

## **Providing learning opportunities for teaching research information skills**

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### **Abstract**

Information literacy skills can contribute to effective research, especially if it is linked to curriculum content. Since 1998 the Department of Information Science at the University of South Africa (Unisa), in collaboration with the Unisa Library Services, has been offering a post-graduate module in Research Information Skills (RIS). The module is generically structured, and can be offered at different levels of study for all courses. The benefits the module offers, the aims and outcomes and the learning content, as well as the learning opportunities are discussed. Special learning opportunities (eg a workshop, computer-assisted tutorials and a Web site) are used to cater for the needs of adult distance learners acquiring these practical skills. A large component of computer illiterate students require additional special measures. A few suggestions are made in this regard.

### **Opsomming**

Vaardighede in inligtingsgelettertheid kan bydra tot effektiewe navorsing, veral as dit aan die kurrikuluminhoud gekoppel word. Sedert 1998 bied die Departement Inligtingkunde van die Universiteit van Suid-Afrika (Unisa) in samewerking met die Unisa Biblioteekdienste, 'n nagraadse module in navorsings-inligtingsvaardighede (Research Information Skills) aan. Die module is generies saamgestel, sodat dit op alle studievlakke aangebied kan word vir alle kursusse. Die voordele wat die module bied, die doel en doelwitte, en die leerinhoud, sowel as die leergeleenthede, word bespreek. Spesiale leergeleenthede (bv 'n werkwinkel, rekenaargesteurde onderrig tutoriale en 'n Web-werf) word gebruik om te voorsien vir die behoeftes van volwasse afstandslereers wat praktiese vaardighede verwerf. Die groot komponent rekenaar-ongeletterde studente verg spesiale maatreëls. 'n Paar voorstelle word in die verband gemaak.

### **BACKGROUND**

A module in Research Information Skills (RIS) has been developed by the Departments of Information Science and Library Services at the University of South Africa (Unisa), as part of a team effort. The Bureau for University Teaching (BUT) and the Centre for Software Engineering (CENSI) from the Department of Computer Science and Information Systems were also involved in the development of some of the components of the study package. The module was instituted on request of a former dean of the Faculty of Science and was first introduced in 1998. For 1998 and 1999 the module was presented for students doing a Masters degree in Chemistry Education (Module MCE507-H) and students doing a Masters degree in Environmental Education (Module MEDE04-S). The study guide was written by a staff member of the Unisa Library Services, J E Thompson, who has since resigned. From 1999 the module was therefore presented by the Department of Information Science because they have extensive experience in teaching similar skills to Information Science students (Fourie 1998). The Department has also been extensively involved in the original planning of the module and development of a CAI tutorial on the formulation of search strategies, in conjunction with Unisa Library Services (Fourie 1999). The Department of Information Science will in future be responsible for further development, and the presentation of the module. This will, however, be done in close cooperation with a representative from Unisa Library Services. Library Services will also continue to present the workshop for practical skills, which is currently coordinated by one of the authors of this article, Els ten Krooden.

The RIS module has a very strong practical component and requires students to complete an information (or literature) search on a topic of interest which falls within their subject discipline. Students also have to compile a personal database to record the information they have found, so that they can use it at a later stage when working on their research projects. Although printed sources are recommended to find information, and the database can be based on a card system, the emphasis is on the use of electronic sources to find information (eg the library catalogue, databases such as ERIC and the Internet). Students are also taught how to use a computer program (DB/TextWorks) to develop their personal databases.

Although the module has currently presented to two groups of Masters students, the content is of a generic nature. The module is structured in such a way that it can easily be adapted to form part of an existing module (eg as with MEDE04-S), or it can be presented as a module on its own (eg as is the case with MCE507-H). By minor changes in the assessment (eg the extent of the practical exercises or the level of difficulty of the practical exercises), the module can easily be presented for courses at honours or even at undergraduate level.

Many of the students who have enrolled for the RIS module have no, or inadequate computer skills. This causes much anxiety for them, and also impedes their progress. Students' experiences with the module and the benefits they see for their studies, as well as their personal lives, are however, very positive. This serves as a major driving force to promote the module for other departments and to work on methods to overcome the barriers due to inadequate computer skills. Suggestions to address the latter are therefore included in this article.

