Evaluation of the "Information Retrieval Skills - Agri220" module in the Faculty of Science and Agriculture at the University of Natal, Pietermaritzburg

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Declaration

The author hereby declares that the contents of this dissertation, unless specifically indicated to the contrary, are her own work, and that the dissertation has not been submitted simultaneously, or at any other time, for another degree.

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Abstract

An evaluation was conducted on a credit-bearing module that has recently become compulsory for second year students in four of the six schools in the Faculty of Science and Agriculture at the University of Natal, Pietermaritzburg. The module was based on a course that has been run for Agriculture students since the 1980s. The module "Information Retrieval Skills" (Agri220) is run over a two week period at the beginning of the first semester and covers the library computer catalogue, OPAC and other retrieval tools such as print-based abstracts and indexes, SABINET Online and the CD-ROM databases in the library.

The study sought to determine students' perceptions of the Agri220 module, to determine whether the outcomes as described in the Agri220 module template were evident in students, and to determine the use students made of the library. The method that was used in the evaluation was summative, and thus conducted after students had completed the module. Furthermore to find out their views about the contribution of the module to their studies, the study focused on students who had done the module over a year previously. The respondents were students in the School of Agricultural Sciences and Agribusiness as these were the students for whom the module was compulsory in 1999. A survey was done of five third year classes, which consisted of both third and fourth year students, and questionnaires were distributed and completed in the classes.

Students were very positive in their feedback about the module and reported becoming more efficient in their use of the library. They were largely familiar with the interlibrary loan service and OPAC but were aware to a lesser extent of the print-based abstracts and indexes in the library. The study found that students predominantly used books and to a lesser extent journals. Electronic retrieval formats were popular. The students who supplemented their notes with extra readings relied on reserved material and reading lists. Students made suggestions about changes to the module: such as extending the length of the module, bringing it forward to first year, and teaching the module in smaller groups.

Table of contents

Chapter 4 : Results

Chapter 5 : Discussion

Chapter 6 : Summary of findings, conclusions, recommendations and further research

List of tables

List of acronyms and abbreviations

AGEC	Agricultural Economics
AGPS	Agricultural Plant Sciences
ALA	American Library Association
ANSI	Animal Science
CAB	Commonwealth Agricultural Bureau Abstracts
CALICO	Cape Library Cooperative
ERIC	Educational Resources Information Centre
LISA	Library and Information Science abstracts
NQF	National Qualifications Framework
OPAC	Online Public Access Catalogue
RRM	Rural Resources Management
SABINET Online	South African Bibliographic and Information Network
SAQA	South African Qualifications Authority
UCT	University of Cape Town

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Chapter 1 : Introduction

This chapter shows the increasing importance of lifelong learning skills in tertiary education and to employers when employing graduates. Information skills, which form part of the skills necessary for lifelong learning, however are lacking in many undergraduate students at tertiary institutions, and there seems to be little awareness and usage of the range of sources available to students. Thus library instruction is of increasing importance in tertiary education. The chapter also discusses the library instruction course, "Information Retrieval Skills" (Agri220) run at the Life Sciences Library at University of Natal, Pietermaritzburg, and the development of the course into a compulsory module for second year students in the Faculty of Science and Agriculture. The research problem, purpose, objectives and questions are also covered in this chapter, as well as definition of terms used in the study.

1.1 Background to the problem

Lifelong learning skills have become increasingly important in education and to employers. The marketplace has altered in the past decade and is characterised by constantly changing jobs, greater interaction between organisations, and greater movement of information within organisations and between organisations (Mitchell 1997 : 4). Employees are hired on short term contract jobs, and these jobs often lack clear definition and involve a range of functions (Luckett 1999 : 4; Rainier 1999 : 9). Employees who possess lifelong learning skills have thus been recognised as having an advantage in keeping up with changes in the workplace, and employers are becoming increasingly interested in the skills obtained during a graduate degree in addition to the actual qualification (Mitchell 1997 : 4-6; Luckett 1999; Rainier 1999: 8). Problem-solving skills are emphasised, which involve problem identification and analysis, the gathering of information related to the problem, and applying the information in the solving of the problem (Rainier 1999 : 8). Other skills include an adaptability to the constantly changing work situation, initiative, and an ability to work with a range of people (Mitchell 1997 : 4; Luckett 1999; Rainier 1999 : 9).

The lifelong learning approach has also been of interest to government. South African government policy on education is advocating a change in education which goes beyond the traditional institution-based approach and acknowledges informal forms of learning, such as training that occurs in the workplace, work experience and skills acquired outside a formal institution (Education Information Centre 1996 : 6). The National Qualifications Framework (NQF) has been established and specifically caters for the ongoing learning process of individuals. It allows people to move into the education system at a level appropriate to the skills they possess, even if they lack the required qualifications for that particular level, and also to move easily between institutions (Education Information Centre 1996 : 17-18).

Higher education is thus moving towards the development of lifelong learning skills in its students; skills which facilitate and enhance continued learning beyond the attainment of the qualification. Some universities in South Africa have therefore begun adopting a programme, outcomes-based approach to their qualifications. A programme forms the structure of the degree and can incorporate a number of disciplines (Luckett 1997; Swarts 1998; Luckett 1999) and is built up of modules that bear credits. Each module is expected to provide skills which are not necessarily directly related to the subject but can be continuously developed during the programme (Luckett 1997). Each module has a stated set of desired outcomes, which includes the knowledge, skills and values that should be obtained by students during the module. The South African Qualifications Authority (SAQA), which is one of the governing bodies of the NQF, has defined a set of skills which the body considers to be essential across all qualifications and should be incorporated into all programmes. One of these critical outcomes involves "collecting, analysing, organising and critically evaluating information" (Luckett 1997 : 43 & 47).

1.1.1 Information Skills

Information skills are skills which include an ability to locate, extract and interpret information efficiently (Feather and Sturges 1997 : 218), and have been identified as lifelong learning skills. These skills are often assumed to already exist at an undergraduate level and therefore little emphasis has been given to their development in the past (Sayed and de Jager 1997 : 9). Studies have, however, shown that information skills amongst undergraduate

students are limited. Bell (1990 : 66 & 111) tested students' information skills prior to a library instruction course for English second language students at the University of Natal, Pietermaritzburg. Students scores were low in the section on the catalogue, but with instruction this area improved dramatically. Zondi (1991 :143) in a study at the University of Zululand found that first year students had very low library-use skills, which included an ability to use the library card catalogue and indexes to periodicals, scoring an average of 40% in competency tests. Outside of the South African context, Hepworth (1999) noted that some of the problems experienced by students at Nanyang Technological University in Singapore were confusion over the specific retrieval functions of the computer catalogue, Online Public Access Catalogue (OPAC), and CD-ROMs, ignorance of the layout of the library and an inability to distinguish between sources on the Internet that have academic merit and those without such merit. In addition students experienced problems in formulating their search strategy, particularly at the topic analysis stage and tended not to develop synonyms for key words or phrases which would assist with the search.

Students also tend to be unaware of the range of resources available to them in the library and therefore use only a limited portion of library resources. De Jager and Nassimbeni (1998 : 133 -134) evaluated an information literacy course at the University of Cape Town, which particularly targeted first year students from disadvantaged backgrounds. It was noted from a questionnaire given prior to the actual course that the use of the library was largely restricted to the reserve collection and that, in searching for information, students mostly used the computer catalogue but rarely made use of the CD-ROMs (de Jager and Nassimbeni 1998 : 135).

Various initiatives have been undertaken to create an awareness amongst undergraduate students of the library and the resources available to support their studies. These approaches range from once-off library orientation or basic instruction by the subject librarian for students in particular disciplines, to information literacy courses that are offered as credit-bearing modules in the undergraduate programme (Gentil 1999; Rawlins 1999). A number of structured courses have been set up at different tertiary institutions in South Africa. They vary in the content they teach, the depth with which they deal with the subject, and the

duration and amount of time allocated to the course. Examples of such initiatives are Technikon Natal, the University of Pretoria, the University of Natal (Pietermaritzburg), and the University of Cape Town (de Jager and Nassimbeni 1998; Leach 1999; Rawlins 1999; Thompson 1999).

However, providing students with information about all the sources available to them and the instruction about how to use these sources does not necessarily mean they will apply them. Zondi (1991) sought to relate the library skills of first year students with the types of sources they consulted when undertaking assigned tasks such as essays, projects and tutorials. The students who demonstrated competent library skills in the study were no different in their use of sources than less competent students; students rarely used information retrieval tools such as periodical indexes and the subject catalogue, and relied mostly on reading lists from their lecturers and the reserve bookroom (Zondi 1991 : 143). Zondi (1991) indicates that the reason students do not make use of the range of sources available to them, even if they are aware of such a range, is that they are not required to do so by the academic staff, and that the teaching staff tend to rely largely on lecturing and textbooks.

It has therefore been argued that the success of an instruction course does not depend entirely on educating students about the sources available to them and how to use the sources (Zondi 1991). Application of what has been learnt, and the incorporation of what has been learnt into a student's search strategy, is equally important. Academic involvement in a course of instruction is regarded as essential for this application. Zondi (1991) argues that with teaching staff input and support an instruction course would have greater status with students. For this reason she advocates that instruction should be integrated with the subjects of the curriculum instead of being run separately and distinctly from the academic programme by the library. In this way it would be geared towards the subject, and would allow greater academic staff involvement. De Jager and Nassimbeni (1998 : 143) point out that for such incorporation to occur academic staff would need to recognise that information literacy is an important lifelong learning skill, and be willing to integrate the skill into the subjects they teach.

The duration of an instruction course can also determine the success of the course. Zondi

(1991 :148) showed that students at the University of Zululand who attended a library instruction course, which consisted of a single lecture, were no more competent in library skills than those with no instruction. The course was too brief and intensive for students to absorb that quantity of information (Zondi 1991 : 148). Zondi (1991 : 151) recommends that instruction ought to be spread throughout first year and continue over subsequent years, and that it keep in step with the study process, thus starting with basic retrieval tools and introducing more advanced retrieval tools at a later stage.

1.1.2 Study focus

The Life Sciences Library at the University of Natal, Pietermaritzburg houses a collection which covers the disciplines of agriculture and biological sciences, including zoology and botany, and was formed in 1983 when the library of the Faculty of Agriculture merged with the libraries of Zoology and Botany (van Niekerk and Prozesky 1987 : 205). Library user education was formalised at the Life Sciences Library in the early 1980s and the library staff initially began by setting up links with the lecturing staff to obtain their co-operation, as this was seen as a vital step to encouraging students (van Niekerk and Prozesky 1987 : 205). Instruction was offered to individual departments, and was modified over the years. By 1986 the Faculty of Agriculture had agreed that instruction be given to all its first year students. The instruction familiarised students with the layout of the library, and gave basic instruction on the use of the catalogue and information retrieval in general. A more advanced level of instruction during second year and organised through individual departments, was included to give more specific instruction on abstracts and indexes, bibliographies and lesser known sources.

The basic introduction to the library, which was taught to first year students, and the advanced level instruction were then combined into one information skills course in 1996 and named Agri220. The course was also moved from a first year level to second year, and was compulsory for all Agriculture students. In 2000, with the merging of science and agriculture into one faculty, the Faculty of Science and Agriculture, Agri220 became a compulsory credit-bearing second year foundation module for four of the six Schools within the new Faculty (Prozesky 2000). The Schools for which the module is compulsory are Applied

Environmental Sciences, Botany and Zoology, Agricultural Sciences and Agribusiness, and Molecular and Cellular Biosciences. A foundation module gives grounding to a particular programme and is seen to provide a base on which other modules in a programme can develop (Luckett 1997 : 6; University of Natal, Faculty of Science and Agriculture 2000 : 8).

The module has three components and the first two are run on consecutive evenings at the beginning of the first semester. The first component is an introduction to the OPAC, explaining its function and use, and involves practical work in using the OPAC to locate material (Prozesky 1999 : 57). The second part covers abstracts and indexes, discusses the South African Bibliographic and Information Network (SABINET Online), and also involves a practical, and a comprehension exercise. The third part, which was added on in the year 2000, is run in August and covers CD-ROMs as an information retrieval tool. The main aim of the module is to create awareness of the range of sources available in the library, and Prozesky (2000), who is one of the subject librarians at Life Sciences Library and teaches Agri220, acknowledges the module deals with a number of concepts in a short period of time. Application of what is taught is thus a necessary reinforcement and depends on lecturers assigning independent tasks that require students to use the library. However she has noticed that when students approach subject librarians they have a clearer conceptualisation of what they want.

1.2 Research Problem

Evaluations of information literacy courses are usually conducted immediately after a course has been completed (Bell 1990; de Jager and Nassimbeni 1998; Choonoo 1999), and often involve a pre-test of the skills students bring into the course and a post-test after the course to determine the effect the course has had on the student. Such an evaluation therefore does not determine the long term retention of skills gained from the course, or get feedback from students once they have had an opportunity to apply what they have learnt (Bell 1990 : 110). Thus such evaluations test whether students have acquired the theory of the course but not whether they can apply it (Bell 1990; de Jager and Nassimbeni 1998). As previously noted, the Agri220 module is a foundation course and among its desired outcomes is that students' retrieval skills will continue developing with application after completion of the module

(University of Natal, Life Sciences Library 1999; see Appendix 1). The module is run for a short duration, in three sessions, and a lot of material is covered in that time (Prozesky 2000). Thus unless it is applied and has practical support from disciplines, what was taught may not be retained by students. Apart from students' evaluations there have been no formal evaluations of the module, and hence there is no gauge, from pre-tests and post-tests, to measure whether students' retention of what they have learnt has declined or whether their skills have improved. However, to conduct an investigation one year later would give a good indication of the actual skills and knowledge of students, since what students learned during the module is not fresh in their minds. Also a year later students would have had a year to implement what they have learnt and would be in a better position to indicate their views on the benefits, or otherwise, of the module to their studies. Thus the problem that is being addressed by this study is the formal evaluation of the Agri220 module.

1.3 Justification

There has been no formal evaluation of the Agri220 module. Furthermore, as a foundation module, an evaluation of the Agri220 module would have implications for other modules in the programme, and for the Agri220 module itself. The study would also contribute to the growing literature on students' library and information skills and add to the increasing number of evaluations that are being done on library instruction courses.

1.4 Research purpose, objectives and questions

1.4.1 Research Purpose

The purpose of the study was to evaluate the Agri220 module a year after the completion of the module and to establish the extent to which the skills and knowledge imparted by the module were retained and applied to the students' studies.

1.4.2 Research Objectives

The study's objectives were

- To determine perceptions of students from the School of Agricultural Sciences and Agribusiness about the Agri220 module, undertaken over a year ago, and its contribution to their current studies.

- To determine whether the stated desired outcomes of the Agri220 module were present in those students from the School of Agricultural Sciences and Agribusiness who had done the module over a year ago.

  Sub-objectives

  i. To establish students' awareness of the range of sources available to them, and how to locate and use them

  ii. To establish students' awareness of the range of retrieval tools available to them, and how to locate and use them

- To determine how those students from the School of Agricultural Sciences and Agribusiness who had undertaken the module over a year ago were using the library

  Sub-objectives

  i. To establish the retrieval tools used by students

  ii. To establish the information sources and sections of the library used by students

1.4.3 Research questions

- What were the perceptions of third year students from the School of Agricultural Sciences and Agribusiness on the Agri220 module and its contribution to their current studies?
- Were the stated desired outcomes of the Agri220 module present in third year students from the School of Agricultural Sciences and Agribusiness?
- In what ways were the students from the School of Agricultural Sciences and Agribusiness using the library?

1.5 Assumptions and limitations of the study

1.5.1 Assumptions of the study

The study assumes that when students finished Agri220 all the students were equal in their awareness of the range of sources available to them and how to use those sources.

1.5.2 Limitations of the study

Two limitations are that students were not tested before doing the Agri220 module to determine the skills they were bringing in to the module, and then tested immediately after the module to determine what they had learnt from the module. If these two steps had been taken comparisons could have been made with three sets of results: before the module; immediately after the module; and a year after the module. This would have allowed for a measure of students' retention of what they had learnt from the module, instead the study relied on students' perceptions of the effects of the module.

1.6 Definition of terms

Perceptions

The views and opinions of individuals, which are defined in the *New Oxford Dictionary of English* as "a way of regarding, understanding or interpreting something; a mental impression" (Pearsall 1998 : 1377).

Desired outcomes

The set of outcomes which a module intends students to have acquired by completion of the module, and which are stated in the module's template.

Lifelong learning

The process of "continuing on a path of education throughout life" (Behrens, Olen and Machet 1999 : 19).

Skills

Being skilled at something is defined as "having or showing the knowledge, ability or training to perform a certain activity or task well" (Pearsall 1998 : 1745).

Transferable skills

Transferable skills are skills that can be "learnt in one situation and then applied in various other situations" (Behrens, Olen and Machet 1999 : 51).

