



Design and implementation of an online information literacy module

Experience of the Department of Library and Information Studies, University of Botswana

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Abstract

Purpose – The purpose of this paper is to present findings of the design and implementation of an online information literacy module to first-year students at the University of Botswana.

Design/methodology/approach – The study population consisted of 103 first-year students in the Department of Library and Information Studies. The population was divided into three equal groups of 34, 34 and 35, respectively, and each assigned a two-hour slot in the smart computer laboratory weekly for five consecutive weeks, to cover five information literacy topics online. Each group was assigned a tutor who received assignments online and graded them. Each topic was followed by questions for students to answer.

Findings – Findings generally revealed that impartation of information literacy through the online mode could improve students' competencies perhaps more than the face-to-face instruction approach. Furthermore, respondents preferred a blended instruction approach to a single learning mode. Contrary to expectations, online instruction might not minimise the copying of each other's work among students to a great extent. Finally, online instruction does not necessarily reduce the amount of workload for staff and students, instead more time is needed to design and administer the course.

Research limitations/implications – The study was limited to first year students in the LIS department. A similar study involving all departments in the University of Botswana would shed more light on the level of information literacy competency among first year students from a cross-disciplinary perspective.

Practical implications – The major outcome of the study is a re-usable online information literacy module. The study findings could also be useful in developing interventions to improve the design and delivery of online courses.

Originality/value – Information literacy is a key challenge facing educators all over the world. Case studies such as this provide unique and comparative experiences that advance existing knowledge. For the University of Botswana, the study provides a first insight into the impact of e-learning on information literacy competency since the implementation WebCT in 2002.

Keywords Information literacy, Digital libraries, Communication skills, E-learning, Botswana

Paper type Research paper



Introduction

The world over, institutions of higher learning, especially universities, are increasingly implementing various forms of online modes of instruction to enhance classroom

teaching and, at the same time, improve on the quality of research. Early uses of information and communication technology (ICT) in the classroom during the 1970s and 1980s largely involved the use of stand-alone computers and simple data-entry devices, which did little to change the overall approach to teaching and learning in most tertiary institutions. However, as pointed out by the Department of Education and Youth Affairs (2001) in Australia, the emergence of the internet in the 1990s and the development of networked environments encompassing a range of computer, multimedia and communication technologies, resulted in a much greater focus on interactive and connected learning experiences for students.

ICTs in general, and e-learning technologies in particular, provide the opportunity to enhance participatory teaching and learning from anywhere anytime; facilitate joint group work; provide the opportunity for reduced costs; encourage self-directed learning, and enable students to maintain electronic portfolios of their work. When an electronic portfolio is posted on the Web, it can allow viewing and sharing of the works of other people (Livingston, 2004). The use of ICTs is underpinned by various learning theories, the most current and pervasive one being the constructivist model. Constructivism is a process by which the learner develops understanding and constructs knowledge through interactions with the environment (Savery and Duffy, 1995).

Further, Savery and Duffy (1995) outline instructional principles for the design of a constructive learning environment. They include:

- anchoring all learning activities to a larger task or problem;
- supporting the learner in developing ownership for the overall problem or task;
- designing an authentic task;
- giving the learner ownership of the process used to develop a solution;
- designing the learning environment to support and challenge the learners' thinking;
- encouraging testing ideas against alternative views and alternative contexts; and
- providing opportunity for, and support reflection on, both the content learned and the learning processes.

Similarly, Spiro *et al.* (1992) points out that constructing new information from text is combined with information beyond the text, which includes prior knowledge. They point out that this allows the learner to form a complete and adequate representation of the text's meaning. The importance of ICT in education needs no emphasis. Toomey (2001) points out that integration of ICT in education is intended to improve and offer flexible learning opportunities. Levin (2004) on the other hand, notes that various uses of ICTs such as TI-83 Plus for creating charts, graphs and interactive physics are important in reinforcing complex mathematical relationships.

Eadie (2001), in a study of the impact of ICT in education, found that effective classroom integration of ICT brought about development of various intellectual skills such as reasoning and problem solving, learning how to learn and creativity. Similarly, Rittard *et al.* (2003), in research on ICT use in education in the UK, found that generally there was a positive impact to the attainment of students who made high use of ICT in their subject learning. Moursund (2002) noted that ICT can help students learn better and faster.

Background to the University of Botswana

Prior to 1982, the now University of Botswana was part of the University of Basutoland, Bechuanaland and Swaziland (UBBS), which was established in 1964 to serve the three countries of Lesotho, Botswana and Swaziland (University of Botswana, 2005a). Following independence of Botswana and Lesotho in 1966, UBBS changed its name to the University of Botswana, Lesotho and Swaziland (UBLS), with the core aim being to offer degrees and diplomas in Arts (including economics and administration), science, education and law. Students, who sought specialised degrees in such areas as medicine, engineering, etc., proceeded to universities elsewhere after completing a two-year study in science.

