
- Clicks <Databases>



- Clicks <A> from the A/Z grid
- Opens ASP
- Finds list of databases
- Highlights ERIC database
- Highlights LISA database
- Highlights and clicks ERIC database
- Types <HIV and AIDS among South Africans>
- System yields no records
- Types <HIV AIDS AND South Africa>
- System yields 3 records
- Returns to WINDOWS
- Closes
- Returns to list of databases
- Slow response
- Closes and ends session

PARTICIPANT 3 ARTS3

DURATION OF SEARCH: 40 MIN

- Opens Internet Explorer
- Clicks 'I' on database grid
- Highlights INFOTRAC but closes
- Clicks <Library>
- Clicks 'A' on grid
- Selects ASP but closes
- Goes back to Internet Explorer
- Clicks <databases>
- List of databases
- Closes
- Opens Internet Explorer again
- Clicks <Library>
- Clicks 'E' on database grid
- Scrolls down
- Opens UWC OPAC
- Clicks <Browse>
- Selects <Author> field
- Types <claribel kholiswa moropa>
- Clicks <Go>
- System yields no records
- Closes
- Returns to UWC OPAC
- Clicks <Browse>
- Selects <Title> field
- Types <claribel kholiswa maropa>



- Clicks <Go>
- System yields no records
- Selects <clarinet and saxophone experience> (*This is obviously irrelevant to the search*)
- Goes back to <Browse> index
- Types <Moropa, Claribel Koliswa>
- Selects <Title> field then changes to <Author> field
- Clicks <Go>
- System yields 2 entries for Moropa, C K
- Highlights records
- Clicks <Back>
- Clicks the entry <Moropa, C K>
- Closes
- Opens Internet Explorer
- Clicks on <Library>
- Clicks <Electronic Resources>
- Clicks Databases
- Opens EBSCOhost
- Closes and ends session

PARTICIPANT 4 CHS1

DURATION OF SEARCH: 10 MIN



- Opens Internet Explorer
- Clicks on <Library>
- Long pause
- Clicks <Electronic resources>
- Clicks <Databases>
- Clicks MEDLINE database
- Clicks on EBSCOhost Publishing
- Clicks EBSCO
- Closes and ends session

PARTICIPANT 5 CHS2

DURATION OF SEARCH: 50 MIN

- Opens Internet Explorer
- Clicks on <Library>
- Clicks <Electronic Resources>
- Clicks on <HIV/AIDS and EDUCATION>
- Scrolls up and down
- Closes
- Clicks on <Library>

- Clicks on <Electronic Resources>
- Clicks on <Databases>
- Selects 'A' on database grid
- Clicks AIDSEARCH database
- Reads database information
- Clicks hyperlink <Click here to register>
- Clicks hyperlink <Complete list of Nisc's products>
- Clicks <Back>
- Closes
- Opens AIDSEARCH database again
- Closes
- Clicks on <Library>
- Selects <Databases>
- Clicks <E> on database grid
- Clicks <EBSCOhostweb>
- Deletes the URL
- Types at Domain address <3development of psychology>
- Clicks <EBSCOhostweb>
- Browses through list of databases
- Highlights ASP
- Clicks <Back>
- List of databases
- Browses through list
- Highlights MEDLINE database
- Opens MEDLINE
- Types at Find: <journal articles dealing with developmental psychology>
- Selects <Search> with <default fields>
- Clicks <Search>
- System yields no results
- Deletes search terms
- Types <journal articles> on 1st row with <default fields>
- Types <dealing with> on 2nd row with <default fields>
- Types <developmental psychology> on 3rd row with <default fields>
- Clicks <Search>
- System yields no results
- Clicks <Back>
- List of databases
- Clicks <Privacy Policy re: EBSCOhost>
- Scrolls down
- Clicks <Back>
- List of databases
- Clicks <More information> under MEDLINE
- Browses hyperlinks
- Clicks <Back>
- List of databases
- Opens EMERALD database



- Closes
- Clicks on <Library>
- Clicks on <Databases>
- Clicks on <E> under <Quick A/Z reference>
- Clicks EMERALD database
- Deletes URL
- Types at domain address <journal articles dealing with physiotherapy for students>
- Clicks <Go>
- Finds 759 pages dealing with the entered terms (NB *These are websites*)
- Retypes <journal articles dealing with physiotherapy for students south Africa>
- Finds 220 pages dealing with the entered terms (*Again, these are websites*)
- Clicks the hyperlink <Electronic databases>
- Clicks <Back>
- Highlights EMERALD
- Closes
- Clicks on <Library>
- Opens UWC OPAC
- Clicks <Database>
- Clicks <University of the Western Cape Catalogue>
- Clicks <Search>
- Clicks <Back>
- Clicks <Browse>
- Selects <Title> field
- Types <Joanne valiant cook>
- Clicks <Go>
- System yields no records
- Closes
- Scrolls down
- Clicks <Back>
- Clicks <Next page>
- Clicks <Previous page>
- Ends up with <J> in A/Z index
- Clicks <Next page>
- Clicks <Back>
- Selects <Author> field
- Clicks <Go>
- Scrolls and browses
- No result matching
- Clicks <Next page>
- Keeps on clicking <Previous page, next page>
- Closes and ends session



PARTICIPANT 6 CHS3

DURATION OF SEARCH: 25 MIN

- Opens Internet Explorer
- Clicks <Library>
- Clicks <Electronic Resources>
- Clicks <M> on the A/Z database grid
- Opens MEDLINE database (Ebscomed)
- Types <HIV AIDS AND WHITE PEOPLE>
- Clicks <Go>
- Clicks <Back>
- Highlights MEDLINE (Pubmed)
- Types <HIV AIDS AND WHITE PEOPLE>
- Receives <No items found> message
- Clicks <Details>
- Suggestions given by Database>
- Reads
- Highlights a few suggestions
- Clicks <Go>
- System yields no records
- Clicks <A> in A/Z grid
- Highlights ASP
- Clicks EBSCOhostweb
- Clicks ASP
- Types <Developmental Psychology>
- Clicks <Search>
- Slow response from system
- System yields 1003 results
- Reads through records
- Finds article with the title <Trying to fix the Development in Evolutionary Developmental Psychology>
- Reads Bibliographical detail of record
- Clicks <Back>
- List of databases
- Clicks <Databases>
- Selects <Science Direct>
- Types <PHYSIOTHERAPY AND STUDENTS>
- Clicks <Go>
- System yields 10 records
- Reads
- Opens the record which is fulltext
- Reads
- Clicks <Back>



- Closes
- Clicks on <Library>
- Clicks on <Electronic Resources>
- Opens UWC OPAC
- Clicks <Browse>
- Types <Cook, Valiant Joanne>
- Selects <author> field
- System yields no results
- Browses
- Retypes <Joanne Viliant Cook>
- Again, no results
- Types <Cook, J. V>
- System yields 2 records
- Opens 1 record with the title <Child abuse...>
- Reads bibliographic details
- Closes and ends session

PARTICIPANT 7 EDU1

DURATION OF SEARCH: 35 MIN

- Opens WINSPIRS 4.01
- Clicks <ERL Configuration Editor>
- Closes
- Opens WINSPIRS 4.01 again
- Clicks <Start>
- Highlights ERIC database
- Highlights LISA
- Back to ERIC
- Reads about ERIC
- Clicks <OK>
- Types <higher education and disadvantaged students>
- Clicks <Search>
- System yields 115 records after search #5
- Reads results (*Not relevant to search*)
- Retypes <disadvantaged students in South Africa and higher education>
- **In** operator is not valid according to the system
- Clicks <OK>
- Deletes the search term <higher education>
- Types <education and...> to read <disadvantaged students in South Africa education and>
- Again the message regarding the invalidity of the **In** operator is displayed
- Deletes all the search terms
- Types <higher education and disadvantaged students and in south Africa>
- The **In** operator displayed as being invalid
- Clicks <OK>