Information skills

Information skills are "the abilities which enable you to use information effectively; these abilities include finding information, analysing and evaluating it, and applying it to solve a problem" (Behrens, Olen and Machet 1999 : 3).

Information literacy

Information literacy is the "the ability to access, evaluate and use information effectively for your purposes from a variety of formal and informal sources" (Behrens, Olen and Machet 1999 :19).

User education

"Training in how to use a library, where information is available, why to use a particular search strategy, what other sources can help and how to exploit them further" (Feather and Sturges 1997 : 454).

Information retrieval

Keenan (1996 : 35) defines information retrieval as "a search process followed in a particular collection to determine which documents relate to a particular subject". Young (1983 : 118) extends this definition to the actual location and document delivery and extraction of information, that is "the process of searching, locating and retrieving data from a file".

Third year students

Students currently registered in the School of Agricultural Sciences and Agribusiness at the third year level.

Library instruction

A number of terms, which are discussed in more detail in section 2.1, such as user education, bibliographic instruction and information literacy are often used interchangeably to describe a range of different types of instruction. Unfortunately there is no single, encompassing term which would cover all of these terms, so for the purpose of this study library instruction is the term which will be used as the general term to cover the variety of terms.

1.7 Layout of thesis

The thesis is divided into five parts : the first part, chapter 2, gives an overview of the literature; the second part, chapter 3, discusses the methodology that was undertaken in the study and the reasoning behind the selection of the methodology used; the third part, chapter 4, presents the findings of the study; the fourth part, chapter 5, discusses the results in relation to the objectives of the study and findings from other studies in the literature. The final part, chapter 6, will draw the study together, offer conclusions and provide recommendations for other studies.

1.8 Summary

Students entering tertiary education often display a lack of understanding of the processes involved in searching for information, and often show confusion regarding how to use the sources available to them. In the market place, and with the demands to constantly keep up-to-date with new information, there is now a focus on the skills which graduates possess in addition to what they actually know. Information skills, such as the ability to extract and utilise relevant information, is one such set of skills. Thus library instruction at a tertiary level has become necessary to equip students with these skills. Such a library instruction course is the " Information Retrieval Skills" (Agri220) module at the University of Natal, Pietermaritzburg, which is a credit bearing module compulsory for second year students in the Faculty of Science and Agriculture. Apart from informal evaluations by the staff at the Life Sciences Library no formal evaluation has been conducted of the module. The informal evaluations also targeted the students immediately after the module and could thus not reveal the module's long term value. It was thus considered of interest to investigate the perceptions of students, who had done the module over a year previously, to determine how it had helped them in their studies. The objectives of the study were to determine: the perceptions of students who had done the module at least a year previously; whether the desired outcomes defined in the module template were currently evident in the students; and the sources students made use of in the library.

Chapter 2 : Literature Review

In this chapter the terms that are used to describe the different types of instruction are discussed, from the narrower library situation to the broader concept of information, and a brief history of information literacy is provided. The debates about the best way in which to teach library instruction to students are also discussed. Studies that have been conducted regarding students' library skills and use of libraries at their tertiary institutions are described, as well as lecturer perceptions of library instruction and their expectations of library use by students. Other studies about the search strategies of post-graduate students, and problems that students experience when using libraries are included. Evaluations of library instruction courses are also discussed.

2.1 Library tours, user education and information literacy

A range of terms, from library tours to user education and bibliographic instruction to information literacy, is used to describe initiatives undertaken to teach potential users of the library about the resources available to them (Behrens 1993 : 124; Gentil 1999 : 29). There is often confusion between these terms and they are often used interchangeably (Behrens 1993 : 125). However the terms seem to apply to a progression from a simple introduction of the library to a detailed teaching of concepts. Library tours or library orientation inform the user about the layout of the library and what sources are available in the library (McCrank 1992 : 488). Terms such as user education, bibliographic instruction and library instruction are the next step beyond orientation and deal with utilising the collection as a whole and are usually applied to the individual library situation (McCrank 1992 : 488 - 489). Information literacy has become a popular term to describe instruction that goes beyond the confines of the library (Behrens 1993 :124). Behrens (1993 :124) notes that information literacy emphasizes the ability to find and use information efficiently and incorporates skills of evaluating information and synthesising it.

These various library initiatives seek to equip potential users with certain skills such as an

ability to access and use sources of information efficiently and effectively. These skills have similarly had a number of terms applied to them, from library skills which apply to the library situation, to information skills which apply to beyond the library situation (Behrens1994 : 313). Although many of the above mentioned terms have been used informally in the library field since the 1970s and 1980s, it was only in the last ten years that they were recognised as subject headings. Thus "information literacy" for example became a retrieval term in the early 1990s in the abstracts and indexes to journals from the fields of library & information science and education, *Library and Information Science abstracts* (*LISA*), *Library Literature*, and *Educational Resources Information Centre (ERIC)* (Behrens 1993:125).

There is no standard formula about how an information literacy programme should be presented, thus there is likely to be variation between programmes and it has been argued that information literacy is little more than an extension of user education (McCrank 1992 : 486 & 487). Many of the terms have become fashionable catchwords during particular periods, such an example is the term "bibliographic instruction" which became popularly used in the 1970s, although it was no different to the term "library instruction" (McCrank 1992 : 489).

Library programmes can range from a brief tour or once off introductory lecture, to a course (McCrank 1992 : 487). Gentil (1999 : 29) notes that the aims of the initiatives are often very similar: to educate users in accessing resources. Opinion on how these aims should be met often diverge however, particularly regarding how much should be incorporated into a particular instruction programme, and how long such a programme should last. There has been debate about whether instruction should just consist of on the spot individual assistance as the need arises, with focus on a user friendly library with clearly demarcated areas (Gentil 1999 : 33 - 34), or should take the form of a brief library tour with an introduction to sources in the library, or should be an actual course that is incorporated into the university curriculum.

There is also debate about the form a course within the university curriculum should take: whether it should be a generic course which deals with the broad principles of information retrieval and is applicable to all fields of discipline, or whether a subject approach should be

adopted which specifically focuses on the field in which students are studying (Behrens 1993: 127). In the subject approach only the retrieval tools and sources pertinent to the particular subject would be taught. The subject approach can take the form of a stand-alone course or can form part of an already existent subject course. Behrens (1993 :127) notes that the latter type of course can be further divided into course-related instruction, where the library skills that are relevant to the objectives of the course are introduced as they fit in, or course-integrated instruction, where the actual objectives of the course include library skills and thus library skills form a major component of the course. Library skills that are learnt with the main subject of study have the advantage of being taught at the time they are actually needed and thus the relevance of the skill will be more evident to the student, than if taught separately from the subject or before the student is required to use the skill (Behrens 1993:127). However the problem with subject-related courses is that students may not be ready to choose their university or career direction that early in their undergraduate degrees, and a general course with a multi-disciplinary approach may be more appropriate (Ocotillo Information Literacy Group 1994).

Some authors advocate that information literacy be spread over a student's tertiary education, which would allow a step-wise acquisition of skills to occur, starting with a simple introduction and then adding on more complicated concepts later on at higher levels (Zondi 1991 : 151; Hepworth 1999). Leach (1999) notes that although a number of authors advocate that information literacy cannot be taught in a single course and ought to be spread out, there are a lot of concepts that need to be conveyed to students regarding information literacy and therefore cannot be dealt with when merged with another subject, and for this reason information literacy needs to form a subject on its own. Leach (1999) thus suggests that perhaps a mixed approach would be appropriate and that some aspects of information literacy would be better learnt in an isolated generic course and some aspects would be better learnt merged in with subject material. At present there is little research to distinguish the specific advantages and disadvantages of each method.

A study which sought to develop an operational definition of information literacy was conducted using focus groups of library staff, academic development programmes,

information technology services and academic staff from five Western Cape tertiary institutions (Sayed and de Jager 1997 : 10). There were differences in opinion in the groups about whether information literacy should be taught separately or be subject related. Some thought that information literacy should be taught generically, as tertiary education itself is tending to move towards an interdisciplinary approach and students should therefore rather have a broad, general overview. Others argued that information literacy should be taught within the subject, as otherwise the difference between the disciplines would make it difficult for students to transfer what they had learnt across to their specific subject. It was felt that the most effective way for the concepts to be taught would be if they were integral to the subject, where skills would become ingrained in students' approaches to their studies even though students may not even be aware that they are acquiring the skills.

Other authors have raised the issue of the timing of library instruction and whether skills are acquired and whether recall of what was learnt is maintained when the instruction does not coincide with the presence of an actual information need (Mayfield 1985; Behrens 1993; Gentil 1999). For this reason Mayfield (1985 : 161) advocates that instruction be incorporated into the curriculum and that instruction occur at the time of need and form part of the learning process of the subject.

Another way of demonstrating the relevance of library instruction to students is to have the support of faculty. Mayfield (1985 : 158) argues that instruction should involve close participation between faculty and librarians, as it allows more relevant material from the subject to be incorporated into the instruction course and allow students to connect instruction and its applicability to their studies and even add to their understanding of their subject. Mayfield (1985) draws from his own experience teaching library instruction to first year geography students at Portsmouth Polytechnic where the course draws closely on the work they do in geography and is dealt with in more detail in section 2.4.9.

2.2 Background to the concept of information literacy

The concept of information literacy was first developed in the 1970s and has been built on over the past few decades. It has particularly expanded with the increasing popularity of

computers and the resultant changes within libraries from print-based to electronic database sources (Behrens 1994 : 311 - 312). Up until 1989 a number of definitions were developed, however the definition that was devised by the American Library Association (ALA) in 1989 has now become the one that is most often used in the literature (Behrens 1994 : 315). "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information... Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand" (American Library Association 1989).

Information literacy initiatives in academic libraries have been established in a range of countries such as United States of America (USA) from the 1970s (Rader 1995). However despite initial enthusiasm, by the 1980s many of these programmes were declining for various reasons, through staff cutbacks, budget constraints and lack of interest (Rader 1995). In the 1990s information literacy programmes saw a resurgence with the increasing emergence of computers into libraries and the need to instruct users in utilisation of databases, which created an opportunity to reintroduce instruction in library skills. Furthermore there were also changes in education towards lifelong and independent learning which required that students become equipped with skills in accessing information (Behrens 1993; Rader 1995).

2.2.1 Information literacy in South Africa

Behrens (1993 : 125) has noted that in South Africa terms such as user education, information skills and information literacy are used interchangeably. Suggestions about incorporating such library programmes into the curriculum at a tertiary level were beginning to arise in the library field literature from the 1970s, and in the 1980s and 1990s there were reports in the literature of initiatives at the various tertiary institutions, such as the University of Natal, Pietermaritzburg, the University of Cape Town and the University of the Witwaterstrand (Wits). Myers (1991) talks about initiatives at Wits for chemistry students - particularly for undergraduate students from school backgrounds with a lack of library facilities, but also for

students at a post-graduate level. However a survey of the literature on South African initiatives recorded that few such initiatives had been reported on in the country at that time (Behrens 1993).

A number of recent initiatives at South African tertiary institutions have been described in the literature. At Technikon Natal there is currently a compulsory two lecture course which gives instruction to students on the functioning of the library and also introduces them to the information sources available in the library (Rawlins 1999 : 54). The University of Pretoria has developed an information literacy course which forms part of a broader compulsory course on computer and information literacy (Thompson 1999 : 36). The information literacy component of the course covers 12 lecture hours and lasts for six weeks. The course deals with theoretical concepts covering the principles of information retrieval, introduces students to the subject databases that are available to them, teaches the variability in retrieval techniques of different databases, and also deals with practical application. The University of Natal, Pietermaritzburg, offers a credit-bearing information literacy module "Introduction to Information Retrieval" which is aimed at first year students (Leach 1999 : 58). The module consists of 30 lectures and 10 practicals and deals with the concepts of information literacy in and beyond the library context. At the University of Cape Town (UCT) a credit bearing single semester course, "Information Society : Tools and Skills", is run for undergraduate students particularly targeting first year students from disadvantaged backgrounds (de Jager and Nassimbeni 1998 : 133).

A library cooperative, Cape Library Cooperative (CALICO),was established in the Western Cape between five tertiary institutions, and was instrumental in the setting up of the INFOLIT project in 1995. The project has a broad objective to equip all levels of the community with information literacy skills, but also includes projects at the tertiary institution level (Karelse 2000 : 1). Some of these projects included the development of an operational definition of information literacy, which was mentioned earlier in section 2.1, and a needs assessment of students at tertiary institutions in the region, which is discussed later in section 2.4.3 (Sayed and de Jager 1997; Sayed 1998).

2.3 Lack of research and evidence on some of the issues underlying information literacy

Despite the considerable discussion around information literacy certain assumptions exist in the library field, which have little empirical research to support them (Eisenberg and Brown 1992 :103). These assumptions tend to be based on anecdotal evidence and theories.

One assumption that is raised is that library instruction and the possession of library skills enhances the educational process. Eisenberg and Brown (1992 :103) query whether it is possible to find a measurement to gauge the value of library instruction. Thus for example they ask whether 'student academic performance [can] be used as an indicator of the value of instruction?'. Recent studies have been conducted linking library usage to academic performance (de Jager 1997; Makotoko 1999), however it has been argued that the assessment system itself in the form of examinations does not necessarily reflect competence in the library (Gentil 1999 : 33 & 34). However, as changes are made towards lifelong and independent learning, the resultant changes in assessment criteria may become a better indicator of library skills. Linked to this is whether library instruction actually has any subsequent effect on the student's academic career or makes a long-term contribution towards learning (Eisenberg and Brown 1992 :104) - see section 2.4.10.

Another assumption is that instruction ought to become part of the curriculum (Eisenberg and Brown 1992 :105). Questions that are raised concerning this assumption regard the approach that is more beneficial to students, and also the form that should be adopted. Thus, whether teaching of library and information skills should be integrated into the curriculum and taught as part of the subject or whether information literacy should form a distinct generic subject itself. One of the problems is that studies often focus on the theoretical knowledge of students or ask them to report their experiences but do not directly follow their actual search process and what sources they are utilising (Eisenberg and Brown 1992 :105).

A further issue that is debated by authors is the form in which instruction should take place: whether the focus should be on direct use of actual library sources or go beyond the immediate library situation and deal with the broader concepts of the process of information

retrieval (Eisenberg and Brown 1992 :104). However, there tends to be little empirical evidence conducted to support these different views, and most arguments tend to be based on theory. This is possibly why there is no standardisation in library instruction and little agreement on the most appropriate approaches.

2.4 Studies

2.4.1 Anecdotal evidence

Librarians in academic libraries are often in a position to identify the problems students experience in using the library, as they interact with students on a daily basis. One example of these types of reports that occur in the literature is of a subject librarian (Hall 1999), who discusses some of her observations of students and their usage of the library. Hall (1999 : 34) noted that students tend to be particularly impressed with electronic formats and computerised systems and will put greater value in information received from a computer than a hard-copy source. Students tend to be familiar with computerised systems but although they follow the changing technologies and can adjust quickly to new systems, students still experience major conceptual problems when doing searches on these systems. They do not plan their searches beforehand for the databases they select, or even plan which databases would be the most appropriate to use. Often once they have worked out how to use a particular database they will use it repeatedly regardless of the appropriateness of the database for the task. Students experience problems in devising keywords and often make typographical errors when using databases (Hall 1999 : 32). Hall (1999) has noticed that there is a gulf between the approaches students and lecturers take when doing searches. Lecturers do not always understand that students have difficulties in searching, as they themselves are familiar with the process of searching, know the journals, and the search process has become a habit (Hall 1999 : 30). However, the problems lecturers tend to experience, in contrast to students, are difficulties in adapting to changing technologies which often results in a lack of awareness of changes that are occurring.

2.4.2 Library usage

Studies have been conducted to determine library usage by students in academic libraries, for example, how frequently students use the library, what they use the libraries for and the

resources they are actually using (Zondi 1991; de Jager and Nassimbeni 1997; Ruth 1997). An example of one such study is that of a survey conducted at the University of the Western Cape to determine the perceptions of the library by undergraduate students. Many students indicated that they used the library for photocopying, and regarded it as a place to study or for socialising (Ruth 1997). Students predominantly used material reserved by their lecturers, and very few students browsed the shelves to find material. A third of students reported that they had had no library experience prior to starting at university. Similarly a study conducted on first year students at the University of Zululand revealed that students relied heavily on reading lists and tended to mostly use the books on reserve, while seldom using indexes and the subject catalogue (Zondi 1991 : 143). This indicated the limited extent to which library resources were being used and that little independent study took place.

