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The design and implementation of an information literacy training course that integrated Information and Library Science conceptions of information literacy, educational theory and information behaviour research: a Tanzanian pilot study.

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Abstract

This paper reviews the implementation of an Information Literacy Training course at the University of Dar Es Salaam in Tanzania. The training lasted seven days and involved Masters students from the Faculty of Education. The course was created as part of a PhD research project on information literacy that was undertaken by the second author of this paper at the Department of Information Science at Loughborough University. The objective was to develop a training course that inculcated information literacy and could be implemented by staff in the library. The success of the course was therefore partly judged on whether it effectively enabled knowledge transfer. This was tested by involving librarians in the pilot, and who took the entire course, and then seeing whether they were able to effectively implement the course themselves. This paper explores the implementation of the information literacy training programme attended by Master students from the Faculty of Education at the University of Dar Es Salaam. The course was innovative in that it integrated knowledge from information behaviour research and educational theory with current perspectives of information literacy from Information and Library Science. The style of training was influenced by the pedagogical theories of Kolb and Vygotsky that stress the importance of experiential and reflective learning and mediated communication. The notion that learning information literacy is more akin to learning a culture rather than skills and that learners are active participants in the learning process further emphasised the need for communication and sharing of learning throughout the course. All stages of the course were evaluated using quizzes, exercises, group reflection and presentations that related to each stage in the course. Trainees' knowledge of information literacy was evaluated before and after the course to provide an indication of changes in knowledge. A review of the course content and its rationale is given here, challenges are identified, and questions about future initiatives are raised. The course, judging from the various forms of feedback, was effective. It also enabled the librarians to run subsequent courses, including the training of Masters students described in this paper. Hence, the programme proved successful in terms of knowledge transfer.

Keywords:

Information literacy training, educational theory, information behaviour, knowledge transfer, teaching, independent learning, information skills.

Information literacy instruction in Africa

A lack of technology and qualified staff has made it difficult to develop meaningful information literacy programs and projects that would lead towards optimal exploitation of the available information resources (Pejova, 2002). In particular, low IT literacy has posed a challenge for using ICT related information resources (Rosenberg, 2005). Nevertheless, several tertiary institutions in countries such as Kenya, Zambia, Zimbabwe, Botswana, Namibia and Nigeria have developed information literacy programmes. In South Africa following the Cape Library Co-operative (CALICO) project (Sayed & De Jager, 1997) the INFOLIT project was run to maximise the gains of networking and teach IL in the Western Province tertiary institutions (Karelse, 1996). Several projects were formed under INFOLIT with the aim of improving undergraduate teaching and learning with an implied design to generate cooperation between institutions (Underwood, 2002).

However, a number of problems were identified. One was the sporadic provision of courses in information literacy in tertiary education in South Africa. Another was that educational institutions in South Africa did not recognise the importance of this initiative, and therefore would not consider it in their mission statements and strategic plans. It was also realised that lack of funds to implement information literacy education played a big role in stagnating all programmes related to this initiative (Underwood, 2002). It was found that the majority of

South African students in academic institutions (especially from disadvantaged origins), were weak in information searching due to the lack of IT-related facilities in schools (Davis, 2004).

In Tanzania university libraries have been conducting library orientation programmes, since their inception, in order to introduce new students to the library, its layout, collections and services. Bibliographic user instruction programmes began in early 1990, when CD-ROM services were introduced to the University library, in order to familiarise students with basic search techniques and how to search for information needed for research purposes. Information literacy courses were introduced in 2001 when the Internet enabled access to free Internet resources and those that the library subscribed to. The training consisted of bibliographic instruction and information retrieval techniques (University of Dar Es Salaam, 2001). The push to enhance information literacy training followed the library's participation into a number of programmes, including the Programme for the Enhancement of Research Information (PERI) under the auspice of the International Network for the Availability of Scientific Publications (INASP) established in 1999 (INASP, 2004).

Universities of Dar Es Salaam and Sokoine adapted the PERI programme workshop modules and teaching materials for their ongoing information literacy programmes, focusing on using the Internet, access to electronic journals and resources as well as on searching and evaluation skills for electronic resources. The main emphasis was on the access, evaluation and use of electronic information resources. These training programmes were run with general library courses, such as how to locate resources in various library collections, using reference and special collections and services. End-user training was conducted through short seminars and workshops, or informally when users visited the library. Participation was generally on a voluntary basis. In some cases faculty members requested the library to organise special training for groups of students in particular subject disciplines (INASP, 2004). Challenges with current initiatives were recognised both in terms of content and structure. In terms of content, most courses failed to reflect the curriculum needs (ibid.). As indicated the emphasis was on traditional library instruction that was conducted in traditional 'chalk and talk' fashion. It was felt that too much emphasis had been put on ICT aspects, such as computer basics, and information retrieval techniques, while more emphasis should be placed on thinking skills and the broader aspects of information literacy. The following areas were also recognised as problematic computer literacy skills for some users and a lack of awareness of existing information literacy programmes (Kiondo & Katunzi-Mollel, 2005), plus inadequate training facilities and a lack of enthusiasm among some library staff for training, as well as the challenge of embracing new technologies experienced by both users and library staff. Also, information literacy programmes competed with the lecture schedule limiting the participation of academic and research staff of the institutions. As a result of these factors, as well as an appreciation of what had been done elsewhere in the world, it was decided to design an intensive, comprehensive, information literacy training course that could be incorporated into the University programme and could also be used to train people who would run such programmes. Furthermore, it was felt that the design of the information literacy initiative should incorporate knowledge of information seeking behaviour and relevant pedagogy.

Methodology

The teaching of information literacy was seen to be part of a broader remit of enabling independent learning and problem solving. Specifically information literacy was seen to be that aspect of independent learning that depended on the use of secondary sources of information, such as books, articles, World Wide Web sites, and the tools to locate these resources. In this case information literacy did not therefore encompass other skills, attitudes and knowledge that tend to fall under the heading of research skills such as gathering primary data through experimentation or survey that could also be considered a part of independent learning and problem solving. On the contrary information literacy was defined as encompassing knowledge of the wider information landscape including people and organisations that may help provide data, information and knowledge. In addition, it was seen to include knowledge of the social context within which these resources are generated that may have a bearing on effective identification and use of these resources and provides a rationale for building on existing knowledge. Furthermore it was seen as a set of attitudes and values that enable the effective use of these resources and provide the necessary motivation to conduct independent learning via secondary research. The context and normative values within which information literacy was to be taught was academic where people are expected to use certain resources such as online databases, online public access systems (OPACs), books, journal articles, search engines, Web based resources as well as experts and authoritative bodies that may provide such resources and knowledge. This, in turn, implied the ability to use library systems and information and communication technology (ICT). They were expected to derive research questions; access resources that would help answer the research question and communicate their findings through a presentation. This form of information literacy could therefore be

described as academic information literacy. In fact this conforms to common conceptions of information literacy that have tended to evolve out of the academic culture.