- Exits
- Opens UWC page
- Clicks on <Library>
- Clicks on <Electronic resources>
- Clicks on <UWC OPAC>
- Browses A/Z index
- Types <Patricia K Kulbow>
- Selects <Author> field
- Clicks <Go>
- System yields no results
- Clicks <Back>
- Types <patricia k>
- Selects <Author> field
- Clicks <Go>
- Again, no results
- Clicks <Back>
- Types <women in higher education in south Africa>
- Selects <Title> field
- Clicks <Go>
- No such title
- Clicks <Next page>
- Clicks <Back>
- Types <Patricia K Kulbow>
- Selects <Author> field
- Clicks <Go>
- Again, no results
- Clicks <Back>
- Closes and ends session



PARTICIPANT 8 EDU2

DURATION OF SEARCH: 10 MIN

- Opens Programs
- Closes
- Clicks <Start>
- Opens Programs again
- Clicks WINSPIRS 4.01
- Highlights ERIC
- Clicks <OK>
- Opens ERIC
- Types <higher education for disadvantaged students in south Africa>
- Clicks <Search>
- The **In** operator displayed as being invalid
- Deletes the term <in>
- Clicks <Search>

- System yields no records
- Reads hints from the system
- Resets
- Types <higher education for disadvantaged students in south Africa>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- Checks Thesaurus, specifically the Permuted index
- Retypes <higher education for disadvantaged students in south africa>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- Clicks <Help>
- Reads
- Clicks <Search> again
- Again, the **In** operator displayed as being invalid
- Clicks on <higher> as permuted term in the index
- The system yields 69805 records (*This is obviously too broad for the search*)
- Closes and ends session

PARTICIPANT 9 EDU3

DURATION OF SEARCH: 35 MIN

- Opens <Start>
- Clicks on <Programs>
- Opens WINSPIRS 4.01
- Highlights ERIC database
- Clicks <OK>
- Opens ERIC
- Types <hiv/aids in south africa>
- Clicks <Search>
- The **In** operator displayed as being invalid
- Deletes <south africa> to read <hiv/aids in>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- Clicks <Database>
- Highlights ERIC database
- Opens ERIC
- Types <hiv/aidsin south africa>
- Clicks <Database>
- Highlights ERIC database
- Resets previous search
- Types <hiv/aids in south africa>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- Opens ERIC
- Resets



- Types < hiv/aids south africa>
- Clicks <Search>
- System yields no records
- Highlights search term #5 <africa>
- Clicks <Search>
- System yields 2176 records
- Reads through records (*These are obviously too broad for the search*)
- Highlights search term #3 <aids>
- Clicks <Search>
- System yields 4485 records
- Reads through records (*Again, these are obviously too broad for the search*)
- Closes
- Clicks on <Programs>
- Opens <Internet Explorer>
- Clicks on <Library>
- Highlights <Library Catalogue>
- Highlights <Electronic Resources>
- Clicks <A> on A/Z grid
- Highlights ASP
- Clicks EBSCOhost web
- Clicks <Back>
- Clicks EBSCOhost web again
- Opens ASP
- Clicks <Back> again
- List of databases
- Selects ASP
- Clicks EBSCOhost web again
- Opens ASP again
- Search Window opens
- Highlights different fields without clicking, e.g. author, title, etc.
- Types under **Find:** <hiv/aids>
- Selects <Subject> field
- Clicks <Search>
- Response from system is slow
- Adds <and south africa> to read <hiv/aids and south africa>
- Clicks <Search>
- Again, response from system is slow
- Closes
- Clicks <Back>
- List of databases
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <Library Catalogue>
- Clicks <Search>
- <Advanced Search> opens by default
- Clicks <Basic Search>



- Types <hiv/aids in south africa>
- Selects <subject field>
- Clicks <Go>
- System yields no results
- Closes
- Clicks <Library Catalogue>
- Clicks <Search>
- Again, <Advanced Search> by default
- Types <hiv/aids> 1st row with <subject field> selected
- Types <south africa> 2nd row with <subject field> selected
- Closes
- Selects <Basic Search>
- Types <zakes mda>
- Selects <Author> field
- System yields 7 records (*Interesting that the system reads the 1st name of the author as well as last name as entry points*)
- Browses records
- Closes and ends session

PARTICIPANT 10 EMS1

DURATION OF SEARCH: 95 MIN

- Opens Internet Explorer
- Clicks on <Electronic Resources>
- Clicks on <Databases>
- Selects on A/Z grid
- Opens BSP
- Clicks EBSCOhost web
- Opens BSP
- Types <strategic management>
- Clicks <Search>
- System yields 2039 records
- Clicks <Scholarly journals>
- Search is refined to 1672 records
- Browses through records
- Selects a record with the title <Strategic research partnerships...>
- Reads through
- Clicks <Back>
- Closes
- Opens <Library Catalogue>
- Clicks <Search>
- <Advanced Search> opens as default
- Types <prinab k bardhan>
- Selects <Yes> for <words adjacent?>
- Clicks <Go>



- System yields no records
- Closes
- Opens <Library Catalogue>
- <Advanced Search> as default opens again
- Types <pranab k. bardhan>
- <Yes> for <words adjacent?>
- Clicks <Go>
- System yields no records
- Clicks <Search>
- <Advanced Search> opens as default
- Types <pranab k. bardhan> on 1st row with <all fields> selected
- Types <business resource premier> on 2nd row with <all fields> selected
- Clicks <Go>
- System yields no records
- Clicks <Back>
- Clicks on A/Z grid
- Highlights BSP
- Clicks EBSCOhost
- Finds title list with regards to journals
- Browses for <strategic management>
- Clicks <Browse>
- Clicks Title <Student BMJ
- Looks at details for this journal (NB *This is obviously irrelevant to this particular search*)
- Clicks <Systematic Biology> (*Again, this is a journal title*)
- Clicks <Back>
- Clicks <British Journal of addiction>
- Clicks <Back>
- Clicks <Library Catalogue>
- Selects <Search>
- <Advanced Search> as Default opens
- Types <Strategic planning for managers>
- Selects <All fields>
- Clicks <Go>
- System yields 4 records
- Checks availability status
- Attempt to place a request for the item although it is on the shelf
- Closes
- Opens <Library Catalogue>
- Again, <Advanced Search> as Default opens
- Types <economic systems of developed countries>
- Selects <All fields> and <Yes> for <Words adjacent?>
- Clicks <Go>
- System yields no result
- Clicks <Back>

- Retypes <economic> (*notices mistake*) to read <economic systems of developed countries>
- Clicks <Go>
- System yields no results
- Deletes search terms
- Types in 1st row <pranab k. bardhan>
- Clicks <Go>
- System yields no results
- Clicks <Back>
- Closes
- List of databases
- Opens BSP
- Selects <Standard Search>
- Types <journal articles dealing with strategic planning managers>
- Clicks <Go>
- System yields no results
- Refines search
- Types at <Publication>: <journal articles dealing with strategic planning managers>
- Clicks <Go>
- System yields no results
- Clicks at <Published date>: <Jul. Yr. <1999.....2002>
- Clicks <Go>
- System yields no results
- Closes and ends session



PARTICIPANT 11 EMS2

DURATION OF SEARCH: 15 MIN

- Opens <Library>
- Clicks <Electronic Resources>
- Clicks <Databases>
- Selects from A/Z grid
- Highlights BSP
- Opens EBSCOhost text
- Opens Internet Explore
- Clicks <Library Catalogue>
- Opens UWC OPAC
- Clicks <Search>
- <Advanced Search> as Default opens
- Selects <All fields>
- Types <strategic plannind>
- Clicks <Go>
- System yields no results

- Types <strategic> 1st row with <No> for <Words adjacent?>
- Types <planning> 2nd row with <No> for <Words adjacent?>
- Clicks <Go>
- Slow response from OPAC
- System yields 615 hits for <strategic> and 2050 hits for <planning>
- System yields 282 records for strategic planning (*in all fields*)
- Clicks and views some records
- Selects the title <strategic management: of resources and relationships: concepts>
- Closes
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <Electronic Resources>
- Opens <Library Catalogue>
- Opens UWC OPAC
- Clicks <Search>
- <Advanced Search> as Default opens
- Types <economic systems>
- Selects <all fields>
- Clicks <Go>
- System yields 83 records
- Views records
- Closes
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <Electronic Resources>
- Clicks on <Library Catalogue>
- Clicks <Search>
- <Advanced Search> as Default opens
- Types <Pranad k>
- Selects <author> field
- Clicks <Go>
- System yields no records
- Types <K pranad>
- Selects <Author> field
- Clicks <Go>
- System yields 2 records (*Interesting given that the author's last name is the access point*)
- Selects a record with the title <Social Justice in the global Economy>
- Reads the Bibliographic detail of the record
- Closes and ends session