Ruth (1997) did an exploratory study before conducting a survey at the University of the Western Cape, which is a formerly disadvantaged university. The exploratory study revealed that students were only concerned with the material that would get them through the exams and thus focused predominantly on whatever material had been prescribed or reserved for them by the lecturer. Students were also shown to confuse terms, such as mixing up journal articles with journals themselves. The survey that was conducted after the initial exploratory study revealed that a third of students had not had previous library experience. Students were questioned about their views of the library, and a quarter considered the library as a place to study, 20% thought of it as a social place, and just 5% regarded it as a place for research. Few mentioned using the library for leisure reading. Most indicated that they had learnt about the library during orientation week (Ruth 1997 : 170) and when asked about the major services provided by the library could indicate interlibrary loan and photocopying. Half used the library daily for studying in. Few said they would use another source if the prescribed text was unavailable (Ruth 1997 : 174). Few said they would browse the shelves, and 95% said they would find what they want by looking on the computer. Ninety percent said they never use interlibrary loan and mainly rely on the reserve collection.

A qualitative study was conducted on 21 students from three disciplines, geography, religious studies and psychology, at Calgary University in Canada (Clarke, Hunter and Lipton 1996).

Students were interviewed about the search methods they used for the assignments they were doing at the time of the study. All students were from third or fourth year levels. The study revealed that students were reluctant to approach subject librarians with queries and would only do so when they had exhausted all their other options. However it was noted that this reluctance did not impact negatively on students' performances in their assignments. The study showed that students predominantly relied on electronic formats when doing their searches : particularly the library catalogue and CD-ROM databases. Other methods such as browsing the shelves and using citations from books and journal articles were also popular, and students indicated that they used a combination of these methods when searching for material in the library. Students used the catalogue to guide them to the shelves from where they could browse for material on their topic, and also used CD-ROM databases to refine their topics. The study revealed that problems were experienced in doing subject searches on the computer library catalogue, particularly as students were not familiar with Library of Congress Subject Headings. Consultation of subject librarians, lecturers and print indexes were methods used by only a few students.

2.4.3 Student needs and factors which affect their skills

In the Cape as part of the INFOLIT project a needs assessment was conducted to establish the state of information literacy as defined by focus groups in the five tertiary institutions in the Western Cape (Sayed 1998 : 164). In this study the concept of information literacy covered skills such as information handling and the ability to use a computer. Thus the study investigated a range of factors to create a profile of the students at the different institutions, such as confidence and motivation, reading and writing skills, library usage, and computer ability.

The students' learning background, which was linked to race, was found to be a major component in determining their information literacy status. The study found that black students had less access to computers and were thus less experienced in computer usage. Despite the difficulties faced by students at disadvantaged universities in their reading, writing and computer usage, a very positive aspect of the survey was that it showed that these students were using the library to search for material that had not been prescribed to them

(Sayed 1998 : 166). This result was particularly interesting in the light of findings by Liu and Redfern (1997), in an American study on information seeking amongst multi-cultural students, that students were less confident in the use of the library when English was their second language.

The tertiary institution was also shown to have an influence on students' information literacy, as there were differences between the resources available at the five institutions and also differences in teaching methods. Furthermore, there was variation in information literacy skills and independent tasks assigned to students of the different disciplines. Disciplines such as engineering, which are more practical, focused more on fieldwork and practical assignments, while humanities and social sciences were more directed at essay writing (Sayed 1998 : 166). It was also found that humanities and social science students made greater use of the reserve collection (Sayed 1998 :155). Discipline not only affected library usage but also the use of computers. Thus, for example students in natural sciences had more experience with spreadsheet packages than humanities students. A common problem amongst students was extracting the ideas from a range of authors and then synthesising these ideas into their own work (Sayed 1998 : 166).

2.4.4 Undergraduate students' usage of library by discipline and year

Other studies have shown how library usage differs between disciplines, and have additionally shown variation according to year (de Jager 1997; Makotoko 1999) A study was conducted on students at UCT library which investigated usage of open-shelf material and the reserve collection, and students' academic performance (de Jager 1997). This method by-passed students' views, and used academic results and library records of student loans of library material. Three different disciplines were used in the study: history; economics; and sociology, and included first and third year students from history and third years from both economics and sociology. Samples were taken of students from the top mark, average mark and low mark categories. The study revealed that for all years investigated in history and sociology there was an increase in marks with usage of open-shelf material (de Jager 1997 : 28). There was no such increase in marks with the usage of the reserve collection, where those with average marks tended to make greater use of reserve material than students with

high marks. It was also noted in the study that readings increased from first to third years. There was no such pattern with economics students and in general economics students made much less use of open shelves than the two social science disciplines: five to seven books compared with 13 to 33 in history and 14 to 32 in sociology. De Jager (1997 : 28) suggested that a possible explanation is that performance is measured differently between disciplines and that in subjects such as history, where students are expected to read broadly about the subject, usage of the open shelves would have an influence on performance.

A variation in the use of the library and its sources according to year and discipline was also found in a survey of students in two residences at UCT (Makotoko 1999). The survey represented a range of students from first year to third year, and covered the disciplines in the social sciences, humanities, economics, science and engineering, and also reached a range of race groups. First and second year students relied heavily on material that had been placed in the reserve collection, and made little or no use of the open shelves (Makotoko 1999 : 60). Third year students made greater use of material that was not prescribed for their courses, and tended to make regular use of the open shelf section compared with the reserve collection. The sources of information that were commonly used by all students were dictionaries, the library catalogue and books, however third year students made greater use of sources such as journals and newspapers in their studies (Makotoko 1999 :59). Third year students also reported that they often made use of references from articles to find readings, which few first and second year students did. However first year students showed greater use of reference sources such as dictionaries and encyclopaedias, while more third year students said that they never used these sources (Makotoko 1999). Encyclopaedias in general were seldom used by students. Internet usage increased with level of study with 30% of first years using the Internet, 37% of second years, and 60% of third year students using the Internet.

In the same study a comparison was made of the use of the reserve collection according to discipline, and a majority of both humanities students and social science students showed a strong reliance on the reserve collection (Makotoko 1999). Most science and engineering students, however, only made occasional use of the reserve collection. Humanities students did not make as much use of the open shelves as they did of the reserve collection, while

social science students reported frequent use of the open shelves. A third of science students said they regularly used the open shelves, while a majority of engineering students said they never used the open shelves. Most social science students reported frequent use of non-prescribed material, while science, engineering and humanities students indicated they only made occasional use of non-prescribed material.

Sixty percent of science and humanities students never used an encyclopaedia, while just over half the social science students never did (Makotoko 1999). However 70% of humanities students and 56% of social science students frequently used dictionaries, and only 6% of social science students reported never using a dictionary. Science students tended to use dictionaries infrequently, and a quarter of the science students said they never used a dictionary. Two thirds of science students said they used article references from readings to acquire further readings, whereas most engineering students said they never used article references. Most humanities students reported occasional use of this search method though a third said they never did. Many of the social science students reported that they frequently used this method to search for journal articles, while others never used this method; few reported only occasional usage.

2.4.5 Study on whether skills enhance library use

As mentioned earlier in section 1.1.1 a study was conducted at the University of Zululand to determine whether library usage skills had any effect on the sources selected by first year students for their assignments (Zondi 1991). The findings showed that students were not restricted in their use of library sources by the library skills they possessed, as students with high library skill levels made similar use of the library sources as those who had low level skills. In general the students had low library skills and few had attended the library's instruction programme (Zondi 1991 : 158). However the study also revealed that those students who did attend library instruction were no more competent in their library skills than the students with no library instruction. Zondi (1991 : 148) suggested that the problem with the library instruction was that it consisted of only one lecture, did not provide any connection to any courses the students were taking, and that it was voluntary.

2.4.6 Students' library skills upon graduating

A survey was conducted at Berkeley University in California in 1994 on students graduating from the disciplines of political science and sociology, to determine the library skills students possessed upon graduation (Davitt Maughan 1994). Three hundred and eighty-six students were surveyed and 255 responded, and the survey consisted of two sections: the first was to find out from students their perceptions of their own skills and the second was a set of multiple choice questions to test library competencies. Only 7% of students gave themselves a low rating, whereas the remainder rated themselves as having fair to excellent library skills, however 63% of students scored low to failed scores in the actual competency test. One percent of the students scored above 90%. The findings revealed that just half of students could do a subject search, could distinguish between book and journal article citations, or could identify the major reference and electronic sources in their subject field. The survey also revealed that most of the students who scored highly in the competency test had had library instruction at some stage of their university career.

2.4.7 Attitude of academic staff towards the library

The extent to which various disciplines expect students to source information independently could influence library usage (de Jager 1997; Sayed 1998). Concern was raised from anecdotal evidence that engineering and science students were predominantly relying on textbooks in the early years of study (Leckie and Fullerton 1999 : 11). It was thought that the requirement of independent study at a later level in their tertiary career, even only at a postgraduate level, was the cause and that some students could graduate with little experience of searching for information or even having used a library (Leckie and Fullerton 1999 : 11). The stage and way in which to develop library skills into the varying disciplines within science and engineering was also a concern. For this reason a survey was done at two American Universities, the University of Waterloo and the University of Western Ontario, of the disciplines within the Faculty of Science and Engineering, to determine lecturer perceptions of library instruction. Disciplines such as nursing, chemical engineering, the biological sciences, earth sciences and medical sciences indicated that library instruction was important at the first and second year level, whereas disciplines such as computer science, mathematics, physics and statistics did not regard library instruction as necessary at this level

(Leckie and Fullerton 1999 : 12). However there was an increase in the perceived importance of bibliographic instruction in the disciplines of statistics, mathematics and physics for third and fourth year students, although these disciplines still remained below the other disciplines (Leckie and Fullerton 1999 : 13). The type of assignments that Faculty staff reported giving students were short papers, research projects, essays, and tutorial or laboratory reports (Leckie and Fullerton 1999 : 16). Students were expected to use books and journals, and half of the staff also indicated that they expected students to use electronic abstracts and indexes. Fewer staff members expected students to use print abstracts and indexes, and expectation of student use of encyclopaedias, dictionaries, statistical data and popular literature was much lower. Critical thinking featured amongst all the disciplines as an important skill to develop through assignments. However staff members seldom sought to encourage students in the use of library resources through the assignments they set, or thought that an explanation should be provided to students about the search process, using retrieval tools or developing a strategy as part of the assignment (Leckie and Fullerton 1999 : 17). Discipline was also shown to influence attitudes, as the practical sciences such as mathematics, engineering and statistics had less interest in developing students' skills in searching for and retrieving information (Leckie and Fullerton 1999 : 18).

Webster (2000) conducted a survey at ML Sultan Technikon of the perceptions of Engineering Faculty regarding library instruction and students' usage of the library. Half of the respondents, who lectured to a range of students from different levels, reported that they had noticed improvements in project work as a result of the library orientation programme run at the technikon, but few felt that the orientation had contributed to academic performance of students (Webster 2000 : 54). Lecturers were asked about their perceptions of student ability in using the library, and 44% said they discerned problems while 41% said they did not know. When asked about the contents of a library instruction course, most favoured practical teaching of OPAC and tours of the library, but few considered that an actual assignment designed jointly between the library and academic staff to develop students' skills, was necessary (Webster 2000 : 61). Lecturers were also asked about the skills that students should possess and the sources they should use for assignments (Webster 2000 : 55 & 58). A skill that was regarded as particularly important for students to possess was computer literacy. An

ability to use the computer catalogue OPAC, and use of electronic formats was also highly rated. An ability to find journals was also regarded as essential. However sources such as print-based abstracts and indexes and reference sources such as dictionaries and encyclopaedias were given low ratings. Lecturers indicated the sources they expected students to use in assignments, and predominantly focused on books, while under half of the respondents pointed to journals and electronic sources (Webster 2000 : 55). Few lecturers said they expected students to use reference sources such as dictionaries and encyclopaedias.

2.4.8 Post-graduate students and their search strategies for assignments

Brown (1999) did a study of students who were doing post-graduate studies in the physical sciences at the University of Oklahoma. Biochemistry, mathematics, and physics-astronomy graduate students were questioned about their experiences of the information retrieval process in their studies at that level (Brown 1999 : 427). Less than half of students indicated that before beginning a search they devised keywords and thought about key authors of the field of the topic, others reported that they considered which sources would be the most appropriate to consult, and a few said they began by planning how to get the information quickly. Students also reported influences on their search process and although a third indicated that nothing would affect their search, others said the process was limited by time while others noted the frustration they experienced when they encountered problems with online databases, such as finding that the keywords they had devised were not appropriate to extracting the required information, problems when the Internet was offline, not being able to work out how to use a particular database, or an item not being available on the shelf (Brown 1999 : 433). Students noted that their searches were enhanced by having access to online databases, and that assistance from the library staff, fellow students and professors helped the process. Students were also asked about what they considered was a successful search and most students indicated either finding what they were looking for, or acquiring information that led to an understanding of the topic, or saving time. A few said it depended on the marks they got, and the quality of the end-product was also given as the sign of a successful search (Brown 1999: 434). Students were also asked about what library instruction they had had at the University and half had had some form of instruction at some stage, but were vague about how useful it was to them (Brown 1999 : 435). The types of instruction that they had had were given as

demonstrations, group tours, and one off lectures. A majority of students said that they consulted a librarian when doing an information search.

2.4.9 Immediate evaluations of library instruction

A library instruction programme run at the University of Natal, Pietermaritzburg which was specifically directed at English second language speakers, taught students the use of the catalogue, the reference section, the breakdown of the various sections of books, and topic analysis (Bell 1990 :107). An evaluation was done to assess the success of the programme through testing the students' library skills before instruction and then testing them again after the instruction. Prior to intervention students scored particularly poorly on the use of the catalogue, and then subsequent to instruction showed the greatest improvement in this area. However students continued to battle with tasks such as topic analysis.

At the ML Sultan Technikon in Durban different methods of teaching the OPAC computer catalogue were tested on first year students (Choonoo 1999). Factors that could have an effect on the success of instruction, such as previous library experience, the computer skills of students, and whether students spoke English as a first or second language, were also taken into account. Students were divided into two groups and the one group was taught the basic procedure in using the OPAC whilst the other group was taught the concepts behind a catalogue such as OPAC. On difficult tasks on the OPAC, such as doing a subject search, developing synonyms for keywords, and using truncation, the concept-based group performed better (Choonoo 1999 : 348). Differences also occurred according to the background of the students, thus students who spoke English as a first language, who were familiar with the use of computers and who had library experience were at an advantage when using the OPAC (Choonoo 1999 : 352). One of the major difficulties students experienced with the OPAC was in using the menus and following the screen instructions, which were exacerbated by poor computer skills and English (Choonoo 1999 : 353). Overall improvements, upon instruction, were greatest for students taught the concepts of OPAC rather than the procedures.

An evaluation, which was mentioned earlier in section 1.1.1 , was done on an information

literacy course, "Information Society : Tools and Skills", run by the School of Librarianship at UCT (de Jager and Nassimbeni 1998). The course particularly targeted students who came from backgrounds which lacked library experience. Students perceptions were investigated before and after doing the course, and it was noted from students' responses prior to the course that there was little awareness and use of resources available to them in the library.

Mayfield (1985) describes a course run for first year students in geography at a polytechnic in Portsmouth, England. The course concentrated on being practical and required active participation of students. It was run over a two week period, consisted of four sessions and each session lasted 90 minutes. Students were divided into small groups of 10 or 12. The course dealt with four main areas : source location, abstracts and indexes, statistical sources and the broader concept of structure of the literature and citations. Mayfield (1985 :160) distributed a questionnaire to students before and after the course about their confidence levels, and students indicated that before the course they were confident about simple tasks such as being able to locate a known item or searching for a specific subject. Students noted that since the course they had a greater confidence in the location of sources, in finding statistical information and official publications, and using abstracts. However, most students felt that the contents of the course such as use of abstracts, statistical sources, and location of material would only be of value to them later on in their studies. In spite of this Mayfield (1985 :160) noted that some of the students had suggested that the course be taught even earlier than it was, and thought this could possibly reflect individual variability in ability and need, or that some aspects of the course would be beneficial being taught earlier, such as location of sources, and some later, such as literature structure.

Mayfield (1985 : 160) suggested that a better way to assess how beneficial the course was would be through the work students produce from the library course, however problems were experienced with obtaining feedback from faculty staff. Mayfield (1985 : 161) advocates that instruction be timed to coincide with an information need and be introduced into the curriculum at the time when such a course would have immediate relevance, thus instruction should become part of the learning activities of the subject. Mayfield (1985) also found that faculty staff and librarians differed in their opinions about the value of instruction to students.