An extensive review of the literature relating to information literacy theory and practice, information behaviour, particularly that which related to students, and learning theory took place. This helped to identify what should be covered in an information literacy programme and also how it should be taught. On the basis of this, a pilot programme was designed and supporting teaching material was created. This took place in the United Kingdom (UK) at Loughborough University in the Department of Information Science. Interviews were then undertaken with librarians and academic staff at the University of Dar Es Salaam in Tanzania. This served to make sure that assumptions made about students knowledge of information literacy and the kind of problems experienced by students were correct. This was important since the majority of the literature that was reviewed originated in developed countries. These interviews showed that there was a recognised need for information literacy and that similar problems, such as unfamiliarity with information sources their use, were experienced in Tanzania and enabled the generic material created in the UK to be customised to take into account the local context.

Once material had been created the pilot was implemented. This was undertaken with new and established staff, from the University library at the University of Dar Es Salaam, and took place in April 2005. This helped to determine whether the format of the programme could be run in the way it had been envisaged. It also gathered feedback from library staff on the programme and from the first author of this paper who observed the training and had extensive knowledge of information literacy and training experience. In addition it later helped to determine whether the training course could be used to train librarians how to teach information literacy. The project can therefore be described as action based research that tested out training pedagogy, made changes and then implemented and tested the final course design. The design of the course took both a behaviourist and social constructivist approach to learning. A constructivist notion of learning was taken in the sense that it was assumed that people are actively involved in creating meaning and that these meanings are mediated through communication (Squires, 1994; Bruce, 1995; Fry et al., 1999; Race, 2001; Vygotsky, 1978). This led the authors to choose situated, problem-based approaches to course design (Brown et al., 1989; Biggs & Moore, 1993; Mayes & de Freitas, 2004). It also incorporated teaching and evaluation methods that stem from a behaviourist perspective including diagnostic tests and the teaching of specific skills that assumed that certain skills would be learnt and demonstrated. It was felt that the learning of skills had to be within a context that aimed to develop a shift in outlook and the development of a mind-set that reflected an appreciation of the norms, values as well as the knowledge associated with academic information literacy. Hence there was an emphasis on the communication and the sharing of ideas. Furthermore, the incorporation of pedagogical practice such as reflective learning and the need to include key thinking skills associated with independent learning and creative thinking (Moseley et al., 2004) was thought to be essential to help achieve learning objectives. Lastly, it was also felt important to incorporate knowledge that stemmed from research into information seeking behaviour as well as the work of other information literacy researchers. This was set within the broader Library and Information Science conceptions of information literacy (CILIP, 2005; Bundy, 2004, ACRL, 2000).

Following the pilot adaptations were made and relevant material was created for the training of Masters students from the Faculty of Education. These twelve students were selected because academic staff in Education were enthusiastic and, in the longer term, it was hoped that inculcating information literacy among future teachers could lead to the incorporation of information literacy teaching in schools. Currently in Tanzania teaching is primarily teacher-focused and tends not to take a problem-based approach to learning. The numbers were limited to twelve by the training facilities available. It was expected that the training programme would provide a generic framework that could be applied to the training of other students. However, it was important to ensure that the training related to the learning context of the students both, in terms of resources, and type of topics they were likely to investigate. As a result interviews were conducted with staff in the Education Faculty to understand how to make the training programme relevant to the students and to meet recognised educational needs.

Description of the training programme

The training programme was run over seven days, generally from 8.00 am to 5.00 pm. In the pilot programme the day finished at 3.00 pm, this was partly because participants were working librarians and needed time to complete other work tasks. However, feedback from the librarians and reflection on the pilot indicated a need to extend the hours allocated to the delivery of the training programme (See the Appendix: Information Literacy Course: Timetable for instructor at the end of this paper).

Introduction to the IL programme
From a pedagogic point of view it was important to engage the students at the beginning of the programme and this would be done partly by getting them to think about and discuss what information literacy means, and how they would describe an information literate person. This also introduced them to the participative, student centred, problem based approaches to learning that the programme followed, as indicated above. An approach that they were not used to. It was felt important that students understood the programme aims, objectives and anticipated outcomes, this, in itself, helped to generate students' motivation to actively take part in the training programme.

Diagnostic test
The same diagnostic test was implemented at the start of the course and at the end of the course, based on the work of Andretta (2005), although some changes were introduced to address the local needs. For example, questions concerning topics such as writing skills, essay writing, analysis, grammar and punctuation, which were covered by Andretta's diagnostic test to suit the learning needs of first year undergraduate students, were not included. Other questions that reflected the information seeking process (such as defining an information problem, synthesising information, communicating and using information) were added. Also several questions within the selected skills were modified to reflect the operating environment (University of Dar Es Salaam) and the subject nature of the students (educationalists) involved in the course. The diagnostic test served the purpose of reinforcing the meaning of information literacy, showed the students that this was a 'serious' enterprise and enabled the researchers to see whether, following a post training diagnostic test, changes needed to be made to the course to improve learning. The test covered the following aspects:

- personal particulars;
- knowledge of the Microsoft Windows environment;
- knowledge of Internet Explorer; knowledge of defining a problem or research topic; knowledge of information sources and their use;
- knowledge of the library, databases and Web resources; knowledge of evaluating information and sources;
- referencing skills and knowledge of synthesising and presenting information.

