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An evaluation of an information literacy training initiative at the University of Dar es Salaam

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Abstract

Purpose

This paper reviews the implementation and impact of an Information Literacy Training course at the University of Dar Es Salaam in Tanzania. The purpose of the research which is described was to determine the effectiveness of different methods of assessment for teaching information literacy.

Methodology

The focus of the paper is an analysis of student learning through quizzes, exercises, reflective discussion and student presentations. The training lasted seven days and involved Masters Students from the Faculty of Education. Data was collected via quizzes, exercises and group reflection and presentations that related to each stage in the course. The data were used to see whether the overall method of training was effective and also to see whether these assessment tools were useful in themselves. The approach was primarily qualitative.

Findings

The course, judging from the various forms of feedback, was effective. Student feedback enabled us to learn about the ways in which each of our teaching methods contributed to the student learning experience. The integration of knowledge from information behaviour research, educational theory and current Library Science perspectives on information literacy also proved valuable in developing the curriculum.

Practical implications

The students themselves appear, from the data collected, to have learnt from the course. The librarians who taught the course were able to use the feedback and experience to run subsequent courses. Hence it proved successful in terms of knowledge transfer and enabling the development of information literacy trainers.

Keywords

Information Literacy; Information Behaviour; Tanzania; Higher Education; Taught postgraduate students; Teachers: librarians; Education faculty; Qualitative research; Teaching methods; Course evaluation.

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1. Introduction

For the past decade there have been exciting developments in Information Literacy across the world. The teaching and learning approaches of information literacy have shifted from teacher-led traditional approaches to more problem-based, active learning with emphasis on critical thinking and problem-solving approaches. The above approaches have been considered key elements in developing life-long learners (Candy et al., 1994). Various standards and models of information literacy have been developed and are widely in use by higher education institutions to support teaching and learning information skills. However, although some agreement has been reached about what information literacy is, knowledge of how to help people to develop their information literacy is still a topic of research. Librarians and information practitioners today are therefore concerned with methodological aspects of how to teach these skills. Few attempts have been made to develop the curricula for teaching and learning the skills despite the abundant standards and models (Arnone et al., 2003, Johnston & Webber, 2003). The focus of this article is therefore specifically on the

efficacy of different methods used to assess learning during the running of an information literacy programme.

In Africa, 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). The teaching and learning of information literacy in South Africa focused on specific skills such as providing access to databases, web-based interfaces and integrated information literacy within the curriculum. However, a lack of technology, un-qualified staff and low IT literacy 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, Rosenberg, 2005). In Tanzania, the University of Dar es Salaam and Sokoine University of Agriculture ran information literacy courses paying particular attention to 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. However, as well as failing to reflect the curriculum needs, these programmes were also conducted in a traditional library instruction, 'chalk and talk' fashion, which does not lend itself to independent learning.

The situation has however been, to a greater extent, different in other parts of the world where attempts have been made to employ a number of methods of teaching. With the launching of problem-based and project-based learning as the principal study methods, student-focused and group based learning, experiential and reflective approaches to the information literacy education process have been employed by various higher education institutions in Europe, Australia and USA (Oliver et al., 1999; Edwards & Bruce, 2000; Denis, 2001; Skov & Skærbak, 2003). There are a number of reports on courses that have adapted teaching and learning methods such as web-based tutorials, lectures, class exercises, assignments, group discussions, laboratory-based hands-on activities and reflections (Denis, 2001; Johnston & Webber, 2003; Andretta, 2005).

However, despite all the changes to improve teaching/learning methods, one of the main challenges that most developers of information literacy courses face is to provide proof that information literacy training does make a genuine difference to short and long term learning outcomes (Bundy, 1998). Therefore the aim of this paper was to focus on specific methods used during the delivery of a seven day information literacy training course. A separate article (Hepworth & Wema, 2006) provides a more general overview of the programme and its impact.

2. Methodology

The information literacy training course was developed at the University of Dar es Salaam, Tanzania as part of a PhD research with the purpose of instilling information literacy skills to Masters of education students in the faculty of education, and it was implemented by staff in the library. This was done by integrating the knowledge from information behaviour research and educational theory and current Information and Library Science perspectives of information literacy. Information behaviour concepts (such as knowledge states; cognitive states; affective states; behaviour and characteristics of sources) were integrated into the programme. These were supported by pedagogic theories (such as behaviourist and constructivist approaches), together with thinking skills associated with independent learning and creativity including productive and reflective thinking.