2.4.10 Longitudinal survey of library instruction

A study was conducted to investigate the information seeking of graduates once they were in the job market, comparing those who had done a library instruction course and those who had not (Holland and Powell 1995 : 7). The course, which was voluntary not compulsory, had been conducted over 12 years at the Faculty of Engineering at the University of Michigan and during that time 250 students had done the course. The course was aimed at senior year students and geared towards assisting students in the particular research assignment they were dealing with at the time. Thus the course was designed to cater for an already existent problem, which some authors have argued is the necessary point at which to introduce instruction (Mayfield 1985; Gentil 1999). The course covered the spectrum of the information seeking process from problem analysis, and devising a search strategy, to using library sources and tools, and evaluating and organising the information retrieved (Holland and Powell 1995 : 8). A survey was done on 60 graduate students who had done the course and 60 matched graduate students who had not done the course, and 31 from the former and 29 from the latter group responded. The results showed that the two groups were similar in their work profiles, their attitudes towards work, their qualifications following their degrees and use of electronic applications at work. Differences arose however with regard to use of sources for information in the work situation, with more of the respondents in the course group indicating that they regularly made use of a library, and those who had done the course also tended to spend more time consulting information sources for work purposes. Thus they reported that they spent:

- 22 hours a month searching for information compared with 12 hours of the non-course group,
- 33 hours reading compared with the 23 hours of the non-course group,
- and 22 hours disseminating information to others compared with 18.

Both groups indicated they relied on networking people as a source of information although those who had done the course seemed to have used a greater range of informants beyond the firm such as consultants and librarians (Holland and Powell 1995 :11). Those who had done the course also showed a broader interest in other information topics. Although both groups were similar in their use of engineering information the course group tended to have greater interest in non-engineering information such as business information.

2.4.11 Problems that students experience

One of the difficulties students experience when doing a search is through being unfamiliar with the layout of the library and not knowing where the different sources are located (Hepworth 1999). Students may also have difficulty distinguishing the various retrieval tools and may be unaware that each type of tool accesses specific information sources. A common error students make is in their use of the library computer catalogue when wanting to retrieve journal articles (Hepworth 1999 and Hall 1999 : 32). Hall (1999 : 34) also noted that students often approach and use whichever CD-ROM database is already open, without any thought to actual strategy, and thus often browse the wrong database, for example using a database for newspaper articles when searching for journal articles. A similar confusion was noted in a study of students at Calgary University, where one student commented on the frustration of having to use the computer catalogue to locate journals in the library and not being able to use the CD-ROM database for the purpose (Clarke, Hunter and Lipton 1996).

Students seldom plan which keywords they should use for a search or devise appropriate synonyms by which to access pertinent information (Hepworth 1999). Thus students often use incorrect keywords and are frustrated when given no responses. Hall (1999 : 32) reported that students had problems with devising keywords for searches. Students particularly battled with subject searching on the library catalogue, though seemed more proficient with author and title searches (Clarke, Hunter and Lipton 1996; Choonoo 1999 : 219; Hepworth 1999).

Choonoo (1999 : 246) noted that with instruction there was a great improvement in students' abilities to use the computer catalogue, OPAC. Despite this improvement there were indications, through tracking student searches on the computers, that even after doing the course on OPAC, students experienced problems with actual use of the system. Students had basic problems selecting the menus, battled to follow the screen instructions and often used the incorrect search choices. Spelling errors were another problem that students experienced, and because they tended not to check their spelling, when no responses were given to a search query they tended to assume there were no sources available on that topic (Choonoo 1999). Choonoo (1999) says that this sort of simple error often leads to confusion and instead of correcting the spelling error students will sometimes even try different access points.

Students also seem to experience problems with evaluating the information they retrieve, and will place as much value on information from the Internet - whether verified or not - as from scholarly journals (Hepworth 1999). Hall (1999) noted that students also give greater value to electronic sources of information.

2.5 Summary

There are a number of different approaches to familiarising and educating users about libraries, and of particular interest to this study is students in tertiary institutions. These approaches range from a simple introduction and library orientation tour, to education about searching for and dealing with information in and beyond the library situation. There is some debate about which are the most appropriate approaches for library and information education: whether courses should be incorporated into the subject or whether they should be taught as a general multi-disciplinary subject in itself; and whether the courses should occur at a first year level or later on in the student's university career when the need arises. Studies have been conducted which reveal the need for library instruction at a tertiary level. Studies have also revealed the types of sources students use in the library and the reliance on recommended readings from lecturers. Other studies have shown a difference in library use and independent searching between students at different levels of study and in different disciplines, and evaluation studies have also shown the improvements students gain from library education courses. A longitudinal survey showed that there were library use differences between graduates who as students had done a library course and those who had not.

Chapter 3 : Research methodology

In this chapter the purpose and methods of doing an evaluation are briefly described, the research methods that could have been used and reasons for choosing the methods that were used in the study are discussed. The data collection method, a self-administered questionnaire, is also discussed as is the design and development of the questionnaire itself. The student population of the study and limitations of the method used are included, as well as the actual administration of the questionnaire and data analysis.

3.1 Evaluation

Evaluations are conducted to determine the impact of social development and education programmes. An evaluation would thus investigate whether a particular intervention programme has attained its goals, how the intervention programme has been implemented and what effect the programme has had (Clarke 1999; Potter 1999). Evaluations are different from other types of social science research in their purpose, which is the investigation of the merit of a particular intervention programme, but are similar in their use of social sciences research methods (Clarke 1999 : 2). Thus a range of methodologies can be applied in evaluations from quantitative to qualitative. Clarke (1999) discusses how evaluations at the simplest level can be divided into two approaches, the formative and summative. The formative approach focuses on clarifying the goals and outcomes of a programme and the implementation of the programme. This approach mostly uses qualitative methods of data collection and often those participating in the programme are involved closely in the evaluation (Clarke 1999). The summative approach seeks to ascertain the overall effectiveness of a programme in terms of the programme's stated outcomes (Clarke 1999 : 9). Quantitative methods are used to collect data on outcomes, impact and implementation (Potter 1999). The present study used the summative method of evaluation.

3.2 Choice of research methods

There were a number of methods that could have been used to obtain the data in this study; such as direct observation of subjects, or in-depth case studies and interviews, or through a survey. The method that is chosen depends on the target population and is also determined by which method will best access the population, will best gain a representative sample and will best gain a response. Two major considerations in deciding the method used for the current study were time constraints for students and gaining access to students. In the pre-test (note section 3.5) when students were contacted to assist in the study and organise an interview the response was very low and those who did respond cited time-constraints as a reason for not being interviewed even for half-an-hour. Thus it was realised that if co-operation was to be obtained from students the method would need to be simple and brief. The study also intended to target a large number of the students who had done the Agri220 module and to cover a range of the students. Case studies and interviews were thus ruled out as these methods tend to focus in detail on a few individuals, whereas the survey method, the method adopted in this study, can reach a number of people at a single point in time. It was decided that the most efficient way of accessing as many students as possible was to approach them in their lectures. This method ensures that there is a captive audience and also a large number of responses can be obtained at one time (Czaja and Blair 1996 : 166). It was also decided that to distribute the questionnaires, which was the data collection technique used in the study, and a request that students complete them in their own time, could have had similar disadvantages to mail surveys where response rate is often low. This possibility had been noted in the pre-test of the questionnaire when the questionnaire was distributed for comment and reminders had to be given for their return. Thus it was decided that a survey, using a self-administered questionnaire, distributed and collected in class would be the most appropriate method to collect data.

The most common method of evaluating a course is to do a pre-test before the course to determine students' incoming abilities and knowledge and then testing the students' abilities immediately after the course, and comparing both sets of results. The difference between the results is then considered to be what has been learnt in the course. The advantage of this method is firstly that it is a quantitative score which allows for a measurement of ability

(Barclay 1993). Another advantage is that it ensures that any intervening factors that may influence ability is reduced. Bell (1990) did an evaluation of a first year course and used the pre-test - post test method, as did Choonoo (1999) when evaluating the best method of teaching students OPAC. Barclay (1993) used a simple test before and after a library course.

Other methods of evaluation involve doing a survey of the students for their feedback on the course. De Jager and Nassimbeni (1998) evaluated a one semester module by surveying students prior to the course to ascertain their perceptions of their abilities and then surveying them afterwards. In addition students' test results were used as an indication of actual ability. Mayfield (1985) also used a survey immediately after a geography library instruction course to ascertain students' reactions to the course. A longitudinal survey was conducted on students who had graduated from university and were in the job market; comparing students who had done an information skills course with those who had not (Holland and Powell 1995). Another method that could also be used in evaluation would be observation, as was used by Hepworth (1999) in a study that was not an evaluation, where students were followed in their search process.

3.2.1 The survey method

Surveys can be used to obtain factual details, attitudes or behaviours about individuals, which are not directly observable, by asking the individuals questions (Moursund 1973 : 45; May 1997 : 84). These questions are developed from the hypotheses and objectives that underlie the study, and the responses are then grouped with similar responses from other individuals in the study and are quantified. As a result it is possible to determine patterns that exist in the study population (May 1997). Questionnaires thus have to be structured so that any differences that occur in the responses by individuals are due to actual differences rather than interpretations of the question (May 1997 : 85).

3.2.2 Data collection method

There are two ways in which questionnaires can be administered: either through structured or semi-structured interviews; or through self-administered questionnaires where questionnaires are distributed to respondents to complete themselves without any intervention by an

interviewer (Bless and Higson-Smith 1995 : 108). Self-administered questionnaires can either be distributed directly to respondents or can be sent by mail. An issue that needs to be considered when dealing with questionnaires is that this type of instrument deals with people's reports of their own reality rather than through direct observation of people (Bless and Higson-Smith 1995 :109). The respondents must be prepared to answer questions honestly, able to report their actual perceptions and beliefs rather than what they think is the 'correct' answer, and able to express how they feel about situations. The advantages of using self-administered questionnaires in this study were the low cost, and that a number of respondents could be reached in a short time. One of the chief considerations was to use the technique that would gain greatest accessibility to students and obtain their co-operation, thus a very simple quick method of obtaining results, which meant that a semi-structured, self-administered questionnaire was considered the most efficient method. The advantage of interviews are that the interviewer can immediately pick up if there are any misunderstandings with the questions or to clarify what is being asked (Bless and Higson-Smith 1995 : 111). However, due to the time involved with interviews such a study is often limited to a small sample (Bless and Higson-Smith 1995 : 111). The posting of self-administered questionnaires was not considered, as responses for mailed questionnaires are often very low and was not necessary given the location of students (Bless and Higson-Smith 1995 : 112).

The type of questions that were chosen for the questionnaire were a combination of: open-ended questions, which sought opinions or explanations from respondents and allowed respondents to express their perceptions; questions that required single word or phrase answers; and closed questions where a list of categories were supplied for respondents to choose from (Bless and Higson-Smith 1995 : 122).

3.3 Structure of questionnaire

The questionnaire was divided into three sections: student profile; perceptions of the Agri220 module; and questions related to the outcomes of the module (Appendix 1). Student profiles included demographic questions about student backgrounds, the degrees they were doing, the year of study they were in and the school they had attended. The questions relating to the outcomes of the module were devised from the desired outcomes stated in the template of the

Agri220 module (Appendix 2). These questions were concerned with determining students' familiarity with the layout of the library such as the reference section and interlibrary loan, and their awareness of the sources and retrieval tools available in the library. The questionnaire was also compiled from the notes of the module and through the consultation of student responses from an informal internal evaluation conducted after the course in 1996 and 1997.

The questionnaire was designed with the awareness that there were certain flaws associated with the methods that were being used. Barclay (1993 : 197) argues that a quantitative measure obtained by testing students before and after a library course is the best way to determine the benefit of the course to the student. Surveys, although valuable in determining students attitudes, are not able to measure how much was learnt during the course as students' perceptions are subjective and they are often not able to judge how much they have learnt.

A test was decided against for the present study, for a number of reasons. Firstly, any theoretical knowledge that students displayed would not necessarily be attributable to the module as students had not been tested before doing the module to determine their background knowledge. The students had also not been tested immediately after the module to determine what they had learnt from the module, thus this study would not be able to differentiate between what students had learnt from the module and what they had learnt prior and subsequent to the module. Instead students were asked what formal and informal training they had had before and after the module. As very little could be drawn from exclusive focus on tests of students' library abilities, given the delay between the module and the evaluation, it was felt that for this type of study students' perceptions of what they had gained from the module would be of more value. It was also thought that a year after doing the module students would be in a better position to gauge the contribution of the module to their studies. The researcher was aware, however, of the problems with surveys regarding the tendency of respondents to underestimate or overestimate learning. A section relating to the desired outcomes of the module was also incorporated into the questionnaire to determine the use students were making of the library for their studies and assignments.

Some questions were drawn from the literature and dealt with some of the common problems students experience in using a library. This included, for example, questions to ascertain any confusion over the function of specific retrieval tools and the types of sources that can be accessed with these retrieval tools, for example the frequent misconception that the computer catalogue OPAC can be used to retrieve journal articles. Other questions suggested by the literature regarded students' lack of awareness of specific retrieval tools, such as print and electronic abstracts and indexes and whether students tend to rely on material recommended by lecturers.

3.4 Population

The population of a study can be defined as "the group or aggregation of elements that we wish to study, the group to which we want to generalize the results of our study" (Czaja and Blair 1996 : 113). When defining the population it is also important to include parameters such as the geographic boundaries in which the population occurs and any particular demographic features, such as age group (Czaja and Blair 1996 ; 114).

The population of this study was defined as the students who had done Agri220 at least a year before the study was conducted. This time parameter effectively excluded the second year students who had done the module earlier in the year. Furthermore prior to the year 2000 the module was only compulsory for students doing agriculture. Third year classes in the School of Agricultural Sciences and Agribusiness were thus targeted as their students had completed the module more than a year before. The classes were selected to cover as many of the 100 third year students registered in the School of Agricultural Sciences and Agribusiness as possible, and six classes were chosen which did not overlap in their students and which represented the range of degrees and majors in Agriculture.

The Agri220 module was not compulsory for science students when the third year students of 2000 did the module in 1999, as it was only during the current year that the module became compulsory for science students. Therefore only a few of the current third year science students did the module in 1999. It was decided therefore to include the few science students that were present in the third year Agriculture classes who had done the Agri220 module.

There were also some fourth year students present in the class, and they would have done the module even further back than the minimum one year period, thus they were included as well.

3.4.1 Limitations

Two limitations of the study were : firstly that although some fourth year students were reached, perhaps fourth year classes should also have been selected as fourth year students may be different to third year students in terms of library skills and application of these skills. The Agriculture degree is a four year degree and differences could occur at the fourth year level as students are given more assignments and are expected to make greater use of the library (Darroch 2000). The second bias that could be present in the study is that one of the classes selected for the study, a group of 17 students from Rural Resources Management (RRM), was not reached as their lectures and tutorials had been completed for the year. At the time of the study they had dispersed for the year to do their own project work. This group was a particularly important group to reach as demographically it was different from the other groups in the study through the degree and majors being done by its students. Also, the students in this group were currently involved in project work which would have involved independent study, and they could thus have found that Agri220 had contributed to their studies in different ways. Therefore the study cannot claim to represent the perceptions of students who have had to do major independent study, as neither fourth year students nor Rural Resources Management (RRM) third year students were present in the study.

The RRM students also seemed to represent more diverse backgrounds than the students that were reached by the study. RRM students were more likely to have come from disadvantaged backgrounds, they were an older group than those in the study who had mostly come straight out of school, and seemed to already be in the job market while studying. Apart from this main group there were few students in the study who would have come from disadvantaged backgrounds, thus the study cannot say how Agri220 benefited students who came from backgrounds with little exposure to libraries.

3.5 Pre-testing the instrument

While the questionnaire was being developed the opinions of fellow students and librarians who had had experience in the academic library field were obtained. These helped with the actual structuring of questions, grammar and relevance. Also the experiences from surveys in the literature and the types of questions posed in the literature were used as guidelines. Input was also obtained from post-graduate science students known to the researcher. As a pre-test interviews for feedback were initially sought amongst science students who had done Agri220 in 1999. Questionnaires were sent through e-mail but there was a very poor response. The pre-test mostly contributed to the study by revealing the importance of choosing an appropriate method of data collection to optimise co-operation and returns from students. Alterations were made to the questionnaire, mostly to shorten it, making questions clearer and reducing questions that made the questionnaire sound like a test. Care was also taken to use terminology familiar to students.

Two important reasons for doing a pre-test of the instrument is to ensure reliability and validity. Reliability is whether an instrument will provide the same results consistently (Bless and Higson-Smith 1995 : 130). Problems that have been raised with reliability is that variation could occur due to the context and mood in which the respondent is filling out the questionnaire. There are various methods such as test-retest reliability, in which the same test is given to the same people repeatedly, equivalent-form reliability, in which the same questions are given in a different form, and split-halves reliability and item analysis. Validity determines whether the instrument is actually measuring what it intends to measure (Bless and Higson-Smith 1995 : 135). This was a major problem in this study as the instrument was not returned after distribution in the pre-test. Caution was taken when the actual survey was done that as the questionnaires came in they were checked for discrepancies. If the first group, which consisted of 10 students, had shown in their answers that they did not understand the questions, that group would have been regarded as the pilot study and not included, and the required changes would have been made to the remaining questionnaires. The altered questionnaires would then have formed the actual study, however such an approach was not required.