Defining the problem
Based on previous research (Garland, 1995; Smith & Hepworth, 2005; Seamans, 2002; Barranoik, 2001) it was felt important to give students choice over their topics. Extensive time devoted to defining the problem and deriving research questions was intended to help ensure engagement with, and ownership of, the learning process. In fact students came to the course with ideas for topics they wanted to explore in their Masters thesis. They therefore had a purpose and could see from a pragmatic perspective how they could benefit from the course. The trainer provided reasons for the need to define the problem, how this could be done and introduced them to resources that could help them achieve this goal, such as available dictionaries and encyclopaedias. It was felt important to start with familiar resources and ones that were easy to use. Time was allocated to help students define their long-term information seeking goals and how they could use information to fulfil these goals. Students were asked to identify what they already knew about the topic, as the literature demonstrates it is good practice to build on existing knowledge (Irving, 1985; Bruce, 1995; and existing IL models such as Bundy 2004, CILIP, 2005) and because this approach creates a less intimidating learning experience. Groups were formed. Each group was made up of students who shared similar individual research topics and were able to agree on a common topic that would help all members of the group achieve their research objectives. This was partly to create a supportive environment but also to ensure discussion between individuals. Discourse and the sharing of ideas were seen to be an important tool in the development of an information literacy mind-set and culture (Garland 1995, Laurillard 2002, Laverty 2002, Mayer & de Freitas 2004).

During the day students completed a quiz that was set partly to test individual understanding but more importantly to encourage trainees to reflect on what they had learnt (Fry et al., 1999; Squires, 1994; Race 2001; Kolb 1984) and also to provide immediate feedback to help ensure that, individually, students were on track. The importance of ongoing feedback was a need highlighted by students undertaking project work (Squires 1994; Smith & Hepworth 2005), rather than providing feedback at the end of project-based work (Moore & St George, 1991; Baranoik, 2001). The latter gives less apparent weight to processes and stages that underpin an independent learning project. From the researchers perspective it also helped to see

whether the training was effective, whether additional training was required and whether, in the long term, aspects of the course needed to change. Examples of questions included:

Why are Encyclopaedias a good starting point for getting information on a topic?

One way to help define your topic is to ask yourself what the topic is all about. What other questions could you ask yourself before you begin your assignment or research?

Toward the end of the first day students were asked to present the results of 'defining the problem'. Presentations were included throughout the training to encourage reflection; stimulate discussion within the groups, to help the class as a whole, identify problems and solutions and learn from each other. This was followed by an exercise that again encouraged reflection and helped the researchers to determine what had been learnt.

'Defining the problem' carried on into the second day. The time devoted to this reflects the importance placed on this stage by the researchers in terms of gaining motivation and commitment to the training and the assumption that trainees were active participants in the creation of an individual and consensual mental map of their topic. Particular emphasis was given to identifying and organising suitable terms that related to their topic. This process helped to ensure that the trainees were clear about what they were researching. It also meant that they used terms that could be applied as input for later searching. Searchers in general find it difficult to quickly identify terms and generally default to a rudimentary use of a few terms (Spink et al., 1998; Hepworth, 2003). This limits the success of their searching. Group presentations took place at the end of the training day and this was followed by a reflective exercise. The latter included questions such as:

Give a brief explanation of what you did in lessons 1 and 2

Which new skills did you gain in this lesson?

What happened after being taught all the skills in lessons 1 and 2? Were you able to apply the skills to your work? Provide your answers with a brief explanation on how the skills gained assisted you to define your topic or research problem.

If you were not able to apply the skills to your work, what could be the reasons? Please explain briefly.

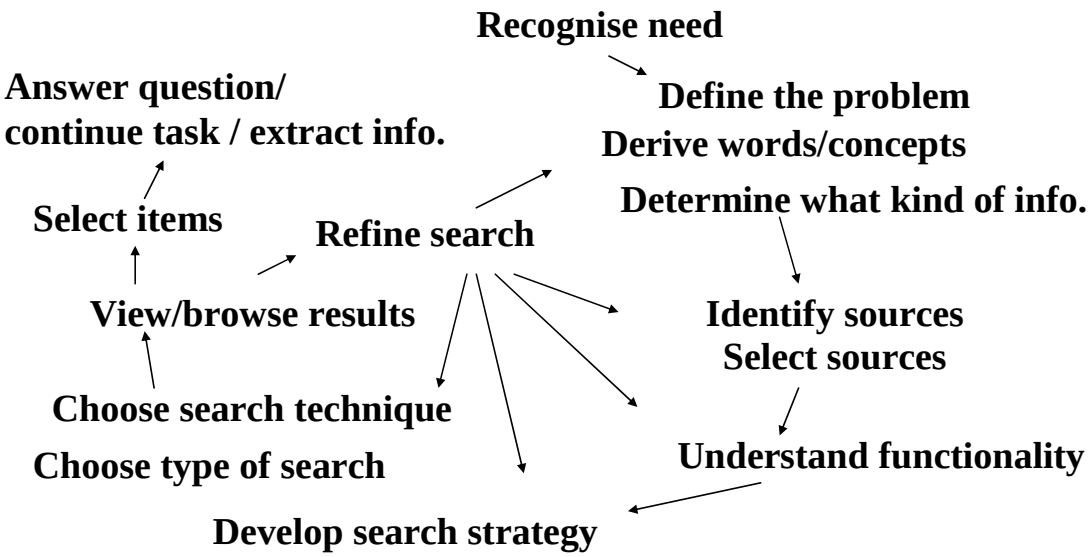
As well as encouraging reflective learning these questions aimed to help the trainees identify possible problems and solutions in order to develop a deeper understanding of the process that they were undertaking, such as defining the problem, or location and access and foster the ability to take a strategic approach to 'defining a problem' rather than only learning discrete skills.

Locate and Access information

Day 3 concerned locating and accessing information and focused on the available tools that could be used. Again the trainer started by discovering what was already known and familiar to the students. This led to a lecture/discussion about how knowledge is generated in society and the forms it could take. This served to inform them about the wider information landscape and alerted them to the range of sources that are available. This was followed by information about the structure of information sources and an introduction to search strategies. The latter included how to use fields, controlled vocabulary and how the structure of sources could be used to broaden and narrow a search

Previous research (Allen, 1991; Rowley, 2000; Hepworth, 1999; Shneiderman et al., 1997) indicated that these areas were problematic for students i.e. knowing where to go for information, not understanding the functionality of information retrieval systems, or what to do when they retrieved too many or too few items. Influenced by Kuhlthau (1993) it was also felt important for students to be conscious of the affective states associated with information retrieval and the wider research process. This would include the feeling of uncertainty at the start of the process. It was also hoped to dispel the false expectation, that may lead to frustration and people abandoning a search, that locating and accessing information is a linear sequence i.e. query-search-result, rather than a highly iterative process (Marchionini, 1997) of search-result-learn-refine-search-result-learn-refine etc. It was felt therefore that students needed to be emotionally at ease with the 'messy' process of building a mental map of the subject and the resources.