PARTICIPANT 12 `

DURATION OF SEARCH: 60 MIN

- Opens Programs
- Opens Internet Explorer
- Opens <Electronic Resources>
- Clicks on <Databases>
- Clicks <A> on A/Z grid
- Highlights ASP
- Clicks <Back>
- Opens <Library Catalogue>
- Clicks <Back>
- Clicks <Subject Resources>
- Browses
- Clicks <Back>
- Opens <Library Catalogue>
- Clicks <Back>
- Closes
- Opens Internet Explorer
- Clicks <Library>
- Clicks <Back>
- List of Databases
- Clicks <Links>
- Clicks <Back> to <Electronic Journals>
- Highlights a few
- Clicks <Back>
- Clicks <Electronic Journals>
- Goes to <Trial databases>
- Clicks <Back>
- Clicks <Subject Resources>
- Clicks <Back>
- Clicks <General Information>
- Opens UWC OPAC>
- <Advanced Search> opens as Default
- Closes
- Types <Google> at address
- Opens Google
- Types <butterworhts>
- Opens <Google Search>
- System yields 182 records containing the term <Google>
- Clicks links <New Arrivals – Sep 2002>
- Closes
- Deletes UWC at domain address



- Types <google>
- Same results – 182 records containing the term <google>
- Clicks <Google search appliance (hardware)>
- System yields 14838 records
- Types <butterworths>
- System yields 10 records containing the term <butterworths>
- Clicks <library learning resources>
- Reads
- Types <butterworths nexis online>
- System yields no results
- Clicks <library learning resources> again
- Reads
- Deletes the URL
- Types <ww.ananzi.co.za>
- Types under Search: <butterworths>
- System yields 77 records
- Opens <Lexis-Nexis Butterworths>
- Clicks <Legal Citator>
- Browses
- Clicks <Judgments>
- Prompt from system for a password
- Clicks <Back>
- <No authorisation to view page> message displayed
- Clicks <South African legislation>
- Browses links to S A legal resources 
- Clicks <Acts Online>
- Clicks <Back>
- Clicks <Forward> to <Acts> online
- Browses
- Clicks <Back> to <Legislation>
- Browses
- Opens <Gazette Watch>
- Types <Labour>
- Clicks <Acts of Labour>
- Reads
- Closes
- Opens Programs
- Clicks Internet Explorer
- Opens UWC website
- Clicks on <Academic>
- Clicks on < Faculties and Departments>
- Clicks <Back>
- Opens UWC OPAC
- Clicks <Databases>
- Opens ASP
- Clicks EBSCOhost web

- Highlights ASP
- Types at Find: <euthanasia law>
- Selects <Standard search>
- Clicks <Search>
- System yields 220 records
- Reads
- Closes
- Clicks <Back>
- Opens UWC OPAC
- Clicks <Search>
- <Advanced Search> opens as Default
- Types <Fiona jane ogle>
- Selects <Author> field, <No> to <Adjacent words?>
- System yields no records
- Repeats the same search with <Yes> to <Words adjacent?>
- System yields no records
- Types <fiona>
- System yields no records
- Closes and ends session

PARTICIPANT 13 LAW2

DURATION OF SEARCH: 20 MIN



- Opens Programs
- Clicks Internet Explorer
- Clicks <Library>
- Clicks <Electronic Resources>
- Clicks <Databases>
- Clicks <Butterworths Lexis Nexis direct>
- Browses
- Clicks <Back>
- Clicks <Butterworths> again
- Highlights <Labour Law Library>
- Clicks <Browse>
- Closes and ends session

PARTICIPANT 14 LIS1

DURATION OF SEARCH: 25 MIN

- Opens <Programs>
- Opens WINSPIRS 4.01
- Highlights ERIC database
- Clicks OK
- Types <hiv and aids and south Africa>

- Clicks <Search>
- System yields 5 records
- Selects 3 records as relevant
- Closes
- Opens Internet Explorer
- Clicks <Electronic Resources>
- Closes
- Opens WINSPIRS 4.01
- Opens LISA
- Types <hiv and aids and south Africa>
- System yields 2 records
- Exits
- Opens Internet Explorer
- Clicks <Library>
- Opens UWC OPAC
- Clicks <Search>
- <Advanced Search> opens as Default
- Selects <Browse>
- Types <hiv and aids and south Africa>
- Selects <Title> field
- No matching result
- Selects <hiv and aids in Africa>
- Reads Bibliographic details
- Closes
- Opens Internet Explorer
- Clicks <Library>
- Clicks <Library Catalogue>
- Opens UWC OPAC
- Clicks <Search>
- <Advanced Search> opens as Default
- Indecision from participant
- Clicks <Browse>
- Types <leornarmontague harrod>
- Selects <Author> field
- No matching result
- Clicks <Previous page>
- Retypes <Leonard montague harrod>
- Clicks <Go>
- Selects a record <Mcfarland, G K> (*irrelevant to the search*)
- Closes and ends session



PARTICIPANT 15 LIS2

DURATION OF SEARCH: 35 MIN

- Opens Programs
- Opens WINSPIRS 4.01
- Opens ERIC
- Types <disadvantages and the student and south africa>
- Clicks <Search>
- System yields no records
- Types <HIGHER EDUCATION FOR DISADVANTAGED STUDENT AND SUOTH AFRICA>
- Clicks <Search>
- System yields no records
- Types <EDUCATION DIS AND ADVANTAGES AND STUDENT AND SOUTH AFRICA>
- System yields no records
- Types <STUDENT AND SOUTH AFRICA>
- Clicks <Search>
- System yields 268 records
- Exits
- Clicks <Programs>
- Opens WINSPIRS 4.01
- Highlights Library and Information Science Abstracts (LISA)
- Types <ORIGIN AND INFORMATION SCIENCE>
- Clicks <Search>
- System yields 107 records
- Highlights some of the records
- Exits
- Opens Internet Explorer
- Clicks <Databases>
- Opens INFOTRAC
- Clicks <UWC Custom Database>
- Types <THOERIES AND INFORMATION SCIENCE>
- No matching citations found
- Clicks <Back>
- Reopens <UWC Custom Database>
- Types <JOURNAL ARCTICLE DEALING WITH THE OROIGIN AND INFORMATION SCIENCE>
- Clicks <Search>
- System yields a list of Journals (*This is clearly based on the 1st term <Journal>*)
- Closes
- Opens Internet Explorer



- Clicks on <Library Catalogue>
- Opens UWC OPAC
- Clicks <Browse>
- Types <HARROD L M>
- Selects <Title> field
- Clicks <Go>
- Finds a match < Harrod's Librarians' glossary...>
- Clicks on the record
- Views full view of the record
- Clicks <Browse> again
- Types <HARROD LEONARD MONTAGUE>
- Selects <Author> field
- Clicks <Go>
- System yields 7 records
- Clicks on one of the records with title <Harrod's Librarians' glossary...>
- Closes and ends session

PARTICIPANT 16 LIS3

DURATION OF SEARCH: 30 MIN

- Opens <Programs>
- Opens WINSPIRS 4.01
- Highlights ERIC
- Clicks OK
- Types <Higher education for disadvantaged students in South Africa>
- Clicks <Search>
- The **In** operator displayed as being invalid
- Clicks <Search> again
- The same message is displayed
- Clicks on <Help>
- Persists in searching with the same terms
- The same message is displayed
- Cancels and exits
- Opens <Programs>
- Opens WINSPIRS 4.01
- Opens LISA
- Types <Journal articles dealing with the origin of Information Science>
- System yields no records
- Clicks OK
- Exits
- Opens Internet Explorer
- Clicks on <Library>
- Clicks <Electronic Resources>
- Clicks <Databases>
- Clicks <I> and opens INFOTRAC database