UBLS was equally funded by the Governments of Botswana, Lesotho and Swaziland, but had little comparative presence in Botswana and Swaziland. In 1975, students' unrest in Roma and the already strained relationship between students and UBLS administration, following the nationalisation of UBLS by the Government of Lesotho and also the appropriation of university property, compelled the Governments of Botswana and Swaziland to withdraw their students and establish their own universities. Thus, the University of Botswana was formally inaugurated on 23 October 1982 (University of Botswana, 2005a, p. 8). The University of Botswana has six faculties: Business, Education, Engineering and Technology, Humanities, Science, Social Science and the School of Graduate Studies.

During the 2004/2005 academic year, there were 15,725 students enrolled at the University of Botswana of which 81 per cent were full-time, 17 per cent part-time and 2 per cent distance learners. Of the total students population, 52 per cent are female, while 48 per cent are male. The distribution of students is such that 24 per cent are enrolled in undergraduate certificate/diploma programmes, 67 per cent in undergraduate degrees, 4 per cent in postgraduate diploma programmes, and 5 per cent in Master's and doctoral programmes. Of all the students, 94 per cent are citizens, while 6 per cent are foreigners (University of Botswana, 2005b). On the other hand, the number of academic staff stood at 791 by the end of 2005, distributed as follows: 11 per cent professors/associate professors, 20 per cent senior lecturers and 69 per cent lecturers (University of Botswana, 2005b).

General education courses

The University of Botswana in 2002/2003 semesterised its hitherto year-long academic programmes as part of key reforms aimed at assisting it to become a leading academic centre of excellence in Africa and the World (University of Botswana, 2005a, p. 20). Moreover, general education courses (GECs) were introduced to provide more student-determined choice and flexibility of academic programmes. The GECs generally address such cross-cutting issues as employers' expectations, competence in communication skills, computer and information skills, literacy, gender, HIV/AIDS, environment, energy and globalisation. The rationale for GECs is succinctly outlined in the University of Botswana Calendar, which thus states:

Every undergraduate student shall take general education courses for the purpose of broadening the knowledge; enhancing university education so that it is broadly-based; promoting critical thinking, intellectual growth, and general skills for lifelong learning (University of Botswana, 2005a, p. 21).

The GECs are offered in seven groups called areas, as depicted in Table I.

Area	Course code	Course title
Area 1: Communication and study skills	GEC 111	Communication and study skills I
	GEC 112	Communication and study skills II
	GEC 210	Introduction to legal language
	GEC 211	Advanced writing skills
	GEC 212	Advanced oral presentation
	GEC 213	Advanced communication skills
	GEC 312	Introduction to rhetoric and public speaking
Area 2: Computer and information skills	GEC 121	Computing and information skills fundamentals I
	GEC 122	Computing and information skills fundamentals II
	GEC 221	Information management skills
	GEC 222	Problem solving with spreadsheet
	GEC 223	Web application skills
Area 3: Modes of enquiry and critical thinking	GEC 322	Multimedia information presentation skills
	GEC 232	Critical thinking
	GEC 233	Logic I
	GEC 333	Logic II
Area 4: Physical education and wellness	GEC 334	Epistemology
	GEC 247	HIV/AIDS education, prevention and control
	GEC 248	Human nutrition
	GEC 249	Human sexuality
Area 5: Science and technology	GEC 441	Special education
	GEC 250	Earth processes
	GEC 251	Ground water and society
	GEC 253	Energy and society
	GEC 254	The environment
	GEC 255	Electrical energy and rural development
	GEC 256	History of technology
	GEC 258	Art and science of design
	GEC 350	Environmental change
	GEC 355	Telecommunication in society
	GEC 356	Renewable energy
	GEC 357	Advances in technology
	Area 6: World civilisation	GEC 261
GEC 262		Introduction to cultural studies
GEC 263		The politics of gender
GEC 264		Religion and development
GEC 268		Literature of liberation
GEC 362		Africa and its past on film
Area 7: World economy and business skills	GEC 270	Accounting for non business majors
	GEC 271	Basic cost accounting and control
	GEC 272	Basic finance and taxation
	GEC 273	The state and society
	GEC 275	Basic concepts in marketing
	GEC 276	Contemporary economic issues
	GEC 277	Law and society in Botswana
	GEC 278	Population and society
	GEC 279	E-governance
	GEC 371	Small business entrepreneurship
GEC 372	Migration and globalisation	

Source: University of Botswana (2005a, p. 21)

Table I.
GECs offered by the
University of Botswana

WebCT implementation and use at the University of Botswana

The University of Botswana installed the WebCT e-learning platform early in 2002 as part of new reform measures to further enhance the quality of its academic programmes as well as teaching. The initiative to implement WebCT started on 10 September 2001 when top management appointed a team known as the University of Botswana eLearning (UBel) to spearhead the project. UBel consisted of representatives from all faculties and strategic partners like the Library, the Centre for Continuing Education, Information Technology and the Department of Educational Technology, with the aim to provide leadership and guidance for the e-learning initiative (Giannini-Gachago and Molelu, 2005).