The following diagram was used to talk through this process:



Students applied this search and retrieve knowledge and, to reinforce this learning, were asked to identify tasks and processes that they experienced. This fed into the group presentation that consolidated the learning through reflection and discussion.

The presentation was followed by the quiz that included questions such as:

Give three reasons why the Internet may NOT be the best or easiest way to find information on a topic

One way to limit your search results in Web directories and search engines so that the results better reflect your topic, is to use phrase searching. To search for words as a phrase, what do you do?

put question marks around the words	□
put asterisks around the words	□
put quotation marks around the words	□

Online library catalogues, electronic periodical indexes, and Internet search engines are all examples of databases.

a. True	□
b. False	□

The information searching process is considered iterative: you can repeat the same process over and again until you are satisfied with your results.

a. True	□
b. False	□

This served to consolidate learning, provide feedback, and also to help determine whether the teaching had been effective. Location and access continued into the fourth day where students applied their knowledge, ran searches and started to capture information. Significantly more time was devoted to this than in the pilot due to the student's pressing need to build knowledge and skills in this area. Day three ended with group presentations of the search results and was followed by a reflective session including an exercise which asked students about the process and included questions such as:

Do you think that the knowledge acquired in the process of locating and accessing information would apply to other situations in your academic work? If yes, what is one thing you learned in this lesson that you will use for similar or related future assignments?

This question was intended to help the students to think outside the current situation and to develop knowledge that could be applied to other situations. It was also intended to demonstrate that this was the case and hence show the value of what was learnt in terms of its wider usefulness. Questions such as the following were designed to help to develop a strategic approach to searching and the ability to independently solve problems experienced in the past.

Generally, describe possible problems encountered in the entire process of locating and accessing information (if any) and how you solved them.

Synthesise and evaluate information
Evaluation tends to be well covered in most information literacy training courses, however, the process of identifying and capturing information tends to be less well covered. Specific techniques were discussed such as scanning, reading headings, summaries and conclusions to capture the essence of the materials used. These skills were placed in a wider research context, and particular emphasis was placed on inductive and deductive approaches to problem solving, since these provided a rationale for collecting data and information. Various techniques such as note taking were also discussed. Even though many students were expected to have these skills it was felt that they needed to consciously apply these skills during the information seeking process (Herring, 1997).

This led to a lecture/discussion concerning evaluation and the use of criteria such as reliability, validity, authority, and timeliness. Previous discussions with lecturing staff in the educational faculty enabled the trainer to incorporate relevant examples of logical fallacies found in educational research. As usual the latter part of the day involved presentations by the students on their evaluation process and how they had applied evaluation criteria. This was followed by group reflection and an exercise that tested student learning, encouraged individual reflection on specific aspects and the recognition of common problems and solutions.

Communicating and using information
Students were asked what previous knowledge they had with regard to presentation, and different approaches to presenting information were discussed. Factors such as intended audience were highlighted. Unusually for IL training time was spent on reasoning skills. This built on the previous session on induction and deduction. This led into the mechanics of referencing and citation and the ethical and legal issues surrounding effective use of information, including the topic of plagiarism. Initial interviews with library and academic staff had confirmed that plagiarism was a serious problem at the University, as it is in the United Kingdom and elsewhere.

Again this session was followed by a quiz providing immediate feedback to the students and a reflective exercise to test understanding and to help embed learning. Questions in the quiz included:

List any two formats for presenting information.

List two reasons for using citations in your research work.

The following are examples of plagiarism:

(a) Cut and paste information from the web or other resources without acknowledging the source. □
(b) Copying lists of citations/references at the end of an article or of a book without citing them in a work. □
(c) Genuinely forgetting that you had downloaded or otherwise copied the material and thought you'd come up with the text yourself. □
(d) All of the above. □

The exercise, as in previous days, was intended to encourage reflection and to see what individuals had learnt.

Give a brief explanation of main activities that you carried out in lesson 6 (communicating and using information).

Were you able to gain any important skills in communicating (presenting) and using information? If yes, give an outline of major skills that you learned in this lesson (if no, then answer question number 7 below).

Give an outline and brief explanations of the major problems you encountered in this lesson (if any).

In case you encountered problems, how were the problems solved?

Explain briefly, which other skills you had expected to learn in this lesson but were not covered?

Give your general comments about this lesson, and if possible your recommendations to improve the teaching and learning process.

Answers generated from these questions also provided feedback to the trainer about what had and had not been taught as well as the problems experienced. These questions were included, as stated, not only to encourage the students to think more deeply about the training, but also to obtain the students' opinion on how the training could be improved. This was thought to be useful for future programme design as well as encouraging the students to feel that they were actively involved in the learning process and that their input would contribute to the refining of the training programme, rather than being passive recipients of instruction. Such an active level of participation also reflected the student-centred approach to instruction.

Presenting information

The final day was devoted to the completion of the students' presentations. The purpose of these presentations was to provide an opportunity for students to present their findings on their research questions. This meant that the course had a genuine outcome i.e. a research question was answered. Hence from the beginning the students could see that the information literacy course should help them achieve their curriculum goals and objectives and provided a source of motivation for engaging in the training course.

The presentations were followed by the same information literacy diagnostic test used at the beginning of the course to help determine changes in the student knowledge over the period of the training course. Finally there was a reflective group discussion that looked back at the entire course followed by a brief individual exercise. Questions in the exercise included:

What were the major activities that you performed in this course?
After having studied all the lessons in the information literacy course, have you acquired any skills? State briefly the most important skills that you have acquired in this course.
To what extent do you think that the skills taught in this course assisted you to meet your information seeking goals?
State what your major achievements resulting from attending this course are by referring to the activities carried out in your group.
What do you consider to be the gaps in your knowledge that made some parts of the course difficult to understand? What solutions are there?
Do you think that you have acquired enough skills to solve any information related problems in your future assignments or academic work? State briefly what you would consider to be the most important and relevant skills to use in your future activities
In general what were the major problems that you encountered in this course?
Has the course met your expectations? State briefly your expectations for this course and indicate whether or not they have been met
What are your general comments about this course, what could be done to improve it?

The exercise, therefore, encouraged students to reflect on the entire course and what they had learnt. In addition it provided information that could be used to improve the training course.

Findings

Feedback from students was obtained throughout the course and gathered formally through exercises and reflective discussions. As stated earlier, the purpose of these was to encourage students to reflect on the various activities carried out in each session as well as to provide feedback on the overall course. It was also meant to provide critical evaluation of the course. Comments that related to parts of the course included:

Define a problem or research topic

"After having learned how to find the central idea about a topic, I was able to re-focus my topic from a general area of "Developmental psychology" to a more specific subject area: "Cognitive and perceptual development."