- Slow response
- Clicks <UWC Custom Database>Types <Journal articles dealing with theories of information retrieval research>
- Clicks <Search>
- System yields a list of subjects with the first term <Journal>
- Exits
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <UWC OPAC>
- Clicks <Go>
- <Advanced Search> opens as Default
- Types <Harrod, Leonard Montague>
- Selects <Author> field
- Clicks <Go>
- System yields no records
- Closes
- Clicks on <Library>
- Clicks on <Library Catalogue>
- Opens UWC OPAC
- Clicks on <Browse>
- Types <Harrod, Leonard ontague>
- Selects <Author> field
- System yields 7 matches
- Clicks and finds 7 records
- Highlights the record <Harrod's Librarians' glossary...>
- Views bibliographical detail of record
- Closes and ends session



PARTICIPANT 17 LIS4

DURATION OF SEARCH: 30 MIN

- Opens <Programs>
- Opens Internet Explorer
- Clicks <Start>
- Clicks <Programs>
- Opens WINSPIRS 4.01
- Highlights ERIC
- Opens ERIC
- Clicks OK
- Types <higher education for disadvantaged students in South Africa>
- Clicks <Search>
- The **In** operator displayed as being invalid
- Types <higher education students for disadvantaged>
- Clicks <Search>
- System yields no records

- The system prompts the searcher to check for spelling
- Clicks search term #1 <higher> which yields 89805 records
- Moves mouse to other terms
- Types <students in South Africa>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- Deletes search terms
- Types <education for disadvantaged in S.A>
- Clicks <Search>
- Again, the **In** operator displayed as being invalid
- SEARCH TERMS
- Clears search history
- Types <LISA>
- Clicks <Search>
- System yields 1360 records
- Retypes <journal iformation science>
- Clicks <Search>
- System prompts the searcher to check for spelling
- Types <ARTICLES WITH INFORMATION SCIENCE>
- Clicks <Search>
- System yields 63 records
- Browses records
- Types <Internet Explorer>
- Clicks <Search>
- System yields 12 records
- Clears search terms
- Clears search history
- Types <EBSCOHOST, EMERALD>
- Clicks OK
- Clears search terms
- Clicks <Help>
- Reads under <Clear History>
- Exits WINSPIRS 4.01
- Clicks <Programs>
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <Electronic Resources>
- Clicks <Electronic Journals>
- Clicks on <I> on A/Z grid
- Browses in <I> electronic journals
- Closes
- Opens <Swetswise publication issue list>
- Closes
- Browses journal list again
- Opens Internet Explorer
- Clicks on <Library Catalogue>



- Browses A/Z index
- Selects <Author> index
- Types <HARROD, L M>
- Clicks <Search>
- Finds 7 entries
- Highlights the record <Harrod's Librarians' glossary...>
- Closes and ends session

PARTICIPANT 18 SC1

DURATION OF SEARCH: 20 MIN

- Clicks <Start>
- Opens <Programs>
- Opens <Wincam> and cancels
- Opens <Programs>
- Opens Internet Explorer
- Clicks on <Electronic Resources>
- Clicks on <Databases>
- Clicks <M>
- Opens MEDLINE (EBSCOweb)
- Clicks EBSCOhost
- Clicks MEDLINE
- Types under Find: <incidence of hiv/aids among white people>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Opens ASP
- Closes
- Opens Google
- Types <Emerald>
- System yields
- Types <Emerald fulltext>
- Reads information about Emerald
- Opens BSP
- Clicks EBSCOhost web
- Back to Google
- Types <Ebscohost>
- Google search
- System yields 132000 sites
- Clicks <Back>
- Types under Google <journal articles dealing with Euclidean geometry>
- Clicks on a hyperlink
- Closes
- Back to list of databases



- Closes
- Clicks on <Programs>
- Opens Internet Explorer
- Selects Google
- Closes and ends session

PARTICIPANT 19 SC2

DURATION OF SEARCH: 15 MIN

- Opens Internet Explorer
- Clicks on <Library>
- Clicks <Document Delivery Services>
- Clicks <Databases>
- Clicks <M> on A/Z grid
- Clicks on MEDLINE database
- Clicks on EBSCOhost web
- Very slow response
- Closes and ends session



PARTICIPANT 20 SC3

DURATION OF SEARCH: 55 MIN

- Opens <Programs>
- Opens Internet Explorer
- Clicks on <Databases>
- Clicks <M> on A/Z grid
- Clicks on MEDLINE database
- Clicks on EBSCOhost web
- Clicks on <Bibliographic and Fulltext Databases>
- Closes
- Clicks <M>
- Clicks on MEDLINE (Ebscomed)
- Back to <Main Library>
- Clicks <Technical Support>
- Back to <Bibliographic and Fulltext Databases>
- Back to <EBSCO Publishing>
- Opens <EIFL DIRECT (Electronic Information for Libraries)>
- Closes
- Back to EBSCO Publishing
- Closes
- List of Databases

- Back to EIFL Direct
- Closes
- Opens Internet Explorer
- Opens <Electronic Resources>
- Clicks <M>
- Clicks on MEDLINE (Pubmed)
- Closes
- Clicks <A>
- Clicks ASP
- Slow response
- EBSCO Publishing page opens
- Clicks
- Slow response
- List of Databases
- Clicks on ASP
- Opens MEDLINE
- Types at Find: <AIDS / HIV in South Africa>
- Clicks <Search>
- System yields no records
- Retypes <AIDS>
- System yields 98667 records
- Selects a record with the title <HIV and AIDS related stigma and discrimination>
- Types <AIDS and South Africa>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Clicks <Programs>
- Opens Internet Explorer
- Clicks <Electronic Resources>
- Clicks <Databases>
- Clicks <A> on A/Z grid
- Clicks ASP
- Clicks EBSCOhost web
- List of Databases
- Opens ASP
- Types <Inorganic Chemistry> in <Title> field
- Selects Publication type
- Clicks <Search>
- System yields 57 records
- Closes
- Opens Internet Explorer
- Clicks on <Library>
- Clicks on <Electronic Databases>
- Clicks <S> on A/Z grid
- Opens SCIENCE DIRECT database
- Under <search for a journal title> types <Euclidean geometry>



- Clicks <Go>
- No matching journal titles
- Retypes <geometry>
- 3 Journal titles found (*Not relevant*)
- Clicks <Back>
- Types <Euclidian>
- Clicks <Go>
- No matching journal titles
- Selects <Quick Search>
- Clicks <Back>
- List of databases
- Opens <Programs>
- Opens Internet Explorer
- Opens <Library>
- Opens <Electronic Resources>
- Clicks <Databases>
- Clicks <Trial databases>
- Clicks <Back>
- Clicks <N> on A/Z grid
- Clicks <Back>
- Clicks <Library Catalogue>
- Browses A/Z index
- Types word/phrase: <George B. Arfken>
- Selects <Author> index
- Clicks <Go>
- No matching result
- Clicks the entry <George Brown>
- Closes and ends session



APPENDIX Z

PENTECH: TRANSACTION LOGS

PARTICIPANT 1 BIOMED 1

DURATION OF SEARCH: 1 HOUR

- Clicks Ebscohost
- Moves Mouse to MEDLINE
- Nothing
- Clicks < More Information>
- Reads the instructions in the Database, eg. Boolean operators, Searchable fields, Definition of fields
- Reads Mesh terms
- Pages up
- Clicks <Back> on MEDLINE page
- Back at previous stages
- Clicks <Search> on EBSCOhost page
- Clicks <Back> again
- Clicks MEDLINE
- Moves Mouse to < More information>
- Gives up and clicks Peninsula Technikon link on page
- Searches the toolbar
- Clicks < Search> on ALEPH menu toolbar
- Clicks <Back>
- Maximises and exits
- Clicks EBSCOhost
- Clicks MEDLINE
- Moves Mouse to Academic Search Premier (ASP)
- Highlights without clicking
- Moves Mouse to <More information> under ASP
- Clicks <Help> under ASP
- Moves Mouse to <Searching Tips> and clicks
- Moves Mouse and reads under <Boolean operators>
- Pages down
- Pages up and closes
- Opens again and pages down
- Pages up to ASP
- Highlights <Basic Search>
- Highlights <Advanced Search>
- Moves Mouse and highlights <Advanced Search> again
- Clicks <Back>
- Clicks <Back> again