UBel defined e-learning as the appropriate use of information and communication technologies in teaching and learning towards student-oriented, active, open and life-long learning. From the time e-learning was launched at the University of Botswana, it was decided that learning would primarily be conducted in a mixed mode, including face-to-face interactions, paper, text books and information, and communication technologies, in order to provide a rich and stimulating learning environment (UBel, 2001). The UBel initiative was implemented in four distinct phases. The first phase involved the creation of a strategic implementation framework for e-learning; a thorough needs analysis, and the selection of an e-learning management system. The second phase involved invitations to academic staff to use generic online tools such as online quizzes, threaded message boards, e-mail and chat sessions. During the third phase, pilot projects were selected from within each faculty and appropriate policies and procedures were put in place. In the final ongoing phase, a strategic roll out is being undertaken in which programmes are selected for online delivery in a mixed mode format.

The selection of WebCT followed a closely monitored procurement process in which vendors (of WebCT and Blackboard) were invited to demonstrate their products on campus. UBel settled for WebCT as the most appropriate online learning management platform for all lecturers who wished to use online teaching as part of their delivery. WebCT offers easy publishing of online course materials, online quizzes, online discussions via threaded message boards and chat groups, among other features. It also provides lecturers with a variety of other tools including an online calendar, an assignment box and a facility to post announcements about courses. The procurement and installation of WebCT in March 2002 was immediately followed by the training of 80 academic staff members to prepare them to deliver their courses online. Further training was provided at the end of 2002, covering online assessment tools and the pedagogy of online learning (UBel, 2002).

The rationale for the implementation of an e-learning platform (WebCT) by the University of Botswana was in the words of UBel: to fulfil the University of Botswana's responsibility to prepare students for effective participation in the workplace and the wider information society; use ICT to increase the success rate of students, and counter the threat of international virtual and private institutes seizing its traditional student market. Moreover, e-learning would provide the opportunity for the University to enhance flexible learning anytime, anywhere and at student's own pace, and to provide customised individual learning preferences. Furthermore, it would enable students to

explore learning materials with more senses (multiple modes and multi-media), and provide an easy means of finding, handling, and publishing electronic materials. It was also expected that through e-learning, access to relevant national and international resources would be facilitated. Moreover, better ways of dealing with large classes would be achieved (UBel, 2002).

Since the implementation of WebCT at the University of Botswana in 2002, there has been a rapid increase in the development of e-learning courses. By May 2005, for example, 178 courses had been offered through WebCT and 75 lecturers were using e-learning. By the end of 2005, the number of staff using WebCT constituted about 9.5 per cent of the total number of academic staff at the University (University of Botswana, 2005b). In addition, the number of students added to online courses has been increasing. For example, by the end of 2005, this number had reached 8,157 (Giannini-Gachago and Molelu, 2005). Table II shows the rate of increase in the number of students added to online courses since the implementation of WebCT at the University of Botswana.

Training of staff to use WebCT is offered individually, on-demand by the Centre for Academic Development of the University. Such training workshops consist of a series of course design and integration of ICTs in teaching and learning. The courses cover a wide range of topics, such as course design principles, introduction to e-learning and e-moderation, and hands-on topics like PowerPoint and Web Design. These training workshops are offered on a monthly basis and the demand has been rising progressively. For example, by the end of 2005, 42 courses had been offered (Giannini-Gachago and Molelu, 2005). The training involves staff being taken through various training sessions on a voluntary basis. This training has generally encouraged teaching staff to integrate online lessons into their instruction milieu. Moreover, through UBel Club (an association of users of WebCT at the University of Botswana) faculty staff are able to share online teaching experiences. The Club also provides funding for research projects involving departmental teams, to help develop and promote best practices in e-learning at the University of Botswana (Giannini-Gachago and Molelu, 2005). The implementation of WebCT at the University of Botswana can be said to be progressively changing the traditional teaching practices as faculty continue to integrate learning technologies into teaching and learning processes. However, there is pressure being put on ICT infrastructure by the increased demand for e-learning at the University.