3.6 Administering the questionnaires

The initial step was to gain the permission of the Dean of the Faculty of Science and Agriculture to conduct the study, and the approval of the Life Sciences Library. Thereafter the third year agriculture student list was obtained from the Faculty officer. The list was divided according to the degrees and majors of the students and specific third year classes were selected to reach these groups of students. The lecturers of five classes in the School of Agricultural Sciences and Agribusiness, the school in which agriculture students are located, were contacted and all agreed to have the questionnaire distributed and completed by students during their lectures. This was particularly important to the study as Czaja and Blair (1996 : 166) point out that this method of data collection can only be achieved with the co-operation of the lecturers. A sixth class group of students, as mentioned earlier, had already finished their lectures for the year, and were not reached. Students spent about 10 minutes or more completing the questionnaires and the questionnaires were collected immediately. After each set of questionnaires were returned the researcher read through the questionnaire responses to check for any discrepancies, particularly because the pre-test response had been non-existent and did not necessarily cover all problems and misunderstandings that might potentially have arisen.

3.7 Data analysis

Data was analysed through doing frequency counts and cross-tabulations using the statistical package, Statistical Package for the Social Sciences (SPSS). Data was also qualitatively analysed. During analysis it was noticed that responses were often missing from particular questions and it was considered that this lack of information was as important as any provided information, and was therefore included. Czaja and Blair (1996 : 181) discuss the importance of missing data and that it is usually not random and can therefore affect the data.

3.8 Summary

The type of evaluation conducted in this study was the summative method which investigates a programme after it has been completed, and determines the impact on the people who participated in the programme. A summative evaluation also focuses on the desired outcomes

that are expected to arise out of the programme in comparison to the actual outcomes, as a way to assess the impact of the programme on people. There were two research methods that were under consideration for the present study: either a survey or interviews of a few case studies. However it was decided that it was essential to reach as many of the target population as was possible and as time was a major constraint to student co-operation it was decided that a simple self-administered questionnaire would be the most appropriate method and that the questionnaires be administered during lectures and returned immediately. Limitations to the study were that more fourth year students did not form part of the sample and a group of the third year students doing RRM were not accessed. Problems experienced with pre-testing and trying to obtain responses to the pre-test questionnaires confirmed the decision to have the questionnaires completed and collected immediately. Questionnaires consisted of three sections : the first which dealt with general student profile was made up of short-answer questions; the second which focused on students' perceptions consisted of questions that were open-ended and required explanatory answers; and the third section which covered student awareness of library layout and sources and use of sources was a mixture of closed questions and single word answers. A number of corrections and improvements were made to the questionnaires before being distributed. Analysis involved frequencies and cross-tabulations, and use was made of the SPSS statistical package in this process.

Chapter 4 : Results

This chapter is arranged according to the three main areas into which the questionnaire was divided, namely: the profile of the students; the perceptions of the students; and awareness and use of the library.

4.1 Profile of students in the study

4.1.1 Demography of students

The students were drawn from five third year classes in the School of Agricultural Sciences and Agribusiness in the Faculty of Science and Agriculture, as shown in the table below.

Table 1 : Distribution of students in the five selected third year Agriculture classes

Class	n=54	%
Agricultural Economics 370	15	28
Dietetics	15	28
Agricultural Plant Sciences 302	10	18
Grassland Science	9	17
Animal Science	5	9
Total	**54**	**100**

Fifty-four students were present in the classes at the time that the questionnaire was distributed, and all completed the questionnaires. Students were evenly spread amongst these classes with no more than 30% of the students in any one class.

Table 2 : Distribution of students at 3rd and 4th year level

Year of study	n=54	%
3rd year	46	85
4th year	8	15
Total	**54**	**100**

Although the classes themselves were third year classes and the majority of students were in their third year of study, there were some fourth year students present.

Table 3 : Distribution of degrees

Degree	n=54	%
BSc(Agric)	23	43
BSc(Diet)	15	28
BAgMgt	10	18
BSc	5	9
missing result	1	2
Total	**54**	**100**

Less than half the students were doing a Bachelor of Science (Agriculture) degree (BSc Agric), with the remainder of students comprising Bachelor of Science (Dietetics) (BSc Dietetics), Bachelor of Agricultural Management (BAgMgt) and Bachelor of Science (BSc) degrees.

Three of the classes reflected the heterogeneity of students. Agricultural Economics (AGEC 370) and Agricultural Plant Sciences (AGPS 307) consisted of third and fourth year students doing different majors in Agriculture, and Grassland Science consisted of third year students doing a range of majors in both BSc (Agric) and BSc. The other two classes of Dietetics and Animal Science were each a homogeneous collection of third year students either doing BSc (Dietetics) or a BSc (Agric) majoring in Animal Science.

4.1.1.1 School backgrounds

The students came from various school backgrounds - of the 54 students in the study 45 different schools were mentioned. The largest group of students who attended any one school was five (9%) at Pietermaritzburg College, four (7%) at Wykeham Collegiate, three (6%) at Durban High School and two (4%) at Wartburg High School. Most of the schools tended to be former government and private schools and would have been well-resourced in terms of computer and library facilities.

4.1.2 Previous library training

Twenty-six (48%) of the students reported that they had some form of training in the use of a library before doing the Agri220 module, while 28 (52%) said they had had no previous instruction.

Table 4 : Previous training in the use of a library

Types of training	n=26	%
First year orientation at university	10	38
School library	6	23
Informal orientation at university	4	15
Recalled a general background in library use	4	15
Experience through using other libraries	2	8
Friends	2	8
Librarian	1	4
Employed in a library	1	4
***Total**	**30**	**115**

***Multiple responses were given**

The students who indicated that they had had previous training in the use of a library predominantly referred to the university level (53%). This training was either in the form of the formal orientation in first year (38%) or as an informal introduction to the academic library (15%). Training before entering tertiary education was also indicated by some students. Most of these students named their school libraries and a few named their local libraries. Two of the students who mentioned their school libraries specified that they had been taught the Dewey Decimal System, another referred to being taught the basics at a school level but not being taught the computer system, and another said the university system was very similar to the school's system. A general background, friends, and being employed in a library were given by some students as other sources of learning about the library.

4.1.3 Subsequent library training

Only six students (11%) responded that they had had further library training after the Agri220 module, while 46 (85%) said they had had no further library training. Two students did not

respond. Subsequent training seems to have been through informal assistance at an individual level. Five (83%) of the students with subsequent training said they had been shown how to use the CD-ROM database after doing the module. Two of these students, in addition, mentioned journals, microfiches and abstracts. The sixth student did not specify what source he/she had been instructed in subsequently. Two of the six students specifically indicated from whom they had received subsequent assistance; both mentioned the librarian and one in addition to seeking assistance from the librarian, also mentioned receiving help from friends. Another student said that at a third year level students were required to make use of the CD-ROM database, Commonwealth Agricultural Bureau Abstracts (CAB), and journals for assignments, implying that subsequent learning had been in the form of practical application.

4.2 Students' perceptions of Agri220

4.2.1 Aspects of Agri220 that were useful to students

Fifty (93%) students specified that certain aspects of the module had been particularly useful to them. One said there had been no useful aspect, one said he/she could not remember and two gave no response.

Table 5 : Most useful aspects of Agri220

Useful aspects	n= 50	%
Location and use of journals	16	32
Retrieval of books	16	32
Use of OPAC	15	30
Use of computers	12	24
Use of CD-ROMs	8	16
Use of abstracts	6	12
Writing references	5	10
Retrieval of journal articles	4	8
Able to find and retrieve information easily: process quicker and time saving	4	8
SABINET Online	2	4
Using interlibrary loan	2	4
Other	2	4
***Total**	**92**	**184**

***Multiple responses given**

Students largely mentioned that being taught how to use the library computer catalogue, OPAC, was the most useful aspect of the module. A general referral to the computer system of the library was also given, as well as use of the CD-ROM databases. Some students linked being taught the use of these retrieval tools with easier access to particular sources such as books and journals. Others, without naming actual retrieval tools, talked about knowing where books and journals were located and being able to retrieve those sources relevant to what they want. A few students talked about being taught how to use print-based abstracts and two specified that it was in order to find journal articles. The use of SABINET Online was also mentioned as was interlibrary loan. Students also felt that the module had been useful in helping them compile reference lists for assignments. Four students referred to an overall benefit by which the search process had become easier, and quicker, due to being taught how to use sources; which led a few to comment that they now saved time when searching. The remaining two students each gave different answers: one could not remember the details but that it did help; and the other said that all aspects were useful.

4.2.2 Aspects of Agri220 that were least useful to students

The least useful aspects of the module were usually given as items which students had not been able to understand, or which they had not subsequently used.

Table 6 : Least useful aspects of Agri220

Least useful aspects	n=14	%
Science Citation Index	4	29
Journals	2	14
Computers	2	14
Other	6	43
Total	**14**	**100**

Science Citation Index was one of the most named items, as were journals and computers. Unlike the responses to the question on the most useful aspects of the module, where detailed explanations were often supplied, students gave brief answers and did not always specify why they found a certain item not useful. Items that were given by individual students were OPAC, journal articles, abstracts and SABINET Online. Other responses by individual students were: one student did not understand the course as a whole; another had forgotten

what was taught; and a third student pointed out that international journals which had been discussed in the course were not available in the library.

4.2.3 Students suggestions about the changes that could be made to Agri220

Twenty seven (50%) of the students suggested that changes be made to Agri220. Twenty (37%) students gave no response, one said they could think of no suggestions and one could not remember. Five (9%) said that no changes should be made - for instance "must not be changed", "I don't think it should be changed - helped in the little knowledge I gained", "none". The changes that were recommended were to add onto the module, as shown in the table below.

Table 7 : Changes that were suggested for Agri220

Changes to Agri220	**n=27**	**%**
CD-ROM database instruction	9	33
Brought forward to first year	5	19
Extend module to at least a few weeks	4	15
Taught in smaller groups	3	11
More focus on library computers	2	7
Other	6	22
***Total**	**29**	**107**

***Multiple responses given**

A majority of the students who gave suggestions thought that CD-ROM databases should be incorporated into the module. Two students (7%) thought that the module should spend more time on using the library computers. Three other categories of changes were recommended by students and concerned the actual running of the module rather than its content. Some students felt that the module should be moved forward to first year, though they did not say why. One of these students suggested that the course be divided between first and second year and that the basics be taught in first year and CAB be taught in second year. The second group thought the module should be extended to a month as they thought a few days was too short to cover the material that the module did. However another student commented that the

module was too long. In the third group a few students thought that the module should be taught in smaller groups. Additional comments by individual students were that assignments should not be done in the module, the module be non-examinable, one student noted the problem of the gap between doing the module and application of what was learnt, and another thought more focus should be given to practical aspects rather than on theory.

4.2.4 Students' responses about their subsequent use of the notes

Only 10 (19%) of the students said that they refer back to the notes that they were provided with in the Agri220 module. Nine (90%) of these students said that they use the notes when writing references for their assignments. Other uses of the notes were as a list of the journals that are available in the library, and as a guide in the steps to retrieving information from the library.

Table 8 : Responses about whether Agri220 notes should be changed

Changes to notes	n=54	%
No response	32	59
Yes	11	21
No	5	9
Could not remember notes	6	11
Total	**54**	**100**

The majority of students gave no response to the request for suggestions to possible changes to the notes. Only 11 (21%) gave suggestions.

The changes to the module, by the 21% who suggested changes, were :

- four (36 %) thought the notes should include a guide to using the CD-ROM databases
- two (14%) thought the notes should provide more guidance to the library layout and procedure of retrieving information
- two (14%) suggested the notes be more user-friendly and become more updated but did not specify in what way these alterations could be made
- other suggestions were that references should be made more specific to the different departments, that Internet references would be useful, and that the notes be more explanatory and provide actual examples, and one student said that notes should not be provided and that the module should rather aim at helping students to understand.

4.2.5 Students' responses about whether Agri220 had an effect on their ability to retrieve information from the library

Forty-seven (87%) students felt that the module had had an effect on their ability to retrieve sources from the library. Seven (13%) indicated that the course had had no effect. Forty-four of the 47 students who thought they had benefited from the module also specified how the module had helped.

Table 9 : The effects Agri220 had on ability to retrieve information from the library

Effects	n=44	%
Specific sources and retrieval tools named	20	45
More efficient at retrieving information, process easier and saves time	9	20
Location and use of sources	8	18
Was unable to use a library prior to the module	4	9
Module was a starting point on which to build	3	7
Other	1	2
***Total**	**45**	**101**

***Multiple responses given**

The majority of students named specific retrieval tools and sources, and mentioned an improvement in their ability to locate and utilise these tools and sources as a result of doing the module. In addition many students mentioned becoming more efficient in the use of the specified retrieval tool. Nine (20%) students commented on a general efficiency they now experienced in their use of the library, and that the process of information retrieval was much easier which saved them time. Eight (18%) students referred to a general improvement in being able to locate and use sources in the library. A few students indicated that they had not been able to use a library previously, and others said that the module was a starting point on which they had subsequently built. One said the module was a reinforcement of what he/she already knew.

As shown in the table below students reported on their improvements in utilising specific

retrieval tools and sources.

Table 10 : Specific retrieval tools and information sources named

Retrieval tool/information source	n=20	%
Able to find relevant books	9	45
Able to find journals	7	35
Use of computer to find sources	4	20
Use of CD-ROM databases	4	20
Awareness and location of print abstracts	4	20
Use of OPAC to find sources	3	15
Finding material through SABINET Online	2	10
Finding articles now easier	1	5
***Total**	**34**	**170**

***Multiple responses given**

The ability to find books and journals, through knowing their location and how to access particular sources relevant to their assignments, were the major benefits of the module mentioned by students. The use of particular retrieval tools such as the computer catalogue OPAC, the print-based and electronic abstracts and indexes, and SABINET Online, and being able to pinpoint relevant information sources with these tools were also mentioned Some students also said that as a result of knowing where to look and how to use retrieval tools searching for books and journals was much easier, and thus finding information relevant to their assignments was quicker.

4.3 Students' awareness of and use of sources in the library

4.3.1 Students' responses about the location of an encyclopaedia

Twenty-six (48%) students were either able to name the reference section, where

encyclopaedias are kept, or knew where it was situated in the library. Twenty-eight (52%) were unable to demonstrate an awareness of the location of an encyclopaedia, and these responses are given in the table below.

Table 11 : Incorrect suggestions about the location of encyclopaedias

Encyclopaedia location	n=28	%
No response	9	32
Vague or incorrect directions given	6	21
Encyclopaedia section	4	14
Did not know	4	14
Computer to find encyclopaedia	3	11
Never needed an encyclopaedia	2	7
Ask at help desk	1	4
***Total**	**29**	**103**

***Multiple responses given**

A majority of those students who could not indicate that encyclopaedias are located in the reference section did not respond, while the other students either could not describe the location of the reference section, or said that an encyclopaedia could be located in the encyclopaedia section, or said that they did not know. Four students although not knowing about the reference section, suggested other ways in which they would get hold of an encyclopaedia. Three (11%) of these students mentioned that they would consult the computer to find an encyclopaedia, and one (4%) said they would ask at the help desk. Another two (4%) students said they had never needed to use an encyclopaedia. One of the students additionally said that he/she would use an electronic encyclopaedia, Encarta.

4.3.2 Location of an item that is unavailable in library

Thirty-eight (70%) of the students either said they would use the interlibrary loan section if an item were unavailable or knew about ordering it from another library. One (2%) said they did not know and two (4%) gave no response. A few of those who mentioned interlibrary loan also mentioned other avenues that they might pursue in addition to interlibrary loan. One said that if an item were out on loan he/she would order it, two said they would look for it on the

computer, specifically SABINET Online in the one case, one said that he/she would ask the librarian, and another said as an alternative that he/she would use the Internet.

Table 12 : Suggestions, by students who did not know about interlibrary loan, about locating an item unavailable in the library

Suggestion	n=13	%
Ask librarian or at help desk	7	54
Internet	4	31
Go to another library	3	23
Other	2	15
***Total**	**16**	**123**

***Multiple responses given**

There were also thirteen students (24%) who did not mention interlibrary loan but gave the direction they would take if they wanted an item that was not in the library. Seven of these students were not certain about what they would do but said they would either ask the librarian or at the help desk. The other six students specified the avenue they would take. Two said they would go to another library such as the agricultural library at Cedara, or would use the Internet, one said that he/she would use the library in town or would do without the item, two indicated they would use the Internet instead and one said OPAC.

4.3.3 Sources that can be located on the computer catalogue, OPAC

Almost all of the students, fifty-one (94%), were able to answer the question about what sources they could locate using the OPAC. Two (4%) gave no response and one (2%) said they were never taught OPAC. The breakdown of the actual sources that the 51 students thought could be located on OPAC, are shown in the table below.

Table 13 : Sources located on OPAC

Sources	n=51	%
Books	49	96
Journals	25	49
Theses	19	37
Journal articles	13	26
Abstracts	12	24
***Total**	**118**	**232**

***Multiple responses given**

The majority of students indicated that books can be retrieved by OPAC, and less than half of students knew that journals and theses could also be retrieved. Only 13 (26%) thought that journal articles could be retrieved by OPAC.