- Closes the page
- Clicks EBSCOhost
- Clicks ERIC
- Clicks <Search> on EBSCOhost toolbar
- Types <journalarticle article <dealing with < h, edua>
- Deletes <a> from <edua>
- Types <education for disadvantaged students>
- Clicks <Search>
- Autocomplete dialog box pops up
- Moves Mouse to <Yes> ...Pauses
- Clicks <No>
- Moves Back to List of databases
- Checks <Help> in using databases
- Clicks <Search Tips>
- Pages up
- Clicks <Back>
- Gets <No Results> message
- Clicks on ASP
- Closes
- Opens PENTECH's library page
- Clicks <Basic Search> on PENTECH's OPAC
- Types <c.c> but deletes again
- Types <fundamentals of microbiology> Selects <all fields>
- Finds 5 records
- Closes and ends session



PARTICIPANT 2 BMAN2ND1

DURATION OF SEARCH: 50 MIN

- Moves Mouse to EBSCOhost and highlights
- Clicks MEDLINE
- Clicks <Back>
- Highlights Business Source Premier (BSP)
- Opens BSP
- Types <Management techniques and small business>
- Clicks <Search>
- System yields 15 records – Reads
- Clicks a record <First class coach>
- Reads through the record
- Clicks <Back> to List of Databases
- Clicks ASP database
- Types under Find: <Human resource management and higher education>
- Clicks <Search>
- System yields 4 records

- Reads abstracts
- Clicks a record <Smart moves pay off>
- Reads
- Clicks <Back>
- Clicks ERIC
- Types under Find: <Ar> - Deletes
- Types <Articles dealing with higher education and disadvantage students>
- Clicks <Search>
- System yields no records
- Moves Mouse to <Limit your results> dialog box
- Retypes <journal> - backspaces
- Retypes <Journal articles and higher education and disadvantage students>
- Clicks <Search>
- System yields no records
- Clears search terms
- Clicks <Back>
- Types <Journal articles and higher education and disadvantage students>
- Clicks <Search>
- No results
- Clicks <Back>
- Types <Higher education and disadvantage students>
- Clicks <Search>
- System yields 1 record
- Clicks on title <Assessing change after a computer course for At – Risk students>
(This article deals with disadvantages that students face)
- Reads through descriptors on page
- Clicks <Back> and <Back> again
- Closes
- Opens PENTECH's library page
- Closes and opens ALEPH page
- Clicks on <Peninsula Technikon>
- Clicks <Search>
- <Basic search> opens as default
- Types <Operation management>
- Selects <author> field
- Clicks <go>
- System yields no records
- Moves Mouse and closes
- Deletes search terms
- Types <OPERATIONS>
- Deletes and retypes <operation and management>
- Selects <subject> field
- Clicks <go>
- System yields no records
- Clicks <Back>
- Types <Production operational management>

- Selects <author> field
- Clicks <go>
- System yields no records
- Closes
- Deletes search terms
- Types <Marketing>
- Selects <author> field
- Clicks <go>
- System yields 36 records
- Browses through records
- Highlights a record and clicks
- Finds bibliographic details of record
- Reads
- Clicks <Back>
- Closes and ends session

PARTICIPANT 3 BMAN2ND2

DURATION OF SEARCH: 15 MIN

- Clicks EBSCOhost
- Clicks BSP
- Types <management techniques small business>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Clicks <Clear>
- Types <management for small business>
- Clicks <Search>
- System yields no records
- Clicks <Clear>
- Types <art> - Deletes
- Retypes <articles for> - Deletes
- Retypes <articles about management for small business>
- Clicks <Search>
- System yields no records
- Closes
- Opens ALEPH
- Clicks <Search>
- <Basic search> opens as default
- Starts typing then stops and clicks <Back>
- Clicks EBSCOhost
- Clicks BSP
- Clicks <Back>
- Clicks ASP



- Types <human resource management in higher education>
- Clicks <Search>
- System yields no records
- Clicks <Reset>
- Types <human resource management aerticles>
- Clicks <Search>
- System yields no records
- Clicks <Search Tips>
- Clicks <Support>
- Arrives at PENTECH's page for <Support>
- Clicks <Back>
- List of databases
- Clicks ERIC
- Types <di> - Deletes
- Types <higher education for disadvantaged student for higher education>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Types <articles for disadvantage student in higher education>
- Clicks <Search>
- System yields no records
- Checks <Search Tips> e.g. Boolean, Wildcard (?), Truncation (*)
- Clears search terms
- Clicks <Back>
- Reads
- Returns to PENTECH's page
- Closes and returns to EBSCOhost
- Returns to PENTECH OPAC
- Moves Mouse about
- Types <principles of management>
- Selects <title> field
- Pauses
- Closes and ends session



PARTICIPANT 4 BMAN3RD1

DURATION OF SEARCH: 1 HOUR & 10 MIN

- Opens EBSCOhost
- Clicks Business Source Elite (BSE)
- Types <Management techniques and Small Business>
- Clicks <Search>
- System yields 10 records
- Pages down
- Moves Mouse around and views all 10 records
- Reads record #10
- Clicks <Back> and <Back> again
- List of databases
- Clicks Academic Search Elite (ASE)
- Types <Human Resource Management and High Education>
- Clicks <Search>
- System yields no records
- Clears search terms
- Types <Human resource and High education>
- Clicks <Search>
- System yields no records
- Clicks <hints>
- Clicks <Search Tips>
- Closes
- Clicks <Back>
- Types <Resource human and education>
- System yields 2 records
- Clicks <Back>
- Cuts search term <human>
- Pastes <human> in front of <Resource>
- Clicks <Search>
- System yields 447 records
- Browses
- Goes back and stops at record 50
- Retypes <resource and management and high education>
- Clicks <Search>
- System yields no records
- Cuts the search term <management>
- Pastes <management> after <education>
- Clicks <Search>
- System yields no records
- Cuts the search term <management>
- Clicks <Search Tips>
- Reads <Basic Search Tips>



- Clicks <All words>
- Clicks <Back>
- Types <Resources> then <Recources>
- Retypes <Human Resource and High education>
- Clicks <Search>
- System yields no records
- Deletes search term <high education>
- Types <...management and education> to read <Human resource and management and education>
- System yields 94 records
- Retypes <higher education>
- Clicks <Search>
- System yields 9 records
- P. reads through
- Moves Mouse around record 3
- Clicks <Back>
- Clicks <Forward>
- Searches list of databases
- Highlights ERIC database
- Opens ERIC database
- Types <Articles and higher education and disadvantaged students>
- Clicks <Search>
- System yields 6 records
- Selects record #6 <Teaching and learning strategies...>
- Clicks <Back> to list of databases
- Closes
- Opens PENTECH library catalogue
- Clicks <Search>
- <Basic search> opens as default
- Types <management>
- Selects <subject> field
- Clicks <Search>
- System yields 23 records
- Selects record #10 <Leader to leader...>
- Closes
- Opens PENTECH library catalogue
- Types <management>
- Selects <all fields>
- Clicks <Search>
- System yields 2064 records
- Clears the search term <management>
- Types <Business management>
- Selects <title> field
- Clicks <Search>
- System yields 146 records
- Clicks record #4 <Business management>



- Closes and ends session

PARTICIPANT 5 BTECHMARK1

DURATION OF SEARCH: 20 MIN

- Clicks EBSCOhost
- Selects list of databases
- Highlights BSP
- Highlights ASP
- Clicks continue (Both databases have been selected)
- Types <marketing strategies students>
- Clicks <Search>
- Systems yield no records
- Clicks <Back>
- Deletes the search term <students>
- Clicks <Search>
- Systems yield 23014 records
- Selects a record <Functions and responsibilities of marketing...>
- Clicks <Back>
- Opens PENTECH library page
- Closes
- Clicks <Back>
- Highlights ERIC database (NB – ASP and BSP still highlighted)
- Reads Limiters
- Types in Journal field: <higher education>
- Types under find: <diaavantage ste> - Deletes <ste>
- Types <students> - Deletes <diaavantage>
- Types <disavantage>
- Highlights all the search terms and cuts
- Pastes under Find:
- Clicks <Search>
- Systems yield no records
- Deletes all the search terms except <higher education>
- Clicks <Search>
- Systems yield 246300 records (NB, ASP, BSP and ERIC)
- Selects a record <Development of a teacher candidate Performance...>
- Reads bibliographic detail of the record
- Closes
- Clicks <Back> to open the ALEPH page
- Selects PENTECH's OPAC
- Types <international marketing>
- Selects <author> field
- Selects <Yes> to <Words adjacent> function
- System yields no records
- Clears all the search terms
- Retypes <strategic management>