The purpose of this article is to explore students' experiences with the RIS module in the light of the internationally acknowledged need for information skills as an important component of successful research and lifelong learning. The need for the RIS module is also considered in the light of the general trend to incorporate information skills as part of subject curricula — something which has been widely reported in the Information Science literature (see, for example Barry 1997; Somerville & Carr 1997; Rader 1994, 1995; Carr 1993; Behrens 1992, 1993; Earl & Hamberg 1991; Collins 1988; Gorin 1982).

The RIS module will also be considered in terms of its aim and outcomes, its content structure and learning opportunities. The latter are especially aimed at the development of practical skills and the needs of adult distance students.

## **WHAT IS INFORMATION LITERACY?**

Research information skills is closely linked to information literacy, which is actually the foundation on which the RIS module builds. When planning the module, a description of an information literate person, formulated by the California Media and Library Educators Association (1994:2-3), was taken as our point of departure and is given below:

An information literate person

- recognises the need for information
- recognises that accurate and complete information is the basis for intelligent decision making
- formulates questions based on information needs
- identifies potential sources of information
- develops successful search strategies
- accesses print and technology-based sources of information
- is a competent reader

An information literate person

- evaluates information
- establishes authority
- determines accuracy and relevance
- recognises point of view and opinion versus factual knowledge

- rejects inaccurate and misleading information
- creates new information to replace inaccurate or missing information as needed

An information literate person

- uses information
- organises information for practical application
- integrates new information into an existing body of knowledge
- applies information in critical thinking

Numerous definitions of information literacy can be found in the literature. According to Sayed (1998:14): "Information literacy refers to the ability of learners to access, use and evaluate information from different sources, in order to enhance learning, solve problems and generate new knowledge". According to Bruce (1995:159) information literacy is the ability to access, evaluate and use information from a variety of sources. Behrens (1992:26) adds to this definition by emphasising that information literacy lies at the higher end of the literacy continuum: "Information literacy entails the application of higher order cognitive skills such as synthesizing and evaluating information which has been gathered through basic location skills. Information literacy thus refers to a person's ability to apply particular information handling skills in order to locate and utilize information from any resource efficiently and effectively".

The RIS module builds on the before-mentioned information literacy skills, and especially emphasises the development of successful search strategies for various electronic sources, and the organisation of information for practical use in a personal database. Students are also expected to constantly reflect on the description of an information literate person and their personal growth in this regard.

## FACTORS AFFECTING INFORMATION LITERACY SKILLS

When planning a module in Research Information Skills, the meaning of information literacy, as well as the factors which may affect the acquiring of information literacy skills, should be considered. From a major investigation as part of the Infolit Project, which aims at promoting information literacy at the five tertiary institutions in the Western Cape, Sayed (1998:13-14) identified a number of factors which may affect the acquiring of information literacy. These factors have also been identified for the RIS module, and will impact on our future plans to cater for enrollment by students from other departments.

Factors	Role of the factors	Implications for RIS
Prior learning experiences	Students have different experiences and exposure to information literacy. Inadequate experiences may impede their mastery of research information skills.	Some students have had very little exposure to the use of libraries and information sources, even though they are enrolled for advanced degrees. Such students should attend the orientation courses presented by the Library Services, or the first year modules in information literacy offered by the Department of

		Information Science.
Contextually-specific teaching and learning	If students lack experience in using the information infrastructures and information technology in their subject discipline it will impede their mastery of research information skills.	Students who are unfamiliar with the information infrastructure of their subject discipline could attend the orientation courses presented by the Library Services, or the first year modules in information literacy offered by the Department of Information Science. The RIS module especially focuses on providing them with opportunities to become acquainted with the electronic information sources within their subject discipline. They should preferably, however, also be familiar with the more conventional sources.
Affective issues	Students should be able to recognise when they have an information need, and they should be confident and motivated to explore the world of information to fulfill such needs.	RIS encourages students to realise their shortcomings but also to become confident searchers for information. They are especially encouraged to become confident users of electronic information sources. Portfolio assessment is used to support them in building such confidence. Students are encouraged to reflect on their information needs as well as their learning needs. They are also encouraged to reflect on their growth in this regard.
Access skills	Students should have the skills to access information from different sources. For this they need various	RIS covers a variety of electronic information sources