4.3.4 The ways in which items can be located on the computer catalogue, OPAC

Forty-five (83%) of the students were able to name the ways in which an item can be retrieved on OPAC. Nine (17%) students did not respond.

Table 14 : Ways to locate a source on OPAC

Ways of location	n=45	%
Author	45	100
Title	41	91
Subject/keywords	40	89
Other	5	11
***Total**	**131**	**291**

***Multiple responses given**

All of those who responded said that an item could be located using the author of the work as an access point. Forty-one (91%) of those who responded knew that a search could be done using the title of the work. And forty (89%) indicated that subject or keywords were an access point. One student also mentioned the International Standard Book Number (ISBN) and another mentioned series. Only three students seemed confused about how to retrieve material using OPAC : one student said they would use the journal title and title of the assignment, whilst two said they would use the topic.

4.3.5 Responses about the purpose of print-based abstract and indexing journals

Thirty-six (66%) students gave a response about the function of a print-based abstract and index, while 15 (28%) gave no response, two (4%) said they did not know and one (2%) said "non-applicable". Thus 33% showed either through admitting such or through not responding that they did not know the answer, however of those who did answer the question just two showed major misconceptions about abstracts and indexes. The answers given by the 36 students who replied is shown in the table below.

Table 15 : Purpose of print-based abstracting and indexing journals

Purpose	**n=36**	**%**
To find journal articles	19	53
Journals	12	33
A summary of article is provided	11	31
Alternative to CD-ROM database	5	14
Other	2	6
***Total**	**49**	**137**

***Multiple responses given**

Just over half of the 36 students who responded knew that an indexing and abstracting journal is used to find journal articles, and a third said that an abstract of the article is provided and indicates whether the article is relevant. There was an overlap in responses regarding location of journal articles and provision of a summary of journal articles, and eight of the above students talked about both. A third of those who responded were uncertain about the use of indexing and abstracting journals, but were vaguely aware that these types of retrieval tools were connected to getting hold of journals. Some students also suggested that they would use the print-based indexing and abstracting journal if a power-failure precluded the use of the electronic database version of the abstracts. A further two (6%) showed misconceptions, one said that an abstract and indexing journal is used to determine whether a particular journal is in the library, and the other said that it is a printout of retrieved information.

4.3.6 Students' responses about whether they had used an abstract and indexing journal since the beginning of the year

Only fifteen (28%) of respondents reported using an abstract and index since the beginning of the year, while 38 (71%) either had not, or did not respond. Of the 15 who had used an abstract and index, 10 named an abstract and index that they had used. The abstracts that were named were *Nutrition abstracts and reviews*, *Horticultural Science abstracts*, *Range and Forest abstracts* and *Poultry abstracts*.

4.3.7 Students' responses about whether they had used a CD-ROM database since the beginning of the year

Twenty-five (46%) students, reported that they had used a CD-ROM database since the beginning of the year. Twenty-seven (50%) said they had not and one (2%) gave no response. Of the 25 who answered in the affirmative, 20 were able to name a database they had used: 11 (55%) mentioned CAB; three (15%) the Life Sciences collection; and three (15%) both CAB and Life Sciences. One student from dietetics mentioned Psych Lit, one said SCI and one PACE, which is not in the library.

4.3.8 The methods students use when searching for journal articles

Forty-eight (89%) students indicated the methods they use when searching for journal articles. Of the remaining six (11%) students who did not point to any method of journal retrieval, one mentioned never having searched for a journal article. The methods that were indicated by the other 48 students are shown in the table below.

Table 16 : Methods and preferences in searching for journal articles

Methods	n=48	%	Preferred method n=31	%
References from an article or book	34	71	2	6
CD-ROM database	31	65	21	68
Contents pages of journals	24	50	4	13
Abstract and indexing journal	19	40	4	13
***Total**	**108**	**226**	**31**	**100**

***Multiple responses given**

Most of the students showed that they use references from books and articles already in their possession to trace other articles. Browsing the contents pages of journals was also shown to be a popular method of finding articles. Use of retrieval tools was common as well, with the CD-ROM database particularly popular. However, when students were asked about which method they preferred, of the 31 who gave a preference, 21 (68%) identified the CD-ROM database, while only two (6%) gave use of a reference list as a preference. Seventeen students gave no preference : eleven indicated that they use sources equally and six gave no response.

4.3.9 The ways in which students supplement their lecture notes

Thirty-one (57%) students said that they supplemented lecture notes with extra reading, with a majority showing a reliance on guidance from their lecturers rather than searching independently in the library. The methods used to supplement notes are shown in the table below.

Table 17 : Methods to supplement lecture notes

Methods	**n=31**	**%**
Reading lists from lecturer	30	97
Material on reserve	28	90
Prescribed textbook	25	81
Browsing the shelves	10	32
Retrieval tools	4	13
Internet	2	6
Other	1	3
***Total**	**100**	**322**

***Multiple responses given**

A majority of those students who indicated that they do extra readings use reading lists provided by the lecturers, reserved material, and textbooks. A third of students said they browse the shelves for readings and a few said they search for readings using retrieval tools. Some students said that they use the Internet and one said that he/she would talk to the lecturer for more detailed explanations.

4.3.10 Awareness of and use of the library and its sources by class

There was a difference in the awareness displayed by students and their use of the sources in the library according to the classes they were in.

- Eleven of the 15 (73%) Dietetics students were able to name the interlibrary loan section, but just four of the 15 (27%) could indicate that encyclopaedias are housed in the reference section. Agricultural Economics (AGEC) students however showed equal awareness of both sections : seven of the 15 (47%) AGEC students knew about these two sections. Eight of the nine (89%) Grassland Science students knew about interlibrary loan, and seven of the nine (78%) of these same students knew about the reference section.

- There were only a few students who did not respond about the sources that can be retrieved on OPAC, however of the nine who did not respond six were AGEC students (67%).

- Proportionally more students in Agricultural Plant Sciences (AGPS), Animal Sciences (ANSI) and Grassland Science supplemented their notes with extra readings : four of the five (80%) ANSI students, seven of the 10 (70%) AGPS students, and six of the nine (67%) Grassland Science students. Six of the 15 (40%) Dietetics students, and eight of the 15 (53%) AGEC students did extra readings.

- About 60% of students in three of the classes were able to answer the question about the function of print-based abstracts and indexes : 10 of the 15 (67%) Dietetics students, six of the nine (67%) Grassland Science students, and three of the five (60%) ANSI students. In the other two classes eight of the 15 (53%) of AGEC students were able to respond, while nine of the 10 (90%) of the AGPS students were able to do so.

- About 20% of students in three of the classes had made use of a print-based abstract and index since the beginning of the year : four of the 15 (27%) Dietetics students, two of the nine (22%) Grassland Science students, and one of the five (20%) ANSI

students. Usage of print-based abstracts and indexes during that year in the other two classes was two of the 15 (13%) AGEC students, and six of the 10 (60%) AGPS students.

- There was greater usage of the CD-ROM databases than print abstracts and indexes in all classes except ANSI, where only one of the five (20%) students made use of CD-ROM databases. Eight of the 10 (80%) AGPS students had made use of CD-ROM databases during the year, as had five of the nine (56%) Grassland Science students, six of the 15 (40%) Dietetics students, and five of the 15 (33%) AGEC students.

- Very few students said that they had not benefited from the Agri220 module, however of the seven who felt that it had not improved their ability at information retrieval four of these were from the AGEC class.

4.3.11 Awareness of and use of the library and its sources by year

In most cases the sample of fourth years was too small to indicate any differences between third and fourth year students. However some findings were noteworthy :

- Six of the eight fourth year students (75%) had used a print-based abstract and indexing journal since the beginning of the year, while nine of the 46 third year students (20%) had used a print-based abstract and indexing journal since the beginning of the year. This means that of the 15 students who had used those types of retrieval tools during the year, 67% were fourth year students.

- All eight of the fourth year students had used a CD-ROM database since the beginning of the year, while 17 of the 46 third year students (37%) had similarly used a CD-ROM database. Fourth years accounted for 32% of the total number of students who had used a CD-ROM database since the beginning of the year.

- Only three of the eight fourth year students (38%) knew about interlibrary loan, compared with 29 of the 46 third year students (64%). Five of the fourth year students

(62%) knew about the reference section, while 20 third year students (43%) did.

4.4 Summary

The students surveyed were predominantly third year students though some fourth year students were also present in the classes. Four different degrees were represented, and covered a range of majors in the agricultural and biological sciences fields. The students came from a variety of school backgrounds. Library training prior to Agri220 was mostly reported in the form of orientation in first year or informal assistance at a tertiary level, though some students also mentioned their school libraries. Few students said they had had subsequent library training, and most of these students mentioned being taught how to use the CD-ROM databases in the library. The most useful aspects of the module were given as being taught how to find journals and books and being taught how to use the library computer catalogue OPAC. Few students reported a least useful aspect, such as Science Citation Index. Students were very positive about the benefits of the module and most reported an increase in efficiency in using the library, as a result of knowing where to locate sources and retrieval tools, and how to use them. Students showed a greater awareness of the interlibrary loan section than of the reference section, and most students were very familiar with OPAC and how to use it, but were less aware of the function of the print-based abstracts and indexes. More students had used the CD-ROM databases during the year than the print abstracts and indexes, and when students were asked about their preferred method of finding journal articles most indicated CD-ROM database searching. Students indicated that they use a number of methods when searching for journal articles: CD-ROM databases and using references from an article or book featured. Half of the students supplemented their lecture notes with extra readings, however most of the readings were from reading lists or from the reserve collection. There was an indication of variation regarding awareness and usage of sources in the library depending on the class the students were in and whether the students were in third or fourth year.

Chapter 5 : Discussion

This chapter will discuss the findings of the study in relation to its objectives, and will also compare the findings with the findings of other studies. The chapter is arranged in a similar manner to the results chapter: with brief discussion of the profile of students in the study; their perceptions of the module; and the findings according to the outcomes of the module's template; and student use of the sources in the library.

Briefly to revisit the three objectives of the study by which the findings are discussed:

- to determine students' perceptions of the Agri220 module
- to determine whether the outcomes as described in the Agri220 module template were evident in the students
- to determine how students were using the library.

5.1 Students' profiles

Students came from a variety of school backgrounds. The schools that were mentioned by students, however, seem to have mainly been previously advantaged schools, and it is therefore assumed that the schools would have been equipped with quality computer and library facilities. Despite coming from backgrounds that would have given them access to, and an experience of, libraries, less than half of students indicated having had training in library usage prior to doing the Agri220 module. Few students actually indicated school as a source of previous training. A possible explanation is that students do not consider the experience acquired informally from their background in libraries as a form of training. Students tended to point to more formal and recent introductions to the library such as first year orientation and being guided by librarians to sources.

5.2 Students' perceptions of Agri220

5.2.1 Feedback about Agri220

Students specified certain sources taught in the Agri220 module that were of particular use to them. Two types of information sources that students focused on were journals and books, and knowing where these sources were situated in the library and being able to pinpoint particular sources. Students also named specific retrieval tools, largely the library computers in the form of the computer catalogue, OPAC, and the CD-ROM databases. Print-based abstracts were also mentioned as a useful aspect taught in Agri220.

When students were asked about the overall benefits of the module they similarly indicated a greater confidence in using the library: through knowing their way around the library and where the sources were located; knowing what retrieval tools would lead them to the sources they were wanting; and knowing how to use the retrieval tools. Students indicated that as a result they had become more efficient in using the sources, and being able to go straight to the sources and knowing how to use them saved a lot of time.

Hepworth (1999) and Brown (1999) reported the frustrations students experience when they have little or no introduction to the library. In Singapore University students had problems in their searches due to a lack of familiarity with the layout of the library and as a result often had difficulty finding material (Hepworth 1999). These aspects were raised by students in the current study as being a benefit of the module: that students now knew their way around the library and were able to locate material quickly. Many of the physical science graduate students at the University of Oklahoma (OU), when asked about what hindered their search process, talked about the frustration with delays of not knowing how to use a database system, of getting no results from the database through using incorrect keywords, and problems when the Internet was offline (Brown 1999 : 433). In that same study the students also revealed their view of a successful search and the three predominant themes that arose were the location of the required information, gaining an understanding of the subject being searched on, and saving time in the search process (Brown 1999 : 434).

The theme of time recurs on a few occasions in regard to the search process (Brown 1999).

When asked about their approach in the early stages of the search process, one of the responses put forward by some students was gaining quick access to the relevant information (Brown 1999 : 431). In addition some students pointed out that one of the factors that hampered a search was a lack of time. Time also featured in regard to when students would conclude a search: some saying it would be determined by when the particular assignment was due, whilst others said that they would stop a search when they considered the time involved was greater than the importance of the information (Brown 1999 : 433). The graduate students also noted the time taken to locate and utilise certain sources : some remarked on the amount of time spent consulting print-based abstracts like *Chemical abstracts*, and one student even mentioned that having to physically retrieve an item from the main library consumed too much time (Brown 1999 : 431 & 433).

In the present study some students said that they previously had had no idea about how to use a library, while others said that the module was a reinforcement of what they already knew. Some students pointed out that the module was a starting point on which they have subsequently built. This point that learning about the library and how to utilise its resources and searching the sources is a continuous process, has been raised by a few authors as a reason for extending library instruction over the students' tertiary career (Zondi 1991 : 151; Hepworth 1999). These authors argue that acquiring library skills and becoming skilled at searching and implementing a search strategy, from the actual planning stages to being able to extract and synthesise relevant information, is an ongoing process which requires practice and needs guidance and reinforcement as it is being implemented (Zondi 1991; Hepworth, 1999). Thus it has been suggested that user education be a continuous process, starting with basic instruction and becoming more complicated as students require those sources for assignments.

The least useful aspects of the module in the present study were usually given as the items which students had not been able to understand, or which they had not used subsequently. Science Citation Index was one of the most named items, while journals, journal articles and retrieval tools such as computers, OPAC, abstracts and SABINET Online were also mentioned. Unlike the responses to the question on most useful aspects of the module, where detailed explanations were often supplied, very few students specified the details of why they

found a certain item not useful. One student said they did not understand the course as a whole, another said that he/she had forgotten what was taught, and a third student pointed out that international journals which had been discussed in the course were not available in the library.

5.2.2 Changes to the module

The students who thought that changes should be made to the module predominantly suggested additions. The main suggestion was the inclusion of instruction in the use of CD-ROM databases. At the time, in 1998 and 1999, when these students did the Agri220 module there was an informal introduction to the CD-ROM databases in the library which students could voluntarily sign on for (Langley 2000). Langley (2000), who is a subject librarian at the Life Sciences Library, has suggested that this informal introduction could possibly explain the confusion which seems to have arisen where some students reported that the most useful aspects of the module was the CD-ROM databases. Since then a component has been formally added onto the module, which deals with introducing students to the CD-ROMs available to them in the library and the practical use of the databases (Prozesky 2000).

Certain students made suggestions about the running of the module which have been raised in the literature : the duration of the module, teaching in smaller groups as large groups affect the ability to follow what was being taught, and the timing of the module.

5.2.2.1 Duration

Some students felt that the module should be extended to cover a few weeks rather than be conducted in a few days, as the short duration did not give enough time to absorb the information. One student, however, thought that the module was too long, and a possible explanation for the difference in opinion was suggested by Langley (2000). Students come into the module with different levels of skills, even to the extent of some students not being able to use a computer. Thus the librarians have to deal with introducing the basics to some students while keeping the other students who already possess the basic skills from becoming bored (Langley 2000). Choonoo (1999 : 352) showed that, even if students are unfamiliar with a particular computer system, if they are equipped with previous library and computer

experience they are able to learn the computer system more easily and quickly than students without that sort of background.

Some suggestions have been put forward in the literature about not overwhelming students by introducing too many concepts at once in a short duration of time, that concepts should arise as a gradual process and that it is necessary to start with the basics early on and become more complicated later on in the students' career when use of these sources is required (Zondi 1991: 151; Hepworth 1999). In the present study one student thought the basics, such as OPAC should be taught at a first year level and more complicated aspects, such as CD-ROM databases, then introduced in second year. The approach of spreading library instruction through a student's tertiary education would also cater for the problem that was raised by one student of forgetting what was learnt and having to relearn it later when required to use the sources.

5.2.2.2 Timing

The timing of library instruction is a theme that is also raised in the literature (Zondi 1991; Mayfield 1985; Gentil 1999; Hepworth 1999). However only a few students in this present study made a point of this theme: whether instruction should take place early on in the student's tertiary education or whether instruction should occur at the time when it is needed in a student's studies. A number of students thought that the module should be taught at a first year level. This is similar to responses by geography students in the evaluation of a library instruction course at Portsmouth Polytechnic, whereby students felt that instruction should occur very early on in their tertiary careers (Mayfield 1985 : 161). In contrast to this two students in the present study referred to a decline in recall after the module, and one student raised the issue of the gulf between attending the module in second year and then having to apply what was learnt in the module in third year. A similar comment was given by another student when discussing subsequent library training.