The teaching of information literacy emphasised enabling independent learning and problem solving using secondary sources of information, such as books, articles, World Wide Web sites, and the tools to locate these resources. In addition, information literacy considered knowledge of the social context within which these resources are generated, since this context may have a bearing on effective identification and use of these resources and provided a rationale for building on existing knowledge. The context and normative values of teaching information literacy were academic, where students were expected to use these resources, including library systems and information and communication technology (ICT). Therefore students were expected to derive research questions, access resources that would help answer their research questions and communicate their findings through a presentation.

The first implementation of the programme took place in April 2005 and involved new and established staff from the University library at the University of Dar Es Salaam. This served to pilot the programme and

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 second author of this paper who observed the training and had extensive knowledge of information literacy and training experience. In addition it helped to determine whether the training course could be used to train librarians to teach information literacy.

Following the pilot, adaptations were made and relevant material was created for the training of twelve Masters Students from the Faculty of Education in June 2005. The numbers were limited to twelve owing to the training facilities available. These students were selected because academic staff in the Education Department 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. 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 thought to be important that the training related to the learning context of the students in terms of resources, and type of topics they were likely to investigate. Hence, interviews were conducted with staff in the Faculty of Education to understand how to make the training programme relevant to the students and to meet recognised educational needs before the programme was implemented with the Masters students.

Data was collected using various methods. For example, data from quizzes and reflective exercises was collected from answer sheets which were distributed to students and analysed. Data generated from verbal reflective sessions and group presentations was collected by audio and video recordings. In addition the researcher, assisted by two research assistants, took notes using data recording sheets. Since this was predominantly a qualitative research project, data was analysed through the use of descriptive matrices. Students worked both individually and in groups (the same groups through the course). Students and student groups are referred to by number in this article e.g. “Student 5”.

In addition, quantitative methods for data analysis were used to analyse data from diagnostic pre-test and post-tests through compiling them on Microsoft Excel worksheets to obtain total marks for each questions in order to determine respondents’ increase or decrease in information literacy skills. Results were then tabulated on Microsoft Word to indicate differences in performances between pre-tests and post-tests.

3. Structure of the programme

The training programme was run over seven days, generally from 8.00 am to 5.00 pm, instead of 9.00am to 3.00pm as was the case during the pilot during which participants were working librarians and needed time to complete other work tasks. The extension of time was a result of feedback from the librarians and reflection on the pilot that indicated a need to extend the hours allocated to the delivery of the training programme. The course started with students thinking and discussing the meaning of information literacy and the characteristics of an information literate person. This introduced students to the participative, student centred, problem based approach to learning that the programme followed. It was also expected to motivate them to actively take part in and engage with the programme. Then students performed a diagnostic test, adapted from Andretta (2005). The same information literacy diagnostic test used at the beginning of the course was used at the end of the course to help determine changes in the student knowledge over the period of the training course. However, since the purpose of conducting a diagnostic post-test was to determine changes in students’ knowledge at the end of the programme, the course did not consider awarding credits to students (hence the course was not credit-bearing).

The course followed the information seeking process and had the following structure:

- Define a problem or research topic
- Locate and access information
- Synthesize and evaluate information
- Communicate and use information

In the first place, short lectures were used to familiarise students with various concepts and tools, such as knowing about sources that would help to become familiar with the topic: primary and secondary sources of information and locating tools such as online catalogues and search engines. Others topics covered during the programme included information retrieval concepts, methods of capturing information through scanning and skimming, criteria for evaluating information, the application of deductive and inductive thinking and its

connection with information literacy, the mechanics of referencing and citation and the ethical and legal issues surrounding effective use of information. In addition to teacher or trainer presentations, students discussed various aspects covered in each session in groups and with the facilitators during lectures. Group presentations were undertaken throughout the programme to enable each group to demonstrate what they had learned and to keep the learning process active. In addition, they completed quizzes and reflective exercises that were set partly to test individual understanding on what was covered in the course and also to encourage them to reflect on what they had learnt.

4. Findings

Feedback from students was obtained throughout the course and gathered formally through quizzes, exercises, group presentations and reflective discussions. The feedback mechanism helped to provide a critical evaluation of the course as well as to encourage students to reflect on the various activities carried out in each session. In addition, it was possible to determine the effectiveness of these feedback mechanisms. Comment on each of these methods follows.