"I learned how to focus a topic and used the knowledge to restructure my topic and it was accepted by my supervisor."

"In our group, we were able to find synonyms related to our topic: attitude, performance, urban areas with the aid of a mind map. This helped us to discover relationship between various aspects of our topic such as how attitudes would influence girls' performance in mathematics in urban areas."

Locate and access information

"We used phrase searching to search for information about "girls' attitudes" AND "performance in mathematics" in Yahoo directory and got a list of annotated bibliographies and related terms "women" AND "mathematics", "gender" AND "mathematics" which were relevant materials to our topic."

"We used Yahoo directory to search for educational journals and alas! – We found so many articles on quality education, something that we never knew before."

Synthesise and evaluate information

"We evaluated a book by Wilson (1979) Critical analysis of teacher education and found that it was not relevant to our topic because it was old for our topic (the source was outdated) since many changes on curriculum aspects have taken place since then."

"We evaluated a journal article basing on criteria learned and realised that it was very relevant to our topic on girls' attitudes towards mathematics."

"We retrieved more than 12 books from the library OPAC, when we evaluated them; we ended up with only four which we considered relevant to our topic"

Communicating and using information

"I came to realise that reasoning skills are not only useful in research, they can be used in information work to provide evidence for my work by using information (evidence) from a library journal to prove something."

"We acquired different skills of quoting sources and we are going to prove to others tomorrow that our presentation has not been plagiarised."

"We were able to learn different ways of presenting information, we will use MS PowerPoint presentation programme to present our findings."

Performance in quizzes, presentations and diagnostic test

Quizzes were both summative and formative. They encouraged reflection on the previous learning, helped to test understanding and also led to immediate feedback to the students through the discussion that followed each quiz. Responses to quizzes showed that students understood various aspects covered in the programme. For example, students seemed to understand the need to define a topic or research problem; the importance of having focus; the need to acquire knowledge about the information landscape, such as reference sources and other potential sources of information. Students indicated their understanding of sources of information, printed and electronic, primary and secondary, search techniques and information searching tools. Furthermore, they indicated their understanding of the different aspects of communicating and using information. The latter included different ways of getting ideas from information sources (such as

reading, listening, viewing); the importance of applying reasoning skills when using information and various ways of presenting information including citation styles and the meaning of plagiarism.

Quizzes also revealed areas where students did less well. This was primarily due to a lack of understanding. For example in quiz B, a question on "the information search process being iterative", several students pointed out that they did not understand the meaning of the term "iterative" hence selected wrong choices. Also, on "describing the Internet search engine Google", one student pointed out that some records in Google contain similar information to the online catalogue record (author, title, place and year of publication) which showed a general understanding of structured information but didn't fully appreciate the highly structured nature of the catalogue record. It should be noted that English is the medium of learning in Tanzania and all materials accessed in this course were in English. However, it should be remembered that English was not the first language of the participants and that this caused problems of comprehension. Furthermore, not using English as a first language is likely to make information literacy practices more difficult, for example, thinking of alternative search terms requires a good vocabulary.

The presentations successfully enabled students to demonstrate the knowledge they acquired in defining research problems; creation of terms/words to be used for information searching; information seeking strategies; search and retrieval; analysis, evaluation and the use of information. The presentations were also seen to help students engage in information seeking activities because each group aimed to present the best results, and students worked hard to achieve this objective. Presentations also created a sense of responsibility in the groups and each student felt obliged to support group work by providing answers to the questions raised by the trainers and fellow students. Moreover, presentation methods, especially the use of Powerpoint, motivated students to learn new presentation skills vital in their teaching profession. These findings echoed those of Steinert and Snell (1999) who found that presentations promote active learning, heightening attention and motivation, and give satisfaction to the teacher and students. Regular presentations also served to show where students had failed to undertake certain activities. For example, after day one, it was clear that several groups had not fully defined their topics. As a result, trainers provided assistance and facilitated this process by helping them identify the broader and narrower subject domains associated with their topic. Presentations also served to highlight situations where a group of students had not kept a record of previous activities, such as recording potentially useful search terms. As a result these students were asked to repeat this activity which they successfully completed on their second attempt.

The diagnostic test showed a dramatic increase in students' knowledge. As there were only twelve students any statistical analysis is relatively meaningless. Nevertheless, in the pre-test more than half the students provided incorrect answers to more than half the questions. In the post-test a large majority of the students provided correct answers to all questions. A summary of the results is shown below.

Summary of students' performances in pre-tests/post-tests by average

IL Skills area	**Pre-test**		**Post-test**	
	Right Answers	**Wrong Answers**	**Right Answers**	**Wrong Answers**
Skills of defining a problem or research topic	5	7	12	-
Information sources skills	5	7	11	1
Skills of Internet resources	5	7	9	1
Internet search skills	4	8	9	3
Skills of database and library search	4	8	11	1
Skills of evaluating information and sources	4	8	10	2
Referencing skills	5	7	10	2
Skills of synthesising information	3	9	10	2
Information presentation skills	5	7	11	1

Problems experienced by the students

The main problem experienced by the students was a lack of ICT knowledge. ICT knowledge refers to knowledge of the Microsoft Windows environment and the associated applications as well as of the applications associated with information literacy, such as the OPAC or other search tools and their functionality. This is reflected in the following statements:

"Lack of IT skills minimised the excitements of the course. Most resources have to be accessed online these days and we could not make effective use of it."

"Despite all that was covered, I failed to know how to effectively make use of various techniques of information searching, because the course did not teach us IT skills as well."

"My weaknesses have been on how to use computers. Frankly speaking, throughout this course, when it came to using computers I felt very frustrated because some of my colleagues were manipulating things on computers quite faster than me and I could not catch up with them so easily."

An unmet expectation was evident:

"I thought this course would also cover several aspects such as different writing skills for journal articles. The rest was OK except for this one."

This would either need to be addressed in subsequent programmes or be part of a brief course that followed the core information literacy course.

Student reflection on the course as a whole

Critical comments included:

"Students should do IL courses after attending basic IT courses."

"The course should be run along a specific duration of time, say once a every week for eight weeks."

"In order for students to acquire the required skills, more exercises and hands on activities should be provided."

"Skills such as IR and bibliographic citations should be broader and must have follow up courses."