	<p>literacies such as computer literacy, library literacy and network literacy (eg using the Internet).</p>	<p>which are dealt with at the workshop. These include exercises in using the library catalogue, appropriate commercial databases such as ERIC (an educational database), and the Internet. Since many students lack adequate computer literacy skills, these have to be addressed in a separate effort. Library skills can be addressed by the Library Services' orientation courses, and network literacy is addressed during the RIS workshop.</p>
<p>Use and evaluation</p>	<p>Students should be able to critically evaluate the information retrieved (as well as the sources), and use the information to solve problems, accomplish tasks and generate new ideas.</p>	<p>As part of the final project for RIS, students have to show how they found information for a selected topic of their choice. They also have to explain how they evaluated the information and adapted the search strategy accordingly.</p>
<p>Higher-order cognitive skills</p>	<p>Students should be able to use these (information literacy) skills to generate new ideas and contribute to knowledge production.</p>	<p>Although students are encouraged to use the information found during RIS for their subject related projects or research, the final application of the information is not tested as part of RIS. It is, however, tested in their completion of their projects (or assignments) for their subject disciplines.</p>
<p>Student-centred learning</p>	<p>Learners should be independent and should know how to learn rather than what to learn. Lecturers are the facilitators who guide students through the experiences.</p>	<p>RIS uses portfolio assessment which is strongly student-centred. The study guide and portfolio activities guide students' learning</p>

		<p>efforts and encourage them to explore aspects of information searching, different information sources, and to share their experiences with the lecturers. Students can comment on the module when submitting their assignments. In addition, focus group interviews are conducted at the workshop to get more detail on students' experiences of the module.</p>
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Learner-centeredness that is being led to a new understanding in the learning process (Kuhlthau 1997:709) is strongly emphasised by the RIS module's use of portfolio assessment. We discuss this more in a later section. The process of searching for information, especially effective and efficient searching, requires constant reflection, which makes it extremely suitable for portfolio assessment. The benefits of reflection on their learning and progress in RIS are highly valued by students currently enrolled for RIS. The use of portfolio assessment is dealt with in more detail by Van Niekerk (1998) and Fourie and Van Niekerk (1999).

For RIS the most serious problem seems to be students' inadequate computer skills, as well as the big difference between the large number of students who have never worked with a computer, and the few who are highly computer literate.

### **NEED FOR INFORMATION LITERACY SKILLS AND THE BENEFITS OFFERED**

The introduction of the RIS module is strongly linked to the many arguments to include information skills as part of subject curricula. For example, Bruce (1995:158) declares: "Effective research, learning, communication, decision-making and problem-solving, require individuals to be able to locate, manage, evaluate and use appropriate information from a wide range of formal and informal sources". Behrens (1992, 1993) and Thomasson and Fjallbrant (1996) also strongly argue that such skills should be related to subject curricula. Behrens (1993:127) proclaims: "... the major advantage of integrating library skills with subject-teaching is that the skills are learnt at the time of need and are more likely to be seen as relevant by students". Stephens (1996:205) again proclaims that a need for library skills training exists in mature students who are continuing their studies after an interval of several years. This need is even greater when considering the use of electronic information systems (eg the library catalogue, databases, and the Internet) which are increasingly the norm in academic libraries. Similar arguments for the need for courses in information literacy are provided by Oberman, Lindauer and Wilson (1998), Ricker (1997), Sayed and De Jager (1997), Silhanek (1996) and Warmkessel and McCade (1997). Barry (1997) also wrote an excellent article arguing for the training of doctoral students in research information skills, while Wood et al (1997) consider the use of computer-assisted instruction (CAI) to promote students' skills in searching for information.