4.1 Findings for quizzes

Quizzes were completed in 20 minutes following each key stage in the training programme and were followed by immediate feedback where facilitators discussed with students their answers enabling the learning process. Quizzes were carried out after each key stage, including: defining a problem or research topic; locating and accessing information and communicating and using information. Questions asked were in the form of both multiple choice and filling in blanks. Examples of each type of question are given below.

> (Multiple choice question) One of the most difficult aspects of writing a research paper is determining how narrow to focus your topic.
>
> True □
>
> False □
>
> (Filling in blanks question) One way to help define your topic is to ask yourself what the topic is all about. What are other questions you could ask yourself before you begin your assignment or research?

Responses to quizzes showed that students understood various aspects covered in the programme. For example, students seemed to understand the need to determine information needs. For example,

> "Determining information needs may help in knowing, for example, which type of information is needed; if I need just a definition, I know that a subject dictionary is an obvious source to consult" (Group 3)

Furthermore, apart from demonstrating an understanding of what was taught, quizzes helped students reflect on what the information seeking process involves, which is in itself an important part of the learning process. For example, they were able to formulate a number of questions they would ask when starting an investigative research topic: (These are responses to one question about topic definition made by Group 3).

> "What is the topic about?"
>
> "Does this topic or subject area exist and if so, which broader and or related subject area surrounds it?"
>
> "What has already been discussed about this topic?"
>
> "What do I know about this topic and what I do not know?"
>
> "Where and how to find background information about the topic?"
>
> "How do I plan to search for information?"
>
> "Which sources exist that provide answers to topical questions addressed?"
>
> "Will the answers obtained be relevant to my topic?"
>
> "To what extent will the information obtained solve information problems related to my topic".

These questions demonstrated students' attempts to reflect on the information seeking process to find information relevant to their topics.

Quizzes also revealed areas where students did less well. This was primarily due to a lack of understanding. For example 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 showed that they did not fully appreciate the highly structured nature of the catalogue record.

4.2 Findings for reflective exercises

In conjunction with quizzes, the course made use of reflective exercises. These consisted of set of questions that prompted individual students to reflect on what they went through in the information seeking process. Reflective exercises were given to students immediately after group presentations and group reflections at the end of each information process and at the end of the training programme. Examples of such questions were:

- 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.
- 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?
- What are your general comments about what was covered in this session?

Answers from individual students indicated that they were able to highlight a range of activities carried out throughout the process of defining the problem, locating and accessing information, synthesising and evaluating information, communicating and using information. Reflective exercises helped to indicate the different skills that students had acquired from the course and how they applied the skills during the course. Comments that related to parts of the course included:

> "I was able to redefine focus of my topic on educational management by identifying topic variables". (Student 5).
>
> "I searched issues on my topic and behold – I got a lot of information about curriculum evaluation that I did not have before" (Student 2).
>
> "I was able to capture and synthesize information from books, theses and reports on quality education". (Student 3).
>
> "I learned various ways of presenting information, apart from using PowerPoint presentations for seminars and presenting my research proposal, I will find a useful discussion list on which to post my research ideas". (Student 7).

Reflective exercises also indicated areas where students faced problems. The following cases were given:

> "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". (Group 1).
>
> "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". (Student 4).
>
> "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". (Student 6).

Some of the above comments implied that these problems would either need to be addressed in subsequent programmes or indicate additional training that either preceded or followed the information literacy programme.

Reflective exercises indicated students' overall satisfaction with the programme and its usefulness for their academic endeavours after finishing studies

> "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". (Student 5).

4.3 Findings for group presentations

In order further to facilitate information literacy learning, group presentations were adapted to help demonstrate what students learned during the key stages: defining research problems; identifying terms/words to be used for information searching; information seeking strategies; search and retrieval; analysis, evaluation and the use of information. In addition, group presentations served to highlight areas of the course that students did less well, hence emphasising a need for improving the course teaching/learning methods. It should be noted that students were given the opportunity to formulate groups that were based on a common topic that helped all members of the group achieve their research objectives. Presentations also facilitated peer-to-peer training as well as stimulating discussion. Encouraging verbal communication, it was felt by the researcher, also helped students to practice and use the language of information literacy and internalise the 'culture' of information literacy.

Results therefore revealed that presentations assisted students' engagement in the learning process through presenting what they learned in the course and what they went through. The following exemplifies this process:

> "We used the library's OPAC to search in Advanced Search option. We typed 'school culture' AND 'educational performance'. We obtained two theses titled: 'Managerial aspects influencing performance of catholic seminaries in national examinations'; 'Instructional resources as a factor in education performance, case study in Tanzania'. But when we typed 'educational performance' AND 'management issue' in Yahoo, we got irrelevant results, we used the above terms and got some results" (Group 3).