- Selects <author> field
- Clicks <Search>
- System yields no records
- Closes <results> box
- Selects <title> field
- System yields 59 records
- Closes and ends session

PARTICIPANT 6 BTECHMARK2

DURATION OF SEARCH: 20 MIN

- Clicks EBSCOhost
- Highlights ASE
- Highlights BSE and opens
- Types <marketing strategies and students>
- Clicks <Search>
- System yields 66 records (NB, BSE yielded these)
- Clicks ASE
- Types <marketing and south African clothing industry>
- Clicks <Search>
- System yields no records
- Deletes <south African>
- Clicks <Search>
- System yields 112 records
- Deletes <clothing industry>
- Adds <South Africa> to read <marketing and South Africa>
- Clicks <Search>
- System yields 68 records
- Clicks <Back>
- List of databases
- Clicks on ERIC database
- Types <higher education and diaadvantaged students>
- System yields no records
- Deletes <diaadvantaged>
- Types <disadvantaged> to read <higher education and disadvantaged students>
- Clicks <Search>
- System yields 460 records
- Clicks <Back>
- Opens PENTECH's library catalogue
- <Basic search> opens as default
- Selects <all fields>
- Types <marketing>
- Clicks <Search>
- System yields 530 records



- Closes and ends session

PARTICIPANT 7 BTECHMECHENG1

DURATION OF SEARCH: 20 MIN

- Clicks EBSCOhost
- Tries EBSCOHOST Publishing
- Closes
- Clicks <Back>
- Clicks EBSCOhost
- Highlights ASE
- Clicks ASE
- Types <Mechanical Endginnering>
- Clicks <Search>
- System yields no records
- Retypes <Mechanical Engineerings>
- Clicks <Search>
- System yields 1 record
- Opens record
- Clicks Internet Explore
- Clicks <Back>
- Deletes search terms
- Types <Motor industry>
- Clicks <Search>
- System yields 129 records
- Retypes <Mechanical Endginnering>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- List of databases
- Clicks <Back>
- Clicks EBSCOhost
- Clicks <Back>
- Closes
- Opens PENTECH's library catalogue
- Types <strength of materials>
- Selects <all fields>
- Clicks <Search>
- System yields 36 records
- Clicks record #2 < Drotsky, Johannes Godfried>
- Closes and ends session



PARTICIPANT 8 BTECHRBR1

DURATION OF SEARCH: 20 MIN

- Clicks EBSCOhost
- Opens BSP
- Types <ARTICLES ABOUT TRADE INDUSTRY>
- Clicks <Search>
- System yields no records
- Clicks <Clear>
- Types <Articles about tthe clothing industry in South Africa>
- Clicks <Full text>
- Clicks <Search>
- System yields no records
- Clicks under Publication type: <Periodical>
- Clicks <Search>
- System yields no records
- Deletes the <t> from <tthe>
- Clicks <Search> again
- System yields no records
- Reads instructions as prompted by the system
- Adds <?>
- System yields no records
- Deletes <?>
- Types <Articles that have information about the clothing industry in South Africa>
- Clicks <Search>
- System yields no records
- Highlights <Periodical>
- Highlights <Newspaper>
- Clicks <Search>
- System yields no records
- Clears all the search terms
- Types <Articles about Trade Industry>
- Clicks <Back>
- Clicks ERIC database
- Types <Looking to Journal articles dealing with higher education for disadvantaged students>
- Highlights <Full text>
- Clicks <Search>
- System yields no records
- Clicks <Search> again
- System yields no records
- Highlights <Journal articles>
- Clicks <Search>



- System yields no records
- Clears all the search terms
- Types <What is the the disadvantage for> - Deletes
- Types <Which are the articles that deals about higher education for disadvantaged student?>
- Clicks <Search>
- System yields no records
- Closes
- Clicks <Back>
- Clicks EBSCOhost
- Clicks <Back>
- Closes
- Clicks PENTECH'S Library page
- Clicks <Gateways to...>
- Tries to login student number
- System displays an error message (Particular gateway only for staff)
- Tries last name
- Again, the system displays an error message
- Closes
- Opens ALEPH page
- Clicks on Penininsula Technikon
- Clicks on Database
- Back to previous page
- Clicks on PENTECH's library catalogue
- Clicks <Search>
- Selects Field - Author - Barcode
- Clicks <go>
- Error message displayed
- Selects <subject> field
- Clicks <Yes> for <Adjacent words> function
- Clicks <go>
- Error message displayed
- Selects <author > field
- Selects <Basic search>
- Types <Authers of Retail Business Management>
- Clicks <Search>.
- System yields no records
- Checks and retypes <W – Authers (Retail)>
- Clicks <go>
- Error displayed
- Selects <Yes> for <Words adjacent> function
- Closes and ends session



PARTICIPANT 9 CHEMENG1

DURATION OF SEARCH: 20 MIN

- Clicks EBSCOhost
- Opens ASP
- Types <Articles about chemical Engineering for South African students>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Highlights <Full text>
- Clicks <Search>
- System yields no records
- Removes <Full text>
- Highlights <Peer Reviewed>
- Types under Journal: <Articles about chemical Engineering For South African Students>
- Clicks <Search>
- System yields no records
- Clears all the search terms
- Types <Articles dealing with the Chemical Engineering Industry in South Africa>
- Clicks <Search>
- System yields no records
- Highlights <Full text>
- Clicks <Search>
- System yields no records
- Highlights <Periodical>
- Deletes the phrase <Articles dealing with> for the search to read <Chemical Engineering Industry in South Africa>
- Clicks <Search>
- Clicks <Back>
- Opens ERIC database
- Types <Journal Articles dealing with higher education for disadvantaged students>
- Clicks <Search>
- System yields no records
- Highlights <Full text>
- Cuts the whole phrase used as search strategy and pastes under Journal
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Closes
- Opens PENTECH's OPAC
- Selects <Basic Search>
- Selects <All fields>



- Types <Fundamentals of heat and mass transfer>
- Opens <Aleph Services>
- Clicks <Back>
- Closes and ends session

PARTICIPANT 10 CHEMENG2

DURATION OF SEARCH: 30 MIN

- Opens EBSCOhost
- Opens ASP
- Types <hiv and aids in south Africa>
- Clears the search terms
- Types <chemical engineering for south African students>
- Clicks <Search>
- System yields no records
- Types <articles about chemical engineering for south African students>
- Clicks <Search>
- System yields no records
- Clears the search terms
- Types <stunts>
- Deletes <stunts>
- Types <articles about chemical engineering for south African students>
- Clicks <Search>
- System yields no records
- Clears the search terms
- Types <south African chemical engineering students>
- Clicks <Search>
- System yields no records
- Clears the search terms
- Types <Chemical engineering in south Africa>
- Clicks <Search>
- System yields no records
- Inserts <students> between <engineering> and <in>
- Clicks <Search>
- System yields no records
- Deletes <in> and types <and>
- Clicks <Search>
- System yields 2 records
- Clears search terms
- Types <chemical engineering industry and south African>
- Clicks <Search>
- System yields no records
- Deletes <and> to read <chemical engineering industry south African>
- Cuts <chemical engineering> to read <industry south African>