There are also many discussions on the teaching of information literacy at school level, for example Craver (1997), Kuhlthau (1997) and American Association of School Librarians and Association for Educational Communications and Technology (1998). Students who are introduced to information literacy at school should be better prepared for the RIS module, and

this in future can lead to opportunities for including more advanced learning content (eg the use of current awareness services and the design of personal Web sites).

The urge for tertiary students to be introduced to research information skills can be summarised in Sayed's words (1998:x): "Information literacy is thus a 'key skill' similar to other foundation skills such as mathematics, statistics, language and communication. The electronic world-brain of the twenty-first century will make information discrimination and handling skills more and more valuable."

Successful training in Research Information Skills can offer a number of benefits to students. These can be summarised as follows:

- Students can gain an awareness that information is important and can make a difference to the quality of their work, research or assignments. It is also important for everyday decisions.
- RIS can lead to more interactive learning and teaching since students should be able to use information sources, especially the Internet, independently. It can for example support a problem-based-learning (PBL) approach to teaching.
- The lecturer's role as facilitator is supported.
- Students are prepared for lifelong learning since they learn how to use information sources independently, as well as critically. These skills can then be applied to their daily lives.
- RIS can give a competitive edge to courses since students can gain access to more information sources — especially if they have access to the Internet.
- RIS can supplement subject curricula by preparing students to search for additional information on their own.

## **RESEARCH INFORMATION SKILLS (RIS) MODULE AT UNISA**

Aspects of the planning and presentation of the RIS module are also described by Thompson (1998), Fourie and Ten Krooden (1999), Fourie and Van Niekerk (1999) and Ten Krooden (1999). The latter article focuses mostly on the presentation of the workshop and the students' feedback.

### **Aim and outcomes**

The planning of the RIS module was directed by the aim and goals that were set. These again were based on the characteristics identified for an information literate person, the need for information literacy skills and the benefits offered by such a module. According to Sayed (1998:13) and Rader (1996:75) the outcomes should be limited, achievable and measurable. This is what we strive for in RIS, where portfolio assessment according to a predetermined list of criteria, is used to measure achievement of the module outcomes.

The overall aim of RIS is to develop students' skills to effectively retrieve, evaluate and organise information required for research. For each study unit an aim and outcomes were formulated to support the overall aim. These can be summarised as follows:

- to understand the link between research and literature searching
- to understand the information industry and information infrastructure
- to understand computerised databases
- to understand the structure and nature of databases in order to apply this knowledge during information retrieval
- to understand how to formulate and adapt search strategies to retrieve the most relevant search results
- to understand the creation and maintenance of a personal database
- to understand what the Internet is and how to find information through the different Internet resources

- to understand the importance of publishing in appropriate journals (including electronic journals)

In the future it may also be necessary to include sections on how to keep up with new developments in the field (eg using current awareness services and the design of personal Web sites.)

### **Addressing information literacy skills at different levels of study**

The RIS module was designed to be used at various levels of study: from undergraduate courses through to Honours, Masters' and even Doctoral level. The information contained in the study guide and the two CAI tutorials is of a generic nature and suitable at any level of study. The portfolio activities and final project (ie the literature search and the design of a personal database) can be adapted according to the level of study; or whether RIS is presented as a full module or as part of a module (eg a module within a research methods course). The portfolio activities are set in a separate tutorial letter, and can therefore easily be adapted for different levels of study.

### **Learning content**

In the RIS module the emphasis is on gaining information literacy skills to support research projects. Thus the student is introduced to the concept of information literacy and the research process in the first unit of the study guide. The theme of acquiring information to successfully complete research projects is carried throughout the study guide, and cumulates in a highly subject-related workshop where students get hands-on experience in using various sources to find information. Students are also expected to analyse and understand their own levels of information literacy and the progress they make, and are encouraged to consider methods to address their shortcomings.

The learning content is divided into eight study units which include the following:

- research and information
- information sources \*
- computerised information retrieval
- database structures
- search strategies
- organisation and maintenance of information in a personal database
- Internet navigation and use
- publishing

\* Although the total information infrastructure, including printed sources is mentioned, the emphasis falls on electronic resources.