Presentations further assisted to demonstrate problems encountered in the learning process and how students could resolve these problems:

> "We tried to search for school leadership, school management and roles of academic heads by using both, simple and advanced search in the OPAC but got nothing. We went to a librarian for help; he told us that the database does not have documents under such subject area" (Group 4).

This and other comments indicated that students did try to understand reasons for failing to acquire the desired results.

Furthermore, findings from presentations revealed that students demonstrated how the knowledge acquired from information accessed helped them to build on their prior knowledge relating to subjects surrounding their topics. The following comment illustrates this:

> "Our prior knowledge about the topic was on roles of heads of secondary schools departments in improving quality education but what we acquired after conducting information search (new knowledge) was on how the heads perceived those roles" (Group 3).

In summary, as well as serving to teach and learn information literacy, 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 did successfully on their second attempt.

45. Reflections on teaching methods

The following teaching methods were used in this study: quizzes, exercises, group presentations, reflections and lectures. It was evident that the use of these methods helped facilitate the teaching and learning of information literacy, as the reflections below indicate.

The use of quizzes was successful in making students reflect on what they learned previously, hence tested their understanding on what was taught. Students demonstrated an understanding of various aspects covered during the course, both from the answers provided in quizzes and immediate feedback (through discussions)

that took place at the end of each quiz. This is supported by the literature and thus creating a more meaningful learning experience (Hall, 1997). Results from the course also indicated that students commended the use of quizzes to reflect on what was taught:

> "Several questions in quizzes such as the proper uses of Boolean AND, OR and NOT made me reflect back on how the three operators worked and I was able to provide the right answer to that question, based on the experience I got from the information retrieval aspect covered in this course". (Student 2).

Students commented that questions in quizzes helped them to reflect on what they had learned in other courses:

> "The first question in the quizzes, which was on difficulties in narrowing a topic when writing a research paper, is similar to what we had learned previously in research methodology course". (Group 1).

Furthermore, quizzes provided evidence of students' learning and also helped to foster the impression among the students that the course is a genuine learning experience (Bury & Oud, 2004). Students commented that quizzes helped them realise that the course was part of what they learned and created a "serious learning environment":

> "Quizzes helped to give an impression that this course was a serious business and one had to recall what was learned in order to improve the learning process, this is what other courses do as well" (Student 11).

Moreover, in an active learning environment, quizzes assist in helping students to apply their information literacy learning to practice (Keyser, 2000).

> "The question on various examples of plagiarism addressed techniques that are really practical in the academic environment where students copy and paste information from the Internet and use it as theirs". (Student 8).

Quizzes also helped to provide self-assessment for the learners at varying levels of the course (Lupton, 2004); one student commented:

> "Quizzes helped to make me more alert during the course and work hard, because whenever we discussed answers to the questions, I found that my understanding of what was being taught was very low". (Student 4).

Results of the study reveal that students reflected on what they had learned throughout the course. In this process students acquired reflective skills which made them conscious of the learning process and would make it more likely that they applied this knowledge in the future Reflections, therefore, equipped students with both, lower and higher order thinking skills associated with information literacy. One student stated that:

> "Reflective questions that needed students to recall on new skills taught and what was acquired, created an awareness of various important skills in information seeking process". (Student 7).

Various researchers emphasise the need to teach reflective skills. Morris (2005) argues that students in first years of study in tertiary institutions find it difficult to write their information search strategies due to failure in understanding the iterative nature of the process. This is caused partly by their lack of reflective thinking skills which would help them to recognise what they have achieved in completing the process of developing search strategies. Reflection in form of on-going feedback is also an important approach in project work since it gives weight to the processes and stages that underpin an independent learning project (Squires 1994; Smith & Hepworth 2005) rather than providing feedback and assessment only at the end of a course. Scheppner et al. (1998) argue further that reflection fosters self-assessment, which in turn promotes life long learning. There were student comments in this area.

> "Reflective exercises have been very useful to me because when I was asked to explain what I have learned and what I did during a particular session, it helped sharpen my memory and determined the extent to which the new skills acquired facilitated the learning process". (Student 1).

> "Questions in reflective exercises were very helpful. They helped me to think over my mind about what I did and what new skills I acquired. This helped me to clarify things more and expand on what I have done". (Student 12).