Mayfield (1985 : 160 &161) noted, however, from the evaluation conducted of the library instruction course in Portsmouth, that most students thought that what they had been taught would not be of immediate use to them, and would only be of value to them later on in their

studies. For this reason Mayfield (1985) suggested that instruction actually be provided later at the point of need. In a similar way the recommendation of spreading instruction through the different years of study would address the problem of point of need, as sources and retrieval tools would be introduced as they are required (Zondi 1991; Hepworth 1999).

However other students in the present study contradicted these views when asked about the benefits of the module. These students stated that the module provided a foundation upon which they had subsequently built. Thus there was no indication of a decline in knowledge of the library but a continued growth in knowledge.

5.2.3 Agri220 notes

Very few students indicated that they had made use of the notes that were provided in the module, and of those who did indicate that they referred back to their notes, the greatest number did so when compiling references for assignments. Only one said that he/she consulted the notes as a guide in the retrieval of information. Those who thought changes ought to be made to the notes thought CD-ROM databases and instruction in how to use the databases should be provided. Thus most suggestions were that they become more of a practical look-up guide of library layout and procedure. However it seems that few students rely on the handouts supplied to them, and there are such practical handouts available in the library to guide users anyway.

5.3 Outcomes

The second objective, which was to determine the presence of the desired outcomes of the module in the students, was divided into two sub-objectives. Some of the desired outcomes that were stated in the template of the Agri220 module (see Appendix 2) were a knowledge of the layout of the library, being aware of the resources available in the library and how to use sources in the library. Thus the one sub-objective was about the layout and the location of the library's resources, and the other sub-objective was about students' awareness of and use of sources.

5.3.1 Layout and location of library resources

More students knew about the presence of the interlibrary loan section than about the reference section in which the encyclopaedias are housed. This does not necessarily indicate use, as can be seen from the findings of a study done at the University of the Western Cape where, despite being able to name the interlibrary loan as a service provided by the library, 90% of students said they never used the service (Ruth 1997 : 176). However in the current study the responses and ability to describe the procedure involved in ordering an item, do seem to indicate that students made use of interlibrary loan. In comparison, responses to the question about where to find an encyclopaedia seemed less certain, and a few students even said they had never needed to use an encyclopaedia.

A survey of students at two residences at the University of Cape Town (UCT) showed that usage of encyclopaedias was low for all years of undergraduate study despite an increase in the use of other sources in the later levels of study (Makotoko 1999). Many of the science students in that study never used an encyclopaedia. Two studies of staff views and their expectations of student usage of sources, one conducted at the Science and Engineering Faculties of two American universities in Ontario, and one at the Faculty of Engineering at ML Sultan Technikon in South Africa, revealed that few lecturers expected students to make use of encyclopaedias or even dictionaries in their assignments. In the former study just a quarter of the staff expected students to use dictionaries and encyclopaedias in assignments, and in the latter study the ability to use reference sources such as dictionaries and encyclopaedias were not rated as highly as electronic formats, OPAC, and the reserve collection (Leckie and Fullerton 1999 : 16; Webster 2000).

In the present study although the majority of students were aware of the interlibrary loan service some who did not know about the service indicated alternatives they would use if an item was unavailable in the library. This lack of awareness could be an inconvenience to these students as a few said they would go to a different library. Others indicated they would use the Internet instead or would do without the item.

5.3.2 Awareness of retrieval tools and sources

5.3.2.1 The sources that can be located on OPAC

Almost all of the students knew about the library's computer catalogue, OPAC, and knew that books could be located using the OPAC. However, students did not seem to be aware of the broader concept that all physical sources in the library are recorded on the library catalogue. It seemed from students' responses to other questions that their knowledge of the sources that can be located by OPAC is restricted to the sources they actually use, and one student particularly commented as such. Students were not as aware that journals are on the OPAC, but this is probably because the journal section itself is arranged in alphabetical order, instead of by the Dewey Decimal System, and hence readily accessed without OPAC. The findings in the present study would thus not necessarily be an indicator of the extent of journal use. Furthermore, lists of the journals in the library for each discipline are posted up in the journal section itself. Similarly abstract and indexing journals would not necessarily be something students would use the OPAC to locate, as these journals are also arranged alphabetically.

It has been reported in the literature that students confuse the type of information source that can be retrieved on the library computer catalogue, OPAC, and thus do not realise that all the physical sources in the library are recorded but not their contents (Hall 1999 : 32; Hepworth 1999). Thus there is a tendency for students to think that journal articles can be found using the library catalogue. A quarter of students in the present study thought that journal articles could be retrieved on OPAC. No comparisons can be drawn from the literature about third year science students, with no previous library instruction, who display such a confusion about the use of OPAC. However within the present study, from the overall impression gained from other answers and explanations, most students clearly differentiated between the OPAC function and CD-ROM databases function and which sources these retrieval tools could access. Students did seem more limited though in their awareness of the actual principles behind the retrieval tools. Students mostly displayed an awareness of the link between OPAC and books, and CD-ROM databases and journal articles, but did not seem to realise there was a broader principle present. This is in contrast to observations by Hall (1999 : 34) of how students often were unable to differentiate databases and would use them randomly without ascertaining whether the most appropriate one was being used.

This study did not investigate problems students experienced with OPAC prior to doing the module, and as Choonoo (1999 : 352) has noted, students who are computer literate and speak English as a first language, even if they are not familiar with the particular computer system, can pick up some of the uses of the system fairly quickly even with no exposure to it previously. A majority of the schools named by students as the schools from which they had matriculated were what could be considered previously advantaged government white schools or private schools. In general those schools were and are well-equipped in terms of computer and library facilities, and it is therefore assumed that students would have had access to these facilities. However in comments by students there were some who indicated a large improvement in OPAC awareness and use, such as one who said "without course, computer would have been harder to use and taken longer", and another who said "easier to locate books via computer, rather than at books themselves" and most students indicated that the most useful aspect of the module was being taught how to use OPAC.

5.3.2.2 Ways in which to access sources on OPAC

Students indicated that they not only knew what they could use OPAC for, but also how to find items on the OPAC, as most could name the three basic types of searches: author, title and subject. Some studies have shown that students are reluctant to do subject searches, preferring to use author or title, and often battle devising appropriate keywords and developing synonyms (Choonoo 1999 : 246; Hepworth 1999). Students also sometimes are unaware of using keywords for subject searching and type in the whole topic instead (Prozesky 2000). However, in the current study only a few students showed such confusion as using the title of an assignment to access information. The study did not ascertain how students developed keywords and synonyms and their approaches to subject searching, as this was beyond the scope of the study.

5.3.2.3 Abstracts and indexes

A majority of students in the present study showed an awareness of print-based abstract and indexing journals, though less were aware that these types of journals led them to journal articles and provided them with an abstract of journal articles. One of the Life Sciences' subject librarians noted that in the past comprehension exercises given to students after the

module revealed that students still do not actually comprehend that a subject search in a particular abstract and index leads to journal articles on that subject and their specific location in journals; that it is an actual retrieval tool (Langley 2000). However the majority of respondents in the current study who answered the question about abstract and indexing journals were able to point to the use of abstracts and indexes to find journal articles, though a third of students who did respond only vaguely recollected a link between abstracts and indexes and accessing journals.

5.4 Use of sources

The third objective was to determine how students were using the library, and was divided into whether students supplemented their notes with extra readings and how these extra readings were obtained, and the information sources and retrieval tools students were using.

5.4.1 Supplementary readings

The students in the current study who did additional readings relied on recommended material, while only a third of these students said they browsed the open shelves for extra reading material. Just one student in the present study indicated use of the library for own interest. Similarly in Ruth (1997 : 171 & 174) few students browsed the shelves or used the library for leisure reading.

The current study showed that only half of the students did extra readings to supplement their notes, and those who did tended to rely on guidance from lecturers through reserved material, recommended reading lists and textbooks. Few students searched independently for supplementary readings or browsed the shelves. A number of studies have shown that in the early stages of students' academic careers there is a reliance on reserved material and little independent use of the open shelves, but that greater use of the open shelves occurs in the later years of study. In Makotoko's (1999 : 60) study third year students showed less reliance on the reserve collection than first and second year students, and greater use of the open shelves and unprescribed material. De Jager (1997 : 28) showed that there was a difference in the use of the open shelves according to year and discipline, and showed that in the disciplines where students were traditionally encouraged to read broadly on the subject,

student performance in exams improved with use of open-shelf material. In subjects where students were not expected to do extra reading, however, performance was not linked to their use of open-shelf material. Zondi (1991 : 143) found at a first year level students relied on reading lists supplied by lecturers and made little use of subject catalogues and indexes.

However the finding in the present study does not necessarily include library use for assignments, and responses by students to open-ended questions about the benefits of the module, in which being taught to use the computer catalogue to find books was a common answer, seem to show that students do make use of the open-shelves. Thus student usage of the open-shelves for their assignments in the current study would probably be comparable to other studies in the literature, as the other studies investigated general usage of open-shelf material, including assignment work, and not just supplementation of notes (de Jager 1997).

5.4.2 Sources used

From students' responses throughout the questionnaire, particularly when discussing the useful aspects of the module, the benefits obtained from the module, and from their knowledge about the library computer catalogue and its function, the source that was most commonly mentioned was books in conjunction with the library catalogue, OPAC. Studies have shown that at an undergraduate level usage of sources increases with level of study, thus by third year students are making use of more sources (de Jager 1997 : 28; Makotoko 1999 : 60). At a first year level books are predominantly used, but by third year journals are used increasingly (Makotoko1999 : 60). In the current study books and journals were the chiefly mentioned sources of information. In other studies, done on science and engineering faculties, books and journals were the sources that were mostly emphasised for use in assignments (Leckie and Fullerton 1999 : 16; Webster 2000 : 55 & 56). Thus in the present study there was little awareness of other sources such as theses or even of reference sources, and there was no mention of these types of sources in the open-ended questions. Few students were aware that theses could be located on OPAC and there was less awareness of the reference section than of the library catalogue or interlibrary loan. Only at a fourth year level in the School of Agricultural Sciences and Agribusiness are students expected to do independent tasks such as projects (Darroch 2000). At a third year level few assignments are

given, and then usually in the form of essays or seminar papers. Students thus mostly tend to use books and journals for essays, and probably only at later research levels would they consult theses.

Usage of the library in the current study seems to be comparable to undergraduate third year students who had had no library instruction, in their reliance on recommended readings and predominant use of books and journals (de Jager 1997 : 28; Makotoko 1999 : 60). This is in contrast to the findings of a longitudinal survey which was conducted of engineering graduates from the University of Michigan, and showed there was greater usage of the library in the workplace amongst graduates who had done a library instruction course during their degree than those who had not (Holland and Powell 1995 : 8).

5.4.3 Retrieval tools - print and electronic abstracts and indexes

When searching for journal articles students revealed that they used a few approaches in conjunction with each other, thus the use of the CD-ROM database or searching for articles from books and articles already in their possession were the most used methods. Browsing the contents of journals was also popular, and abstracts and indexes were also used. Brown (1999: 431) noted that the physical science graduate students surveyed at Oklahoma University seemed also to use a combination of methods. Although they relied on online databases for searching, half of the students of that study thought reference lists in journal articles were very useful sources of information. A combination of methods to search for material in the library was also popular amongst students at Calgary University in Canada, where students listed the use of CD-ROM databases, browsing, and using citations from books and articles (Clarke, Hunter and Lipton 1996).

The use of citation lists to lead to information sources seems a popular method of searching (Clarke, Hunter and Lipton 1996; Brown 1999). Sixty-six percent of the science students in a survey of students at the University of Cape Town (UCT) reported using references from journal articles (Makotoko 1999), in comparison to 70% in the current study, although students in the UCT study did not indicate other methods of finding journal articles. It did seem surprising in the current study that with an awareness of retrieval tools that students still

browse the contents pages of journals, as this is often the technique used when not aware of any other way to find relevant journal articles. However few students used only one method of searching for journal articles, and the overwhelming preference students had was to search the CD-ROM databases.

A quarter of students in the current study said they had used a print abstract and index during the year, and just less than half said they had used a CD-ROM database in that time. More students, however, indicated use of these retrieval tools when asked about the methods they use in searching for journal articles. This discrepancy perhaps indicates that some students have used these retrieval tools at some stage but do not do so on a regular basis. Furthermore, not all of the students who said they had used these retrieval tools since the beginning of the year were able to name the abstracts and indexes they had used, which perhaps also indicates infrequent use by those students who could not name specific abstracts and indexes.

Thus in spite of the common references made by students about journals and CD-ROM databases, there does not seem to have been frequent use of the retrieval tools used to access journals, namely print-based indexes and abstracts and CD-ROM databases. A possible explanation could be that the assignments that students have been given in their studies so far have not required extensive use of library sources. At this level few assignments are included, it is more at the fourth year level that students are required to do independent projects (Darroch 2000).

5.4.4 Preference for electronic formats

Throughout the questionnaire respondents showed a familiarity with electronic formats and frequent mention was made of the OPAC and CD-ROM databases, unlike print based abstracts. Many students thought the module and notes ought to be geared more towards CD-ROM databases. Students showed a preference for using CD-ROMs in doing searches and could easily name the CD-ROM databases available in the library.

Similarly electronic formats have been shown to have a popularity in the literature. The resurgence of popularity in library programmes for students in the 1990s, after a decline in the

1980s, has been attributed to the development of electronic retrieval tools (Rader 1995). In the study of post-graduate science students at Oklahoma University, it was shown that students relied on electronic abstracts and indexes when searching for relevant journal articles (Brown 1999). Many only used print-based abstracts when the online databases were offline, and considered such an occurrence as one of the possible frustrations that could arise during a search (Brown 1999 : 431). Similarly most of the students interviewed at Calgary University said that they used CD-ROM databases when searching for material in the library, while only a few said they used print indexes (Clarke, Hunter and Lipton 1996).

In a study conducted on the science and engineering faculties of two American universities it was shown that lecturers expected students to make use of electronic formats to a greater degree than the print-based versions (Leckie and Fullerton 1999 : 16). Similarly, in the study of the Engineering Faculty at ML Sultan Technikon, respondents emphasised electronic formats and computer ability, but showed little interest in print abstracts and indexes (Webster 2000 : 55 & 58).

Thus it is not surprising that some students in the current study viewed print-based abstracts and indexes as alternatives to the electronic versions, to be used in the event of a power failure. Hall (1999 : 30) attributed the popularity of electronic formats to students being familiar with electronic media in general and having an ability to keep up-to-date with changing systems, but cautions that although students may adapt to systems very quickly they are not always able to understand the concepts that underlie the functioning of the system. Thus students often, as soon as they become familiar with one system, carry on using that same system for all applications. It was also noted that students are often more accepting of information from a computer than from a hardcopy source (Hall 1999 : 34). Students at Calgary University also preferred using CD-ROM databases as they found the retrieval tools easy to use (Clarke, Hunter and Lipton 1996).

5.5 Awareness and use of sources by class and year

In this study a tentative finding was that year had an influence on usage of retrieval tools and sources, in particular the proportionately greater use of abstracts and indexes by fourth year

students. There was also a difference in students' awareness of the library layout and use of sources according to the classes in which students were situated at the time of completing the questionnaires. One class for example which consisted of students from one particular major BSc(Dietetics), largely knew about interlibrary loan but had less awareness of the reference section, while other classes knew about these resources equally. These differences indicate that there are some other influences that occurred subsequent to the Agri220 module, which the students themselves seem to be unaware of. These findings seem to indicate that discipline and lecturers have an influence on students' awareness and use of sources in the library.

5.6 Summary

Although students came from school backgrounds which would have probably provided them with library facilities of a good quality, students did not seem to attribute this schooling background to their training in the use of a library. The students who did indicate training previous to Agri220 mostly mentioned tertiary level orientation. Students responded positively about the module and particularly found its guidance to library layout and sources of value. The module enabled them to use the library effectively and efficiently. The ability to find books and journal articles was the major concern to students. Students' usage of the library seems similar to that described in the literature regarding third year students without library instruction (de Jager 1997; Makotoko 1999). Most students in the present study, however, were aware of the resources available to them and seemed to understand the basic library concepts. There was variation in awareness of the sources in the library according to year and class, which indicates that despite the fact that few students reported further training subsequent to Agri220, some other factors must have influenced their retention of what they learned in the module.

Chapter 6 : Summary of findings, conclusions, recommendations and further research

The following chapter will give an overview of the study from the objectives through to findings that were obtained. It will also give the main conclusions drawn from the study, will give recommendations and will finally provide suggestions for further research.