- Pastes after <south African> to read <industry south African chemical engineering>
- Cuts <industry> and pastes after <engineering> to read <south African chemical engineering industry>
- Cuts <south African> and pastes after <engineering> to read <chemical engineering south African industry>
- Adds <and> between <south African> and <industry> to read <chemical engineering south African and industry>
- Clicks <Search>
- System yields no records
- Cuts <south African> and pastes before <chemical engineering> to read <south African chemical engineering and industry>
- Adds <and> after <African> to read < south African and chemical engineering and industry>
- Clicks <Search>
- System yields no records
- Deletes <and>
- Deletes <industry>
- Types <industries> to read <south African chemical engineering industries>
- Clicks <Search>
- System yields no records
- Cuts <south African> and pastes after <industries> adding <in>
- Reads <chemical engineering industries in south Africa>
- Clicks <Search>
- System yields no records
- Deletes <in> and replaces with <and>
- Reads <chemical engineering industries and south Africa>
- Clicks <Search>
- System yields no records
- Closes
- Opens PENTECH page
- Clicks on Peninsula Technikon
- Clicks <Search>
- Selects <Basic Search>
- Types <Coulson and Richardson>
- Selects <author> field
- Clicks <go>
- System yields records
- Clicks the title <Coulson and Richardson's...>
- Clicks <Back>
- Closes
- Clicks <Back> again
- Finds ASP
- Deletes <and> in previous search
- Highlights <Search> but then aborts
- Clicks <Google.com>

- Enters network password
- Types <South African chemical engineering industry>
- Clicks <Google Search>
- Results 43900 records
- Browses a few
- Clicks <Chemical engineering – Publications>
- Opens a list of <Recent Publications >
- Browses
- Clicks on <UCT Department of Engineering>
- Clicks <Back>
- Clicks <2nd page>
- Closes and ends session

PARTICIPANT 11 ELECENG1

DURATION OF SEARCH: 30 MIN

- Opens EBSCOhost
- Opens ASE
- Types <articles and electrical engineering and south African students>
- Clicks <Search>
- System yields no records
- Deletes search terms
- Types <electrical engineering and south African students>
- Clicks <Search>
- System yields no records
- Deletes <...ineering> to read <electrical eng and south African students>
- Clicks <Search>
- System yields no records
- Clears search terms
- Types <Electrical engineering and south Africa>
- Clicks <Search>
- System yields 1 record
- Clicks title <Europe / Africa...>
- Clicks <Back>
- Deletes <Africa> in search terms
- Types < southafrican students>
- Clicks <Search>
- System yields no records
- Deletes <students>
- Types <learners> to read < southafrican learners>
- Clicks <Search>
- System yields no records
- Puts space between <south> and <African>
- Deletes <learners>
- Retypes <students> to read <south African students>



- Clicks <Search>
- System yields no records
- Types <electrical engineering and south african and students>
- Clicks <Search>
- System yields no records
- Types <engineering and south african and students>
- Clicks <Search>
- System yields 4 records
- Clicks 1st record <Education and Communication>
- Clicks on the abstract to view the publication details of record
- Closes
- Clicks <Back>
- Clicks <Forward arrow>
- Opens Pentech page
- Selects <Basic Search>
- Types <electrical engineering>
- Selects <subject field>
- Clicks <Go>
- System yields no records
- Clears search terms
- Types <digital systems>
- Selects <subject> field
- Types <engineering>
- System yields 85 records
- Selects a record <Adonis, Marcus Leroy> with title <An investigation and design...>
- Clicks <Back>
- Closes
- Clicks Pentech Library Catalogue
- Finds <Basic Search>
- Types <electronics>
- Selects <Subject> field
- Clicks <Go>
- System yields no records
- Types <ericsson>
- Clicks <Go>
- System yields no records
- Types <electrical engineering>
- Clicks <Go>
- System yields no records
- Types <electrical machines>
- Selects <subject> field
- Clicks <Go>
- System yields 1 record
- Reads the title <The customer – centered enterprise...>
- Closes



- Opens Pentech Library Catalogue
- Types <electrical machines>
- Clicks <Go>
- System yields no records
- Closes and ends session

PARTICIPANT 12 ENVHEALTH1

DURATION OF SEARCH: 15 MIN

- Clicks EBSCOhost
- Opens Health Source: Consumer edition
- Types <incidence of HIV/AIDS and South Africa>
- Clicks <Search>
- System yields 1 record
- Deletes </AIDS> to read <incidence of HIV and South Africa>
- Clicks <Search>
- System yields 2 records
- Deletes <incidence of> to read <HIV and South Africa>
- Clicks <Search>
- System yields 52 records
- Clicks <Back>
- Finds list of databases
- Opens ERIC database
- Types <SARS VIRUS>
- Clicks <Search>
- System yields no records
- Types <dealing with SARS virus>
- Deletes <virus> to read <dealing with SARS>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- List of databases
- Opens Health Source: Consumer edition
- Types <dealing with SARS virus>
- Pauses
- Clicks <Search>
- System yields no records
- Clicks <Back>
- List of databases
- Opens ERIC database
- Clicks <Back>
- Opens Pentech page
- Clicks <Search>
- Selects <Basic Search>
- Selects <all fields>



- Types <science>
- Selects <subject> field
- No words adjacent
- Clicks <Search>
- System yields 7 records
- Selects a record <Howie, Sarah> with title <Mathematics and science literacy...>
- Closes and ends session

PARTICIPANT 13 INTAUD2ND1

DURATION OF SEARCH: 25 MIN

- Opens EBSCOhost
- Opens BSE
- Types <internal auditing principles>
- Clicks <Search>
- System yields 2 records
- Clicks <refine search>
- Adds <article +> to read <article + internal auditing principles>
- Clicks <Search>
- System yields no records
- Deletes <article +>
- Clicks <Back>
- Selects record #2 with title <Swedish Public Authorities to follow IIA standards>
- Clicks <Back>
- Clicks ASE
- Opens ASE
- Types <internal auditing of high\er education institutions> - deletes \
- Clicks <Search>
- System yields no records
- Adds <+> between <auditing> and <higher> to read <internal auditing + higher education institutions>
- Clicks <Search>
- System yields no records
- Deletes <institutions>
- Clicks <Search>
- System yields no records
- Retains search term <internal auditing> - Deletes the rest
- Clicks <Search>
- System yields 23 records
- Clicks <Back>
- List of databases
- Highlights ERIC database
- Opens ERIC
- Types <Journals + higher education + disadvantaged students>
- Clicks <Search>



- System yields no records
- Deletes <Journals +> and <+>. Adds <and> to read <higher education and disadvantaged students>
- Clicks <Search>
- System yields 460 records
- Clicks on record with the title <Bridging gaps...>
- Clicks <Back>
- Closes
- Opens PENTECH OPAC
- Selects <Basic Search>
- Types <author + internal auditing>
- Deletes <+> to read <author internal auditing>
- Selects <author> field
- Clicks <Search>
- System yields no records
- Clicks <authors>
- Selects a record with the title <Standards for professional practice...>
- Closes and ends session

PARTICIPANT 14 MARK3RD1

DURATION OF SEARCH: 25 MIN



- Opens EBSCOhost
- Clicks BSP
- Types <marketing students and students>
- Deletes <students and students> to read <marketing>
- Adds <strategies and students> to read <marketing strategies and students>
- Clicks <Search>
- System yields 78 records
- Reads a record with the title <The brand called U>
- Clicks <Back>
- Opens ASP
- Types <South African clothing industry and marketing>
- Clicks <Search>
- System yields no records
- Clears search terms and types <marketing and South African clothing industry>
- Clicks <Search>
- System yields no records
- Adds <and> between <South African> and <clothing industry> to read <marketing and South African and clothing industry>
- Clicks <Search>
- System yields no records
- Deletes <n> from <African>
- Clicks <Search>

- System yields no records
- Adds <design> to read <
- System yields 3 records
- Clicks <Back>
- Clears search terms
- Opens ERIC database
- Types <higher education and disadvantaged students>
- Clicks <Search>
- System yields 1 record
- Clicks <Back>
- Closes
- Opens PENTECH OPAC
- Selects <Basic Search>
- Types <Marketing>
- Selects <subject> field
- Clicks <Search>
- System yields 2 records
- Clicks <Back>
- Closes and ends session