Apart from successfully demonstrating the knowledge they acquired in the course, presentations helped students engage in information seeking activities since each group aimed to present the best results, which prompted students to work hard to achieve this objective. One student made the following comment which highlighted students' full engagement into the process:

> "Group work made me work very hard because I knew that my turn would come for presenting what our group had discussed. This not only helped me, but also the entire group because everyone feared to be defeated by one another". (Student 3)

Presentations also helped students to feel obliged to support group work by providing answers to the questions raised by the trainers and fellow students:

> "In our group everybody felt obliged to work diligently to support each other especially when other groups worked towards defeating us. We were willing to share responsibilities even when one of us committed mistakes while making a presentation". (Group 4).

Additionally, presentations helped to identify unfulfilled needs and therefore called for possible adaptations of the course in future. Moreover, PowerPoint presentation skills motivated students to learn new presentation skills vital in their teaching profession (Steinert & Snell, 1999). The following comment illustrates this:

> "Microsoft PowerPoint presentation techniques are new in our profession, yet very important because teaching in the world of today is mediated by IT facilities which prompt the use of numerous techniques, PowerPoint being one among them". (Student 5).

The combination of presentations with group reflections also facilitated communication among students in which they shared ideas with each other in groups, hence facilitated peer-to-peer shared learning.

The combination of quizzes, reflective exercises, group presentations and reflections, together with lecture presentations further assisted to improve the teaching/learning process. Lectures, for example, assumed that certain skills needed to be taught and demonstrated. Students made the following observation:

> "It was not easy to learn certain subjects such as information retrieval, without having lectures. I once registered for an online course on information search but could not get clear explanation on how Boolean search worked. However, when a facilitator lectured and demonstrated the same, I understood it absolutely well". (Student 9).

Biggs (1999) argues that lectures are effective means of disseminating information, to model problem solving, to elucidate difficult theories, and to organise concepts. Therefore lectures not only helped to disseminate information and clarify difficult aspects, they assisted in making students aware of what they were doing and the importance of knowing what they did. Furthermore, lectures helped prepare students and enabled them to participate in the learning process which was facilitated by other methods discussed above. This was evident from comments raised by students:

> "Lectures worked as a guide to us because they assisted to highlight and clarify important aspects which we later encountered when participating in group discussions and reflection sessions through quizzes, exercises and presentations". (Group 3).

In conjunction with various methods mentioned previously, diagnostic tests (pre/post) were also used to demonstrate the increase/decrease in students' information literacy skills. The tests were constructed from an assortment of questions from Andretta's work (2005) and other sources. These tests revealed a dramatic increase in students' information skills. Literature revealed that diagnostic tests can be used to compare pre- and post-training results as a way of evaluating a training course to identify the strengths or weaknesses of students which could be catered for through better designed programmes (Miller et al, 1998). Diagnostic tests can also be used as a benchmark measure for competence, although this was not the main purpose of the tests in the course. Diagnostic tests at the beginning of the course help to assess students learning needs and provide means for considering the progress that learners wish to make throughout the course. The two observations were made in this case. Firstly specific aspects of IT skills that students seemed to lack were identified and indicated that the course facilitators, prior to the information literacy course, should spend one

day equipping students with basic IT skills relevant for the course. The diagnostic test also enabled students to anticipate what they were about to learn.

Similarly, diagnostic post tests gave students the feelings of success and accomplishment of the learning process (Dempster, 1997). One student argued at the end of the course that the second diagnostic test proved that he accomplished what he expected when the course started:

> "When I did the diagnostic test for the second time, I realised that I have acquired enough skills than before, I felt satisfied and achieved the objectives for attending the course". (Student 1).

To summarise the study noted that a combination of reflection, communication via group work, quizzes, reflective exercises, presentations combined with problem based learning, worked effectively and students coped with these new methods of teaching and learning despite their unfamiliarity with them. Students were kept engaged and on track throughout the course. This has not always been the case with other information literacy training initiatives at the University of Dar es Salaam.

6. Challenges in implementing information literacy courses in tertiary institutions

There are a number of methodological challenges associated with quizzes, tests, reflective exercises and lectures. Lectures have been considered by various researchers as a poor way of imparting knowledge to students as compared to other methods such as personal reading and study or discussions (Ramsden, 1992; Steinert & Snell, 1999). Limitations of lectures include their ineffectiveness to promote deep level learning in which students are placed at a passive position that discourages reflection or critical thinking. With regard to this course, lectures were found to create an impression that the course was teacher-focused, which made students afraid of asking questions or challenging the facilitators. Also, at certain points, facilitators spent time lecturing, hence making students less active. One student commented on this particular problem as follows:

> "Day three consisted of series of lectures. However due to the complex nature of what was being covered (structures of information sources and information retrieval) and limited time, the only best way of learning was by lectures, which however made the learning process very formal, hence unexciting". (Student 10).