### **Learning opportunities**

Students who enroll for RIS are adults, who are often also employed on a full-time basis, and with family and other responsibilities. Our experiences during 1998 and 1999 have also shown that a large number of the students have inadequate or no computer skills. Since the students also have different learning styles, and are not always in a position to attend the workshop to gain the practical skills, a number of learning opportunities are provided to master the required skills. These include the following:

- Study guide (including self evaluation exercises).
- Tutorial letter with portfolio activities.
- Two CAI tutorials (these deal respectively with the formulation of search strategies and database structures).

- Practical workshop covering searching the library catalogue, a selected subject-related database(s) and the Internet, and designing a personal database. Since the current group of students enrolled for RIS are teachers, the workshop was scheduled to fall in the June - July school holidays.
- Advising students to work through some of the lessons of Comuser, a CAI tutorial developed by the Department of Computer Science and Information Systems.
- Pre-workshop sessions allowing students to work through selected lessons from Comuser to gain computer skills. They can also use the opportunity to work through the two CAI tutorials on the formulation of search strategies and database structures.
- Web site with additional information and links to sources that can be used to search for information.
- Independent practical sessions in the computer laboratory of the Department of Information Science (by prior arrangement).
- Advising students to watch a selection of videos on how to search computerised databases for information.
- Use of facilities in the computer laboratories in the different branches (unfortunately these still do not provide all the required facilities).
- Test version of the program which is used to create the personal database (DB/TextWorks)

The learning opportunities are dealt with in more detail in another article by Fourie and Ten Krooden (1999). In this article we will only highlight the role of the workshop.

### **Role of the workshop**

From students' feedback it is clear that they thoroughly enjoyed the workshop and found it extremely useful. Their lack of computer skills, and the additional stress this put them under to keep up with the pace of the workshop, however, seems to be a major stumbling block. This aspect needs to be addressed even more intensively in the future. It, however, takes up a lot of extra time from the teaching department (Information Science) and Library Services, who present the workshop.

In the workshop the emphasis is on subject related exercises, to support students in the completion of their research projects for their subject disciplines. It aims at hands-on experience. Students are introduced to different components of the information infrastructure and how to find information. Searching the Library catalogue (OASIS), as well as an applicable database (ERIC) and searching the Internet are covered. The Library catalogue and ERIC are available via the Internet. Students can therefore practise from home if they have Internet access. This also makes it easier for them to revise their answers to the practical exercises covered at the workshop.

The workshop focuses on

- step by step guidelines in the practical exercises and the use of different components of the information infrastructure
- the use of relevant, subject-related examples
- learning through self-exploration. Students are advised to constantly reflect on what they are doing, the effectiveness of their information searches, and to explore new aspects of the information sources.

The workshop program covers the following:

Day 1:

Searching the library catalogue (OASIS) and a brief orientation to the Library. The emphasis was on how to search using keywords or subjects.

Day 2:

Search skills using a specific subject database, such as ERIC (an educational database). The emphasis was on searching for keywords and evaluating the search results. Students then had to adapt their search strategies accordingly. Training based on evaluation rather than on procedures has been shown to be more effective in teaching library end users to retrieve quality search results (Cheney 1991; Jacobson & Ignacio 1997). Students are encouraged to evaluate their search results, and to make informed decisions about the information they retrieved. In this way critical thinking skills are incorporated in their information skills training. The Masters students, knowledgeable in their own fields, such as environmental education and chemistry education, have the authority to evaluate their results based on their subject knowledge. Through making choices and refining their searches, the students are constructing meaning and increasing their understanding of their research topic. The evaluation process is also very strongly emphasised in their portfolio assessment.

Day 3:

Searching the Internet: how to navigate the Internet and how to find specific sites by means of subject directories and search engines. Students also have to complete several Portfolio activities in this regard (eg searching for discussion lists in their field of interest).

Day 4:

How to organise information in a personal database. Students also learn how to design a database, how to add records to the database, and how to search for records in the database. In the design of the database they have to decide on the fields they will include in the database.

Day 5:

The last day provides the opportunity for students to practise the skills learned and to apply them to the portfolio activities. This also gives them the opportunity to complete the portfolio activities for their examination portfolio.