"The course should be conducted right before students finish year 1."

In general comments were positive and included statements such as:

"Right from the beginning to the end of this course, all the skills taught have been very important in our future work. For example, in order to write any research work, one has to know about what he is doing, what the subject is all about, what he knew before and what information is missing, how to get information to fill the gap how to find information and what to do with it."

"Information literacy skills, in my opinion, are scientifically well designed principles that enable one to do the same things even after this course is over. All skills taught can be repeated again by an individual with maximum effects."

"By knowing how information is generated, one can plan how to acquire it; this means that even after finishing my studies I can apply the same principles by knowing where to go for information."

"I can use reasoning skills to inductively observe an aspect, use the information from the observations to write a report about it in order to prove something."

"One of my goals was to publish a journal paper in academic journals. The skills of information searching acquired from this course have enabled me to gather enough literature for my journal article within a short time, and I am going to submit it in September 2005."

"I expected to learn how to search for information relevant to my research. I think this objective was met."

"I gained much more than what I expected would be covered in this course"

"I am happy that after knowing how to shape my topic and formulate relevant search terms, I was able to search for information sources that provided useful information to answer my research questions. Now my research proposal has been accepted by my supervisor and I am waiting to formally present it in the department"

"Working in a group on a topic that covered various areas of our research interests has assisted in finding answers to the main questions of our individual topics. We have now got a direction to follow when writing our Masters dissertations"

Several of these statement indicated that the students felt that they could apply the knowledge that they had gained on the course to other situations.

Conclusion and discussion

The course did seem to go well and was favourably received by the Masters students from the Educational Faculty. However, the lack of information literacy and ICT knowledge and a lack of presentation skills, information retrieval skills, and bibliographical citation skills among the students did have an impact on the effectiveness of the course. The lack of ICT skills meant that students made little use of folders (in the Windows environment) or online file management facilities such as Yahoo Briefcase to capture and organise information. It was felt, therefore, that in the future, prior to such a course, some basic ICT training and presentation skills should be provided. In addition, following such a course, further training should be given to build on the information retrieval skills learnt in this course, particularly in relation to the use of subject specific databases. Further training should also be provided on how to present information in reports, essays or journal papers. Additional training on bibliographical citation was also felt necessary. Ideally, as noted by the students, an information literacy course such as this should be run in the first and final year at undergraduate level, and similarly at the Masters level at the beginning of the programme as well as before the start of the dissertation. Whilst it would be possible to spread the course over a semester it was felt that this would reduce the impact of the training.

The extensive use of reflection and communication via group work, quizzes, reflective exercises and presentations seemed to be very effective and proved popular with the students despite their unfamiliarity with this style of learning. These methods, combined with problem-based learning, also provided a good way to keep students engaged and on track throughout the intensive seven-day course. It is recognised that these methods are commonly found in many other areas of learning, but are less evident in the teaching and learning of information literacy.

In general the conscious integration of Library Science approaches to information literacy with both the knowledge of information behaviour and pedagogic theory seemed to aid the development of a training course that engaged the learner and achieved good results which we hope will be evident in the students future work. We do plan to see whether the Masters theses of these students are significantly different from those produced by students who did not attend the information literacy course. However, it will be difficult to tell, categorically, whether this was the result of the training because non-participants did not take the diagnostic test. Ideally a survey of the trained students will also be conducted after they leave University to see whether the course made a contribution to their development as life long independent learners.

One of the challenges for the course designer and the learner is understanding that defining needs, finding, using and presenting information is both, at one level, a linear process and at another level a non-linear and highly iterative process. Hence the need to remind and encourage trainees to reflect on actions and results and often repeat, refine and change actions and strategies at any point in the research process. Another challenge is that students may only recognise the value of each step when they reach their final goal. As a result, only through taking part in the full information literacy experience can students fully appreciate information literacy knowledge and the component skills and attitudes associated with it. A conscious

attempt, therefore, needs to be made to engage the student and overcome this potential barrier to learning from the start of the information literacy learning experience.

It should be said that part of the success of this course was felt to be due to the collaboration with faculty and subject librarians who were able to help to ensure that the content of the course was relevant to the students in terms of the sources accessed and the examples chosen to explain various topics. Making such courses relevant to the context and goals of the audience was therefore seen to be fundamental.

With regard to the 'knowledge transfer' nature of the training course this was successful in the sense that the librarians who took part in the pilot did then implement the training programme with Masters students from the Faculty of Education, described here and have run subsequent training programmes applying the same course structure. It should be remembered that these trainers did go through the course themselves and, we would argue, developed high-order competences that enabled the facilitation of information literacy for learners. We feel that it would be hard to fully appreciate the nature of the course without experiencing this problem-based, situated, reflective and highly participative approach to learning and teaching information literacy. Furthermore, experience of this training, particularly the reflective quizzes, exercises, presentations and discussions by future trainers, provided an opportunity to reflect on the style of pedagogy, as well as the content, that is far removed from the traditional skills based approach to learning information literacy.

The work does, however, raise questions. How can an approach that is very time consuming, due to its discursive nature, the time for quizzes, exercises, presentations, reflection and hands-on use of ICT be used to teach information literacy to the entire student population? Should all lecturers be familiar with information literacy, as defined here, and should particular module outlines be required to demonstrate it in their teaching and learning strategies? Can universities be persuaded to ensure all programmes incorporate information literacy? Could virtual or hybrid learning environments be developed that emulate and support this kind of information literacy learning and enable its delivery to the student population? There is obviously ample opportunity to explore how information literacy can be incorporated into tertiary education, and also in primary and secondary schools as well as other contexts, to help ensure that future populations are information literate in order to enable them to be independent lifelong learners.