PARTICIPANT 15 MECHENG1



DURATION OF SEARCH: 35 MIN

- Opens EBSCOhost
- Opens ASP
- Types <MECHANICAL ENGINEERING AND SOUTH AFRICA>
- Clicks <Search>
- System yields 2 records
- Closes
- Opens EBSCOhost
- Selects ASP
- Clicks <Continue>
- Types <MOTOR INDUSTRY AND USA>
- Clicks <Search>
- System yields no records
- Adds <ENG> but deletes again
- Adds <ENGINEERING> to read <MOTOR INDUSTRY AND USA ENGINEERING>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- List of databases
- Clicks <continue> for ASP

- Types <MOTOR INDUSTRY ENGINEERING AND USA>
- Clicks <Search>
- System yields no records
- Clicks <hints>
- Reads <Improving Search Results Tip>
- Closes <hints>
- Highlights the search terms
- Deletes all
- Types <USA AND MOTOR INDUSTRY ENGINEERING>
- Clicks <Search>
- System yields no records
- Clears all the search terms
- Clicks <Back>
- List of databases
- Opens ERIC database
- Clicks <More information>
- Clicks <Definition of fields>
- Clicks <Back>
- List of databases
- Clicks <More information>
- Clicks <Definition of fields>
- Clicks <Back>
- Opens EBSCOhost
- Clicks <Gateways to restricted databases>
- Clicks <Students>
- Types student number
- Login failed message displayed
- Tries again typing student number
- Types password
- Login failed message displayed again
- Closes
- Clicks <Back>
- List of databases
- Opens ASP
- Types <MECH ENGINEERING MOTOR INDUSTRY AND USA>
- Clicks <Search>
- System yields no records
- Deletes <MECH> and types <MECHANICAL> to read <MECHANICAL ENGINEERING MOTOR INDUSTRY AND USA>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Opens GOOGLE search engine
- Types <MOTOR INDUSTRY ENGINEERING AND USA>



- Clicks <Google Search>
- System yields no records * CHECK AGAIN
- Clicks a hyperlink <IHS Global>
- Types <MOTOR INDUSTRY...>
- Selects United States (The Website deals with Global engineering)
- Clicks <Search>
- No hits are recorded
- Browses countries again
- Selects <United States minor outlying islands>
- Clicks <Search>
- No hits are recorded
- Clicks other links
- Closes
- Clicks ERIC
- Clicks <More information>
- Clicks Peninsula Technikon on desktop
- Clicks <Gateways to restricted databases>
- Enters student number
- Fails to login to system
- Clicks <Student publications>
- Clicks PENTECH home page
- Scrolls Faculty of Engineering departments and browses
- Clicks <Library link>
- Clicks <Back>
- Closes and ends session



PARTICIPANT 16 MECHENG2

DURATION OF SEARCH: 10 MIN

- Opens EBSCOhost
- Opens ASP
- Types <mechanical engineering and south Africa>
- Clicks <Search>
- System yields 2 records
- Opens record #2 with the title <Briefly noted>
- Clicks <Back>
- Opens ASP
- Types <motor industry and USA>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Opens ERIC database
- Types <high education and diszvantage>

- Retypes <diszvantage> to read <disadvantaged>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Opens PENTECH OPAC
- Types <preculculus for mecheng maths>
- Selects <title> field
- Clicks <Search>
- System yields no records
- Clicks on <Request Permutation>
- Finds a list of records
- Clicks <Back>
- Long pause
- Closes and ends session

PARTICIPANT 17 MECHENG3

DURATION OF SEARCH: 40 MIN

- Opens EBSCOhost
- Opens BSE
- Types <mechanical engineering>
- Adds <south african> in front of <mechanical engineering>
- Search strategy reads <south african mechanical engineering>
- Clicks <Search>
- System yields no records
- Cuts <south african>
- Types <in> after <mechanical engineering>
- Pastes <south african> after <in>
- Search strategy reads <mechanical engineering in south african>
- Clicks <Search>
- System yields no records
- Retains <mechanical engineering> but deletes all other search terms
- Clicks <Search>
- System yields 997 records
- Clicks on record with the title <How to fight noise where the rubber meets the road>
- Clicks <Back>
- List of databases
- Opens ASE
- Types <united states motor industry>
- Clicks <Search>
- System yields 1 record
- Types <motor industry in united states>

- Clicks <Search>
- System yields no records
- Clicks <Back>
- Back to previous records
- Clicks on record with the title < A man of Flint>
- Types <automobile industry in the united states>
- Clicks <Search>
- System yields 158 records
- Clicks on record #6 with the title <automotive> *CHECK AGAIN
- Clicks <Back>
- List of databases
- Opens ERIC database
- Types <higher education for disadvantaged students>
- Clicks <Search>
- System yields 5 records
- Clicks on record with the title <increasing opportunities...>
- Opens PENTECH OPAC
- Selects <Basic Search>
- Types <strenght of materials>
- Selects <title> field
- Clicks <Go>
- System yields no records
- Clicks on Request Permutation
- Clicks Titles [Materials]
- Results are 422 hits
- Closes
- Types <drotsky, j.g>
- Selects <title> field
- Clicks <Go>
- System yields no records
- Finds index of a/z list of authors, titles,etc
- Clicks <drotsky>
- Finds a record with the title <strength of materials for technicians>
- Closes and ends session



PARTICIPANT 18 RET3RD1

DURATION OF SEARCH: 30 MIN

- Opens EBSCOhost
- Opens BSP
- Highlights <Periodical> under <Publication Type>
- Types <Inustry> but retypes <Industry and trade>
- Clicks <Search>
- System yields 132007 records
- Selects record with the title <Operationalizing technology...>
- Clicks <Back>
- List of databases
- Opens ASP
- Highlights <Newspaper> under <Publication Type>
- Types <South Africa and clothing industry>
- Clicks <Search>
- System yields no records
- Clicks <Back>
- Types <Clothing industry and South Africa>
- Clicks <Search>
- System yields no records
- Clears search terms
- Types <Clothing in South Africa>
- Clicks <Search>
- System yields no records
- Highlights <Periodical>
- Types <Clothing industry and South Africa>
- Clicks <Search>
- System yields 3 records
- Selects record with the title <Inner – city economic...>
- Clicks <Back>
- Clears search terms
- Types <Higher education and disadvantage students (All the participants)>*NB
This was the actual search strategy of this participant*
- Clicks <Search>
- System yields no records
- Reads <hints>
- Deletes search terms
- Types <Higher education and disadvantaged students>
- Clicks <Search>
- System yields 29 records
- Selects record #1 with the title <Selecting students for a South African mathematics...>
- Reads abstract and bibliographic detail of record
- Deletes search terms



- Long pause
- Clicks <Back>
- List of databases
- Clicks <Peninsula Technikon> on desktop
- Clicks <Library> hyperlink
- Clicks <Gateways to restricted databases>
- Clicks <Students>
- Enters student number
- Enters a password
- Failed login
- Repeats the above
- Failed login
- Mouse moves around
- Repeats the above again
- Closes and ends session



ANNEXURE

PERMISSION TO CONDUCT THE STUDY AT THE FORMER PENTECH

Gavin Davis - Re: Fwd: Ph. D Studies

Page 1

From: "ANTHONY PETER STAAK" <STAAKA@pentech.ac.za>
To: <gdavis@uwc.ac.za>
Date: Tue, Mar 18, 2003 4:47 PM
Subject: Re: Fwd: Ph. D Studies

Dear Gavin

Apologies for not responding sooner. I tabled your request at our Rectorate meeting last week, and am pleased to report that the request was approved. Would you kindly discuss the detail with Mr Bennet, our library director who is best placed to advise you on the logistical issues.

Good luck with your research!

Regards

Anthony Staak



(Prof) A.P.Staak
Deputy Vice-Chancellor: Academic
Peninsula Technikon

Tel: +27 21 9596202
Fax: +27 21 9596002

>>> "Gavin Davis" <gdavis@uwc.ac.za> 03/18/03 02:37PM >>>
Dear Prof Staak

This mail serves to remind you of my request to conduct research at your institution.

Kindly acknowledge receipt.

Yours sincerely

Gavin R Davis
Dept. Library and Information Science
UWC

TEL: (W) 9593546
(H) 9045139

CELL: 0824245242