### **Problems with computer literacy**

As we discovered that the students who attended the workshop in 1998 were not computer literate, we insisted on the acquisition of basic computer skills for workshop attendance in 1999. Students were provided with a pre-workshop opportunity to gain basic computer skills. This was limited to the use of the keyboard, the mouse and using icons and menu-driven options. Two days were set aside for this: the Friday and Saturday before the RIS workshop. Students were also encouraged to work through the CAI tutorial, Comuser, as well as the two other CAI tutorials, using Unisa computer laboratories if they did not have personal access to a computer. Several students made use of the pre-workshop opportunity, but still felt that they lacked the necessary computer skills to keep up with the pace of the workshop. There were also, however, students who were highly computer literate, and who felt that they could have achieved much more if a separate workshop, based on students' computer literacy had been conducted. For 2000 we are planning to allow more time for the pre-workshop session, and to have two workshops: one for computer literate students, and one for students who are still working on their computer skills.

### **Assessment method**

Portfolio assessment, where students build a portfolio of their own work, was selected because it links very well with the interactive nature of searching for information. The latter includes adapting search strategies, consulting different information sources, critically evaluating information sources, and constantly reflecting on the search process, and the effectiveness of the search. The compilation of a portfolio is also based on reflection, on

growth, knowledge and skills and on the revision of work. A holistic view is taken of the search process for information and its subsequent organisation. Students are encouraged to record their learning experiences and growth in their portfolios in order to enable them to have a record of the skills they have acquired, for future reference. The portfolio thus becomes a collection of their accomplishments and of their learning outcomes.

Students' reactions to the use of portfolios have been very positive. Although they sometimes have spent too much time deciding how they are going to structure their portfolio and what they will include, they feel that they greatly benefited from the independent nature of the work, as well as the constant reflection on their growth process. Since they are not penalised for wrong answers, they feel that they can take more chances to experiment with different approaches to their work.

Students have to submit two assignments based on the portfolio activities and practical exercises on the finding of information and the design of a personal database. They receive comments on their work as well as a personalised letter. They are advised to make the necessary changes, and resubmit the revised answers as part of the next portfolio. This also applies to the final examination project which covers the students' final efforts on the assignments, their search strategies, and personal database. Reflection on the effectiveness and success of the searches, critical evaluation of the search results, and the usefulness of the personal database is strongly emphasised. The examination portfolio is marked according to a predetermined list of criteria which is also made available to students in the tutorial letter setting the portfolio activities. An external examiner is also involved. The use of portfolios and portfolio assessment in RIS is dealt with in more detail by Fourie and Van Niekerk (1999).

### **Student experiences and the benefits they gain from RIS**

Students' experiences of RIS have been very positive. We gain feedback based on their comments in assignments, questionnaires, as well as a focus group interview held during the workshop. The focus group interviews in 1998 and 1999 were conducted by a member of Unisa Library Services, and provide very valuable feedback. Students for example felt that

- they were empowered with computer skills
- they were empowered with skills to search for their own information (which could also be applied in their jobs, other courses, and personal lives)
- they have the ability to apply the skills they have learned.

### **CONCLUSION**

The RIS module has great value for students enrolled in any academic course but should be linked to a particular module or course to put it in the context of the student's subject discipline. Since we hope to introduce the module to other courses, we are constantly revising the course structure and learning opportunities. Our efforts are based on feedback from students, monitoring students' reactions and performance, as well as the subject literature and discussion groups to see what other people are doing in similar courses. Since the university's technological infrastructure is a major stumbling block, improvements in this regard are constantly being monitored and where possible, encouraged. Technological developments are also monitored to augment the module with recent developments.

Students' prior learning and inexperience in using a library, as well as their lack of computer skills seem to be the major stumbling blocks. These can be addressed in various ways. Skills in using the library can be addressed by library orientation courses, Internet courses or courses in using the library catalogue. Such courses are currently being offered by the Unisa Library Services. In a more formal context the two first year modules in Information Science (INS101-U and INS102-V) offered by the Department of Information Science can fill the gap. Efforts to help students gain the necessary computer skills will also be intensified.

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