Biographies

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Introduction to IL programme	08:00-08:20	Introduction to IL course	• Definition of IL by students through brainstorming (What is IL and who is an IL person?) • Course aims, objectives and anticipated outcomes	20 minutes	Presentations/discussion on Introduction to IL course
Pre-Test	08:20-09:15	Information literacy skills test	• Information literacy skills test to determine students skills and knowledge	55 minutes	Test
Fifteen minutes break					
Define a problem or research topic	09:30-10:00	Knowledge of the topic	• Students describe their topics and also formulate discussion groups for their topics • Course instructor explains the need and importance of defining a problem or research topic • Course instructor demonstrates an example of a topic as a statement • Students are asked to construct different statements basing on their topics • Course instructor demonstrates to students how to formulate questions about their topic • Students do as demonstrated by course instructor focusing on their topics	30 minutes	Lecture/discussion on determining knowledge of a topic
	10:00-10:20	Knowledge of information need	• Course instructor explains a need and importance of defining information needs • Course instructor discusses with students information needs	20 Minutes	Lecture/discussion on determining information needs
	10:20-10:40	Defining goals for information seeking process	• Find out from students their perceptions of the training course and what they expect to achieve • Course instructor explains the need and importance of defining goals for information seeking process • Carry out discussions with students about their short and long term goals with regards to the information seeking activity	20 minutes	Lecture/discussion on goals for information seeking process
	10:40-11:30	Knowledge of sources/tools to find background information about the topic	• Find out from students their prior knowledge about previously used sources/tools that would help familiarize them with the topic or research problem • Introduce students to the range of useful tools or sources for familiarisation with the topic such as reference sources • Demonstrate to students the range of useful tools/sources • Course instructor explains to students why it is important to consult sources/tools to find background information about the topic •	50 minutes	Lecture/discussion on knowledge of sources/tools to find background information about the topic

	11:30-12:30	Applying the skills of defining information needs	• In their groups students define what the topic is about • Students determine the purpose for which the information is needed (and type of information needed) • Students determine information already known relevant to their questions and establish the information needed/gap (through brainstorming) • Students identify possible sources to find background information about their topics	1 hour	Lab session
	One Hour Break				
	13:30-14:00	Preparations for group presentations	• Students prepare presentations on defining information needs	30 minutes	
	14:00-15:20	Group presentations	• Group presentations on defining information needs (to reflect the above aspects)	1 hour, 20 minutes (20 min. for each group)	Presentations
	15:20-16:00	Quiz A	• Quiz with results at the end	40 Min.	Lab session
	16:00-17:00	Hands on activities	• Group work using sources to become familiar with a topic	1 hour	Lab session

IL PROCESS DAY 2	**TIME**	**SKILLS TO TEACH**	**ACTIVITIES**	**DURATION**	**TEACHING/LEARNING METHOD**
Define a problem or research topic (cont.)	08:00-09:00	Terms/words identification when defining a problem or research topic (Mind mapping)	• Introduce to students the idea of terms/words identification and demonstrate mind mapping • Demonstrate to students how to use various tools to find relevant terms related to a topic • Course instructor explains to students why it is important to identify terms/words	1 hour	Lecture/discussion on concepts identification in defining tasks
	09:00-09:25	Organize terms/words	• Introduce students to the idea of organizing terms related to a topic or research problem and the need to do so • Demonstrate briefly to students how to organise their ideas related to a topic or research problem	25 minutes	Lecture/discussion on concepts organizing ideas in defining a problem
	Twenty minutes break				
	09-45-1200	Mind mapping activity	• Students identify terms suitable to their topics using various tools and based on their experience • Students formulate and build vocabularies from terms by finding suitable labels/terms/words • Students draw mind maps based on the chosen topic or research question • Students organise terms/words based on their similarities and differences	2 hour, 15 minutes	Group work Lab session
	One hour break				
	13:00-14:20	Group presentations	• Group presentations on mind mapping: students present their mind maps and discuss how they organize ideas for defining tasks	1 hour, 20 minutes (20 minutes each group)	Presentations and discussions
	14:20-15:15	Reflective thinking about defining task and problem definition	• Students reflect on what they have learnt when defining a problem or research topic. • Students answer reflection questions in ***EXERCISE A2***	• 30 minutes • 25 minutes	Discussions Exercise
	15:15-16:00	Hands on activities	• Using tools to find search terms	45 minutes	Lab session

IL PROCESS Day 3	TIME	SKILLS TO TEACH	ACTIVITIES	DURATION	TEACHING/LEARNING METHOD
Locate and Access Information	08:00-08:40	Knowledge of categories of sources of information	• Find out from students their knowledge of categories of information sources • Introduce students to categories of information sources • Demonstrate how to identify/choose information sources	40 Minutes	Lecture/discussion on categories of information sources
	08:40-09:00	Knowledge of location and access tools	• Find out from students their knowledge search tools • Introduce students to defining a range of search tools • Demonstrate how to identify/describe search tools • Course instructor should explain to students why such tools are used and their importance in the information seeking process	20 minutes	Lecture/discussion on locating/finding tools
	Twenty minutes break				
	09:20-10:00	Knowledge of the structure of information sources	• Course instructor finds out from students their knowledge of information generation and structure of information sources • Introduce students to how knowledge is generated and organized • Course instructor explains why it is important to know the structure of information sources and how it facilitates the information seeking process	40 minutes	Lecture/discussion on information generation and organization of knowledge
	10:00-11:15	Knowledge of information retrieval systems and search strategies	• Demonstrate how to formulate search strategies and how to use them in an information retrieval system • Demonstrate how to retrieve information by using various methods and explain the reasons for developing search strategies and importance of using different search techniques (narrow, broaden etc.)	1 hour 15 minutes	Lecture/discussion on information retrieval systems and search strategies Lab sessions
	11:15-11:30	Affective states associated with location and access	• Create awareness of the likely confusions and uncertainties during location and access • Emphasise the need to take a positive problem-solving approach to searching and information retrieval	15 minutes	Lecture/discussion on affective states when locating and accessing information

	11:30-12:30	Applying location and access skills	In their groups students should: • Identify major tasks that they experienced during location and access of information • Identify possible problems when searching, locating and accessing information • Identify ways of overcoming the obstacles • Course instructor should explain to students why they have to carry out the above activity	1 hour	Group work
	One hour break				
	13:30-14:00	Applying location and access skills	• Preparing presentations	30 minutes	Group work
	14:00-15:20	Group presentations	• Group presentation: Students present their plans for locating and accessing information	1 hour, 20 minutes (20 minutes for each group)	Presentations and discussions
	15:20-16:00	Quiz B	• Quiz with results at the end	40 Min.	Lab session
	16:00-17:20	Hands on activities	• Information searching – students start the information seeking process	1 hour, 20 minutes	Lab sessions