6.1 Review of research purpose and objectives

The purpose of the study was to conduct an evaluation on the Agri220 module and to establish the contribution of the module to students' studies and the extent to which the skills and knowledge imparted by the module were retained and applied by the students in their studies.

The objectives of the study were :

- To determine perceptions of students from the School of Agricultural Sciences and Agribusiness about the Agri220 module, undertaken over a year ago, and its contribution to their current studies.

- To determine whether the stated desired outcomes of the Agri220 module were present in those students from the School of Agricultural Sciences and Agribusiness who had done the module over a year ago.

  Sub-objectives

  i. To establish students' awareness of the range of sources available to them, and how to locate and use them

  ii. To establish students' awareness of the range of retrieval tools available to them, and how to locate and use them

- To determine how those students from the School of Agricultural Sciences and Agribusiness who had undertaken the module over a year ago were using the library

  Sub-objectives

  i. To establish the retrieval tools used by students

  ii. To establish the information sources and sections of the library used by students

6.2 Overview of study

Chapter 1 discussed the increase in interest by both tertiary education and potential employers regarding the skills which students acquire during their undergraduate years. One set of skills is information skills, which enables the individual to independently locate information from a range of sources, and extract and utilise the information. Studies, however, have shown that students are not well equipped with library or information skills and are mostly unaware of the range of sources available to them in a library. Library instruction courses have become increasingly popular, internationally as well as in South Africa, and one such course is run by the Life Sciences Library at the University of Natal, Pietermaritzburg, for second year students in the Faculty of Science and Agriculture. This course, Agri220, has recently been formalised into a module and is a credit-bearing, compulsory foundational module. There had been no formal evaluation of the module prior to this study. The research problem, purpose, objectives and research questions were also stated in the chapter.

Chapter 2 gave an overview of the literature, describing the range of terms used to describe initiatives from user education to the broader concept of information literacy. A background to the development of the concept of information literacy was also provided. Finally a range of studies investigating students' library and information skills were described.

Chapter 3 dealt with the methods that were considered for the study, and the reasons for the decision to use a survey. Self-administered questionnaires were administered to five third year classes, and the students completed the questionnaires in class. The results

were then analysed using frequencies and cross-tabulations. The software package used was SPSS.

Chapter 4 dealt with the findings of the study:

- The students were drawn from four different degrees and came from a range of majors, and the majority were third year students. The students came from a variety of school backgrounds, mostly ones that would have been equipped with good quality libraries. Previous library training was mostly in the form of informal or first year orientation at a tertiary level, though some students indicated school libraries. Few students indicated subsequent library training, and when this was included was in the form of CD-ROM database instruction.

- Students predominantly named location of and easier access to books and journals as the most useful features of the module, and also focused on the electronic retrieval tools. Mention was made of the print-based abstracts and indexes. Few students commented on least useful aspects of the course. A considerable number of the students believed the module had contributed to their ability to retrieve information from the library: pointing out that they could locate sources; that they were more efficient in using the library and that the process of information retrieval was much easier; and as a result time was not wasted in the search process.

- The suggestions that were made about changing the module were mainly as additions: the incorporation of instruction on CD-ROM databases; the module should be extended; be moved to first year; and taught in smaller groups.

- Little use was made of Agri220 notes, and those who did use them mainly consulted them when compiling references.

- As an indication of students' familiarity with the layout of the library, students were asked about the location of encyclopaedias and about the interlibrary loan

service. Fewer students knew about the former than the latter: half of the students knew about the reference section, while 70% knew about the interlibrary loan section.

- A majority of students knew about the sources that could be located using the OPAC and the ways in which access to a source could be made on the OPAC. Over 90% associated OPAC with book retrieval, though a quarter believed that journal articles can be acquired through use of OPAC. Fewer students were aware of the use of print abstracts and indexes, with just 35% of the students stating that journal articles can be retrieved using these retrieval tools.

- More students made use of the CD-ROM databases than of the print abstracts and indexes, and a majority mentioned using the database CAB abstracts. Students also indicated that when searching for journal articles they preferred using the CD-ROM databases, and also made use of the reference lists in articles and books.

- Half of the students did supplementary readings, and of these most relied on reading lists, material in the reserve collection, and textbooks, while fewer mentioned browsing the open-shelves or using retrieval tools to locate relevant material.

6.3 Conclusions

- Students felt that the module had given them a good grounding in the use of the library: they were now familiar with the layout of the library and the location of sources; how to use retrieval tools; and were more efficient in following the search process. This fulfills the objective of a foundation module, which is to form a basis upon which other modules build. It also ties in with the desired outcomes that were stated in the module's template, about the module's objective to create an awareness of library resources, how to locate them, and how to use retrieval tools and sources.

- The module seems to have, by students' accounts, created an awareness of resources, and some understanding of the difference between information sources and the tools used to gain access to them. However students showed a much greater awareness of some sources than others, for example they had a greater awareness of the retrieval function of OPAC than of the retrieval function of print-based abstracts and indexes. This perhaps indicates that usage has some influence on their awareness of resources and the functions of these resources. Even though few students mentioned any formal or informal subsequent training, there could possibly be some form of influence that consolidated what they had learnt. The variation in awareness and usage of different sources between the various classes, and the difference between the fourth year students and third year students suggests that lecturers have an influence on students' library knowledge. Thus, for example, students at a fourth year level had a greater awareness of some of the retrieval tools than third year students did, as they would be expected to do more independent searching.

- The module itself does not seem to influence students' usage of the library, even though it may improve their ability to use the library. Comparisons can be drawn between the students in this study and those at a third year level in other studies where there has been little or no library instruction. However, comparisons can only be tentative as few such studies have been done and mostly from other disciplines, and there does seem to be variation between disciplines.

6.4 Recommendations

- The module seems to fulfill the objective of providing a grounding for students in their search procedures: knowing where to look for information sources and how to gain access to relevant sources through use of retrieval tools. Some students suggested alterations to the running of the module itself, that the module run for a longer period, and be run in smaller groups. These students said that it was difficult to absorb so much information in such a short time. In such a module, where just three evenings are spent teaching students, a lot of concepts have to be

covered and many new and unfamiliar sources and retrieval tools need to be introduced and explained, such as abstracts and indexes. And for some students who have possibly come from a background with no library experience, there will be an unfamiliarity with even the basic aspects that are covered, which ordinarily would be expected to be brought across to the tertiary level from school. Thus for consolidation of the material covered and a slower pace to be adopted to ensure that students understand what is taught, it would probably be of benefit to students that the module be extended. However the module is already being run in the evenings so that it can be accommodated into the curriculum, and as it is dealing with around 200 students and has to repeat sessions to cut down the size of the classes taught, the present situation does not actually allow for its extension.

- Another aspect students touched on in their suggestions was that the module be brought forward to first year. Perhaps at a first year level, which is a year that is very general and where the discipline-specific direction has not yet been taken, a compulsory basic introduction to the library and exposure to the library catalogue would be appropriate. Such an orientation would then ease the pressure on the amount that would need to be explained in the Agri220 module. Library orientation already forms part of the orientation programme for first years, however the orientation is just a one hour introduction to the library and although it is supposed to be compulsory for first year students, it does not reach all the students (Kuhn 2001). Students also mentioned incorporation of the CD-ROM databases into the module, however this component of the module was already added on in the year 2000.

- Students did show some confusion about abstracts and indexes. While 35% were able to point out that print abstracts and indexes are used to retrieve journal articles, others were unsure of the purpose of these retrieval tools but were aware of their connection to journals. Although most students could distinguish the retrieval tool that led to the source, they were not always aware of the principle behind the tool. This may indicate a need for clarification of this issue in the

module.

6.5 Suggestions for further research

This study makes four recommendations for further research that could be conducted:

- Another factor that could influence awareness and use of sources, could be the sources that lecturers expect students to use for their assignments. A study on the third year students and fourth year students who have done such a module, could compare the awareness and use of sources in the library by these two levels of students. This study hinted at a difference, though the sample of fourth year students was much smaller than third years and therefore made it difficult to compare.

- A study could be done at a fourth year/post-graduate level, when independent use of the library is necessary, regarding the awareness of and use of sources between students who have done such a module and those who have not. The ideal method would be to test students before the one group did the module to compare initial abilities.

- In general, evaluations of library instruction courses being run at a tertiary education level need to be publicised to allow for comparisons between courses. Hence a study of courses on offer is necessary so comparisons can be made. A survey of all tertiary institutions in terms of information literacy and what is being done would establish the state of library instruction courses currently on offer in South Africa.

- More studies need to be done on the library and information skills and usage by students at different levels of study and between different disciplines. There seems to be an indication in the literature that there is a difference between library usage at a first year level compared with third year level, and a difference between third year level and post-graduate level.

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Appendix 1

Questionnaire on the module "Information Retrieval Skills Agri220"

As part of my Masters degree in Information Studies I am doing an evaluation of the "Information Retrieval Skills Agri220 " module, which is done by Agriculture students at the 2nd year level. The aim of this questionnaire is to find out at the third year level how the Agri220 module has helped in your studies so far.
The questionnaire is divided into three sections : 1.) general background
2.) your feedback on the Agri220 module
3.) to see if the main outcomes of the module have been attained
The questionnaire is anonymous and is not a test. It consists of either multiple choice questions or brief answers - please answer them to the best of your ability. If you have done the questionnaire before please do not do it again.
Thanks for your co-operation. Emily Krige (MIS student, Information Studies, School of Human and Social Studies).

Section A. Student profile

1. What degree and major are you doing?
   _____

2. What year of study are you in?
   _____

3. At what high school did you write your matric?
   _____

4. Which of the following types of assignments have you done since the beginning of the year? (tick as many answers as apply) :
   __ none
   __ tuts
   __ prac reports
   __ essay/s
   __ seminar/s
   __ project/s
   __ other ... please specify_____

5. When did you do the Information Retrieval Skills Agri220 module?
   _____

6. Before doing the Information Retrieval Skills Agri220 module had you had any other formal or informal training in the use of a library (e.g. library orientation)?

__ yes
__ no
If yes, please give brief details

_____

7. Have you had any other formal or informal training in the use of the library after doing the Information Retrieval Skills Agri220 module, (e.g. that may have been incorporated into another module)?

__ yes
__no
If yes, please give brief details

_____

8. What type of assignments have you used the Life Sciences library, or any other library, for since the beginning of the year? (please tick as many answers as apply)

__none
__tuts
__ preparation for pracs
__ prac reports
__ essay/s
__ seminar paper/s
__ project/s
__ other ... please specify_____

Section B. : Perceptions of the module

9. What aspects of the Information Retrieval Skills Agri220 module have been most useful to you in your studies since doing the module?

_____

10. What aspects have been least useful?

_____

11. In what ways do you think the module should be changed?

_____

12. Do you feel that the module had an effect on your ability to retrieve information from various sources in the library?

__ yes
__ no
If yes, please explain briefly

_____

13. Do you refer back to the notes that were provided in the module?
__ yes
__ no

If yes, under what circumstances do you use them

_____

14. What changes would you suggest be made to the notes?

_____

Section C : Use of sources in the library

15. If wanting to locate an encyclopaedia which section of the library would you go to?

_____

16. If an item were unavailable in the library how could you get hold of it?

_____

17. Which of the following items can be located using the computer catalogue, OPAC (please tick as many answers as apply)
__books
__journals
__ theses
__journal articles
__abstracting journals

18. There are a number of ways to locate an item using the OPAC, please give three ways of doing so

_____

19. What would you use a print based indexing or abstracting journal for?

_____

20. Have you used a print based indexing or abstracting journal since the beginning of the year?
__yes
__no

If yes, please name one you have used_____

21. Have you used a CDROM database since the beginning of the year?
__yes
__no
If yes, please name one you have used_____

22. When searching for journal articles which of the following methods do you use (please tick as many answers as apply)
a) __ search using a CDROM database
b) __ search using print-based index or abstract journals
c) __ browse through the content pages of a journal on the topic
d) __ use references from a journal article/book

Please indicate which of the above choices is your preferred method of searching for a journal article (a-d)
_____

23. Do you supplement lecture notes with additional readings?
__ yes
__ no

If yes, what type of readings? (tick as many answers as are applicable)?
__ recommended reading lists from lecturer
__ from doing a search using one of the finding aids
__ books/articles on short loan
__ prescribed textbook
__ browsing among the shelves
__ other, please specify _____

Thank you for completing this questionnaire, please return it as soon as possible.

Appendix 2

Template of Agri220 Course - 6 June 2000
University Library in association with the School of Applied Environmental Science

A Academic Quality of the Module
1. Title of module: Information Retrieval Skills
2. Module code: AGRI220
3. NQF Level: 6a
4. Credit value of the module: 1
5. Field/subfield: agriculture and nature conservation/physical, mathematical, computer and life sciences.
6.School offering the module: University Library in association with School of Applied Environmental Sciences
7.Programme(s) on which the module will be offered:
Service course for Agriculture, Science and Environmental Science programmes
8.
   8.1. Date of submission (to Faculty/College Board): 6 May 1999
   8.2. Date of 1st offering: 2000
   8.3.Date of evaluation and review: 2001

9. Purpose of the module
This module is designed to provide students taking agriculture, science and environmental science options with the skills necessary to retrieve information from the substantial resources at the disposal of the university library and elsewhere independently and efficiently. Years of experience in user education have shown that the optimum time to offer the module is in the second year of study. Knowledge of the principles, process and tools involved in the advanced, systematic retrieval of information provide the student with a lifelong, research skill.

10 Statement of specific learning outcome for the module
While the outcomes listed below are the desired outcomes, it is recognised that a student only needs to exhibit reasonably adequate skills at the end of the module. It is appreciated that these skills will develop with each literature search performed during the remaining years of study.

Knowledge
1. The student understands the structural organization of information and the methods of organizing information.
2. The student knows the different sources of information e.g. books, journals, maps, audio-visual material, grey literature.
3. The student knows where to find and how to use the different tools to access these sources e.g. OPAC, abstracting and indexing journals and CDROMS and some online databases.
4. The student knows the correct order in which to use the different sources e.g. start from

the simple and move to the more complex.

Skills

5. The student identifies and selects the appropriate information/data sources.
6. The student selects the appropriate tools to access the selected information sources and uses these tools effectively.
7. The student applies the steps of information retrieval correctly (ie the order in which you retrieve information).
8. The student compares and evaluates the information retrieved from the different sources.
9. The student records bibliographic and electronic references correctly.

Attitudes and values

10. The student is confident in retrieving information in any context.
11. The student appreciates the vast scope and diversity of information resources.
12. The student is organized and flexible in her/his attitude to information; this lending itself to greater creativity.
13. The student's learning, research and work capacity is enhanced.

11 List of content topics

1.Orientation of students in terms of worldwide organization of information, bringing it down to the local library level.

2. Sources of information: books (different types of books)
   journals (different types of journals)
   videos and audiotapes
   maps, CDROMS, computer disks and online databases

3. Tools to access information sources in different formats, and instruction in how to use different tools:-

for books - OPAC, printed catalogue, subject guides.
for journals - OPAC, printed list, subject guides, abstracting and indexing tools (hardcopy and CDROM format).
for online database e.g. (SABINET) - login procedure etc
for videos, audiotapes - OPAC
for CDROMS and computer disks - OPAC

4. Steps in systematic retrieval of information:-
   topic formulation
   reference selection and recording, including the function of the review paper and *Science Citation Index* in this context
   document acquisition
   information retrieval from documents

12. Types of delivery and estimated notional study hours per type

Student activity	Number of notional study hours
Lectures	3 lectures = 2 +1/2 hours
Practicals	5+1/2 hours
Sub-total: No. of contact hours	8 hours
Self directed study	2 hours
Sub-total: No. of notional self-study hours	2 hours
Total: No. of notional study hours required to complete the module	10 hours

13. Teaching - learning methods used in the module

1. The courses will be held after hours in he Agriculture and Science undergraduate LANs.
2. The course will be presented in two phases for logistical reasons, with phase 1 (constituting 80%) being presented within the first two weeks of the first semester, and phase 2 (constituting 20%) being presented within the first two weeks of the second semester.
3. Lectures (including practical demonstrations of the online catalogue (OPAC) facilitated by the use of data projector; the major agriculture and science indexing and abstracting journals (hardcopy) and CDROM databases, demonstrating boolean logic); practicals (involving answering questions off the OPAC, using books and journals to retrieve information, using abstracting and indexing tools (both hardcopy and CDROM versions), recording references: all of the above involving interaction with the lecturers and demonstrators using a question and answer approach ; comprehension exercise.
4. Each student will be required to satisfy the lecturer that they are reasonably literate in terms of information retrieval skills.

14. Statement of assessment criteria against which the specific learning outcome for the modules are assessed.

The student is required to hand in a total of three completed practical assignments and one comprehension exercise to demonstrate that they are reasonably proficient in the use of the library and its resources.

15. Methods of assessment to be used in the module (indicate the weighting for each method)

Attendance (40%)

Assignments (60%) with 60% required as a pass