However, it was found during the course that, certain aspects of the course had to be taught to students in order to clarify various concepts that seemed unfamiliar to students, such as structures of information sources, information retrieval aspects, citation styles and others. Also lecturing aimed to stress the importance of acquiring certain skills such as the reasons of defining a topic, identify terms, affective states in locating and accessing information and others. However, the lectures were short and interspersed with more active learning as King (1993) noted, short lectures are useful to introduce the basic steps of a new skill.

The use of quizzes and tests as a way of assessing the course performance has been criticised by several researchers. For example, Webber (2001) points out that multiple choice assessment methods allow for guess work. They may also end up testing superficial knowledge (Astin, 1993). During the course, students observed the same problems, as the following comments indicate:

> "Quizzes, especially multiple choices provided less-committed students with greater chances of guessing the answers, hence preventing them from thinking harder". (Student 6).
>
> "Sometimes I selected possible answers for multiple-choice questions without thinking why I did so". (Student 2).

Nevertheless, to make the two methods more effective, quizzes consisted of both multiple-choice and filling in questions, which required elaborate and specific answers. Also quizzes were followed by immediate answer sessions in which students discussed with facilitators the correct answers, making these sessions useful in terms of knowledge acquisition, understanding and sharing. Also, lectures and discussions were used to instil students with deep knowledge by elaborating in details various aspects asked about in diagnostic tests such as information generation and sources, information search evaluating information, presenting and using information.

Moreover, despite successfully using reflective exercises to facilitate reflective learning, it was discovered by the researcher that learning to think reflectively was not straight forward. When asked to give their opinions about reflective thinking skills, several students admitted as follows:

> "Reflective thinking skills were not acquired directly. One had to acquire these skills by thinking what was learned, not by practising what was learned". (Student 6).
>
> "Reflective thinking skills were meant to make us aware of what we have acquired. But it took time for some of us to recognise what new skills we have gained after each session". (Group 2).

The above comments concur with Macdonald, Heap and Mason (2001) who argue that the acquisition of reflective thinking skills may not be straightforward. However, as was pointed out, literature supports the use of reflective skills since they can be acquired and applied in various situations.

7. Conclusions

Several lessons have been learned from this study. The study has proved that the combination of various methods such as quizzes, reflective exercises, presentations and group reflections, diagnostic tests and lectures may work effectively in a course designed on the basis of active, situated and problem-based learning. In these, learners frame experience through a series of problem solving activities by actively participating in problem solving activities collaboratively and through knowledge sharing. These methods help to support learners' critical knowledge, problem solving proficiency, self-directed learning strategies, and team participation skills. Lectures help to explain and clarify issues learned. Quizzes, exercises, presentations and tests enhanced understanding and encouraged reflection on what was learned, knowledge sharing and collaboration. In addition, problem-based learning provided a good way to keep students engaged and on track throughout the intensive seven-day course.

Results of this study however indicated that the success of such an information literacy programme would be facilitated by learners' acquisition of basic skills and competence in ICT knowledge, presentation skills, information retrieval skills, and bibliographical citation skills prior to the course. These skills support the learning of information literacy by enabling students search, capture, organise, store, retrieve and present information. It was discovered in this research that, 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. Moreover, the results indicated that the information literacy training course would not be the end of such training. For example it was found that further training was required that would build on the information retrieval skills learnt in the main course, particularly in relation to the use of subject specific databases. Further training was also seen important in areas such as how to present information in reports, essays or journal papers. Additional training on bibliographical citation was also felt necessary.

The findings from this study also indicated that it was a productive strategy consciously to draw on knowledge from Library Science approaches to information literacy, with the knowledge of information behaviour and pedagogic theory to aid the development of a training course. For example, information behaviour research helped the trainers to understand the cognitive problems that students experience when undertaking an independent project as well as the iterative nature of this information seeking process. An understanding of pedagogy meant that teaching methods and techniques could be applied to foster the learning process in the most appropriate way and in a manner that engaged the students. Lastly, the Library Science approach to information literacy helped to provided the overall structure for the course. These three elements enabled us to design a distinctive curriculum for the students.

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