Day 4 Locate and Access Information (cont.)	08:00-10:00	Information searching and capture (*continued)*	• Students continue the information seeking process: • Identify and familiarise with search tool's functionality • Construct search strategies • Use a variety of search techniques to perform searches • Retrieve and review the results • Refine/modify searches by either repeating some or all of the above processes or using alternative/related words/terms or sources including people and organizations or strategies/techniques • Capture and organise sources retrieved	2 hours	Group work Lab sessions
	Twenty minutes break				
	10:20-12:00	Information searching and capture	• Continue with the above exercise	1 hour, 40 minutes	Lab session Group work
	One hour break				
	13:00-14:20	Group presentations	• Students present their search results	1 hour, 20 minutes (20 minutes each group)	Presentations and discussions
	14:20-15:15	Reflective thinking during locating and accessing information	• Students asked to reflect on what they have learnt in locating and accessing information • Students should answer reflection questions in ***EXERCISE B2***	• 30 minutes • 25 minutes	Discussions Exercise
	15:15-17:00	Hands on activities	• Continue with information seeking activities in groups	1 hour, 45 minutes	

IL PROCESS DAY 5	TIME	SKILLS TO TEACH	ACTIVITIES	DURATION	TEACHING/LEARNING METHOD
Synthesize and evaluate information	08:00-08:30	Ways of capturing information from sources	• Find out from students how they capture information from sources • Discuss and demonstrate to students various techniques of capturing information from sources (skimming and scanning, reading introductions and conclusions) • Course instructor explains to students why it is important to capture information from sources	30 minutes	
	08:30-09:15	Knowledge of various techniques of synthesizing information	• Course instructor finds out from students their knowledge of synthesizing information • Discuss and demonstrate to students, various techniques of capturing and synthesizing information (develop notes of important concepts, paraphrasing, outlining, summarizing, annotations, using charts, maps, graphs, note cards, note taking sheets, audio and video, databases, spreadsheets, timelines etc) • Course instructor explains why they should know different ways of combining information	45 minutes	Lecture/discussion on determining knowledge of a topic
	20 minutes break				
	09:35-10:05	Knowledge of evaluation criteria of information	• Find out from students their knowledge of evaluation criteria for information • Discuss and demonstrate to students various evaluation criteria of information and sources (reliability, validity, accuracy, authority, timeliness, point of view or bias etc) • Course instructor introduces students to various logical fallacies found in educational theory • Course instructor explains why they should know criteria for evaluating information and sources	30 Minutes	Lectures/discussions on evaluation criteria for information and sources
	10:05-12:00	Applying synthesis and evaluation skills	• Evaluate information and sources using defined criteria such as reliability, validity, accuracy, authority, timeliness, point of view or bias etc • Students synthesize information from various sources to get information relevant to their topic • Organize information in a meaningful way	1 hour, 55 minutes	Lab sessions Group work
	One hour break				
	13:00-13:30	Preparation for presentations	• Preparation for group presentations	30 minutes	Group work
	13:30-14:50	Group presentations	• Group presentations: students make their group presentations on criteria used to evaluate information and sources used	1 hour, 20 minutes (20 minutes each group)	Presentations and discussions
	14:50-15:45	Reflective thinking during synthesizing and evaluating information	• Students asked to reflect on what they have learnt in synthesizing and evaluating information • Students answer reflection questions in ***EXERCISE C2***	• 30 minutes • 25 minutes	Discussions Exercise
	15:45-17:00	Hands on activities	• Continue with evaluation of information and sources and synthesis of information	• 1 hour, 15 minutes	Lab sessions

IL PROCESS DAY 6	TIME	SKILLS TO TEACH	ACTIVITIES	DURATION	TEACHING/LEARNING METHOD
Communicating and using information	08:00-09:00	Knowledge of presentation techniques of information	• Find out from students their knowledge about information presentation techniques • Discuss with students and demonstrate different ways of presenting (communicating) information by defining the purpose of information, intended audience, format, product and presentation techniques • Course instructor explains why they should know different ways of presenting information	One hour	Lecture/discussion on presentation techniques and using information
	09:00-09:15	Ways of using information	• Find out from students and discuss different ways of using information (listening, seeing, touching) information to get relevant information	15 minutes	
	Fifteen minutes break				
	09:30-10:00	Reasoning skills in communicating and using information	• Introduce to students inductive and deductive reasoning by using examples from a chosen topic (use examples to show how to use data (evidence) to get ideas (information); use examples to show how to use ideas (information) to get evidence to prove a case) • Course instructor explains why it is important to apply reasoning skills in using information	30 minutes	Lecture/discussion on concepts formation in reasoning
	10:00-10:20	Bibliographic citations	• Find out from students their knowledge of referencing and citing • Discuss with students various systems of bibliographic citations • Course instructor should explain why they should know different ways of citing and the importance of citing	20 Minutes	Lecture/discussion on Bibliographic citations
	10:20-11:00	Knowledge of ethical and legal issues of using information	• Find out from students their knowledge of the ethical and legal issues of using information • Discuss with students ethical and legal issues surrounding the effective use of information and information technology • Discuss with students different laws, regulations and institutional policies related to the access and use of information resources • Course instructor explains the ethical and legal issues of using information	40 minutes	Lecture/discussion on ethical and legal issues of using information
	11:00-11:30	Quiz C	• Quiz with results at the end	30 Min.	Lab session
	11:30-12:30	Applications of information communicating and use skills	• Students prepare presentations that include answers to their research questions and also reflection on the research process	1 hour	Lecture/discussion on behaviour on presenting and using information
	One hour break				
	13:30-14:25	Reflective thinking during presenting and using information	• Students asked to reflect on what they have learnt in communicating and using information • Students should answer reflection questions in ***EXERCISE D2***	• 30 minute • 25 minutes	Exercises Discussions •
	14:25-16:25	Preparations for presentations	• Students prepare for the overall group presentations	2 hours	Group work Lab sessions

IL PROCESS DAY 7	TIME	SKILLS TO TEACH	ACTIVITIES	DURATION	TEACHING/LEARNING METHOD
Communicating and using information	08:00-09:00	Preparations for Presentations	• Students prepare their presentations	1 hour	Lab sessions: Preparations for presentations
30 minutes break					
Communicating and using information	09:30-11:30	Presentations	• Students present their findings on their chosen topics and also their reflections on the research process	2 hour s (30 minutes each group)	Presentations/discussion on communicating and using information
Ten minutes break					
Post Test	11:40-12:30	Information literacy skills test	• Information literacy skills test to determine skills gained by students during the course	50 minutes	Test
One hour beak					
Reflections	13:30-14:30	Reflective thinking for the entire programme	• Students reflect on what they have learnt during the entire course • Students answer reflection questions in ***EXERCISE F***	• 40 minutes • 20 minutes	Discussions Exercise
Course Closure					