Semester	Students enrolled to e-learning courses by semester/year
2/2004,2005	8,157
1/2004,2005	4,229
2/2003,2004	2,153
1/2003,2004	3,395
2/2002,2003	1,640
1/2002,2003	1,722
Total	21,296

Source: Giannini-Gachago and Molelu (2005)

Table II.
Number of students
added to online course by
end of 2005

Need for online information literacy at the University of Botswana

In general, the importance of information or computer literacy in education needs no emphasis. Proponents of computer literacy emphasise the need to provide students with a complete set of skills and information on how computers are used, and knowledge of their effects. The Association of College and Research Libraries (2004) defines information literacy as a set of abilities requiring individuals to recognise when information is needed and have the ability to locate, evaluate and use effectively the information needed. On the other hand, the Clinton Era Technology Literacy Challenge equated technology literacy with computer skills and the ability to use computers and other technology to improve learning, productivity and performance (US Department of Education, 1996, p. 5).

The need for an online information literacy module at the University of Botswana is becoming increasingly evident because it would seem the purpose for which GECs were introduced at the University has yet to be realised. Both anecdotal and empirical evidence show that there are serious problems in the administration of GECs at the University. For example, a study on the level of information literacy competency amongst LIS students at the University in 2004 (Mutula *et al.*, 2005) revealed that most students had an attitude of unwillingness to learn and read, displayed lack of proficiency in English language, were not competent in questioning what they were taught, and largely added little value to the learning process. Moreover, students generally showed inability to provide reviews of papers, cite documents appropriately, demonstrate competency in report-writing skills, express themselves clearly and correctly, use correct spellings, demonstrate competency in search strategy formulation, and demonstrate respect for copyright laws. Similarly, an internal memo from the Deputy Vice Chancellor in charge of academic affairs in 2005 noted that:

[...] teething problems are experienced in implementing the general education courses as the demand far exceeds the supply. In addition, departments face resource and capacity constraints... and there are issues relating to program loads, course scheduling, academic advising and course selection practice which require attention (Deputy Vice Chancellor, Academic Affairs, 2005).

Against this background, the idea of designing and implementing an online information literacy module became opportune, when the Centre for Academic Development (CAD) at the University of Botswana sent out invitations to teaching departments asking them to submit bids on an innovative teaching approach using ICT, for funding to be implemented beginning semester 2 of the 2004/2005 academic year. The authors drawn from the Department of Library and Information Studies submitted a winning bid to design and implement an online information literacy module that would be offered to first year students in LIS, registered in the programmes of: information systems, archives and records management, and library and information studies.

The information literacy module was offered during the second half of semester 2 in 2005 as part of the existing course "Introduction to Information Science", which has a large component of information retrieval content. This course is usually offered as core (compulsory) to Bachelor of Information Systems students, but students from other programmes can enroll on an optional basis (not compulsory). The module was designed to enable students to:

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- develop information literacy competencies such as identifying and defining their information needs;
 - locate information resources by choosing from a variety of internet and library sources;
 - select the most useful resources by evaluating the sources available;
 - organise information;
 - present information effectively;
 - assess what they had done by critically reviewing their work; and
 - share learning experiences with each other.

Methodology and research design

The major objective of this study was to design and offer an online information literacy module to first year students registered in the Bachelor of Information Systems, Diploma in Archives and Records Management of and Degree/Diploma in Library and Information Studies at the University of Botswana, in order to improve their information literacy competencies. The online information literacy module was delivered during the second semester, building on basic digital literacy skills acquired from ICT courses offered during the first semester and was designed to undertake meaningful online learning through WebCT. The module was offered for six weeks to 103 students.

Three tutors from the Department of Library and Information Studies developed the online content. The content was thereafter redesigned and uploaded onto WebCT by a content designer from CAD. Each of the tutors was given designer status in WebCT for managing content and administering the module to a given group of students. The students were divided into three equal groups for effective management. The first and second groups had 34 students each, while the third had 35. Each group was assigned a two-hour slot in the smart computer laboratory (a dedicated computer laboratory with fast internet-hooked access and other technical resources such as digital projectors, a videoconferencing facility, scanners, video cameras, etc.), from where each of the three groups worked online during Mondays, Tuesdays and Wednesdays, weekly, for six consecutive weeks. Each group was assigned a tutor who received assignments online and graded them. The tutors had the option to work largely online or print the assignments and assess them offline. Most tutors preferred the latter method to the former for various reasons, including reluctance to stay on a computer for long periods. The marking scheme for all assignments was prepared jointly by all the tutors involved. Once the assignments were graded, they were posted online along with the marking key.

Communication between students and tutors as well as submission of assignments was exclusively carried out online. There was minimal physical contact between tutors and students. Tutors, however, visited the smart computer laboratory from time to time to determine how many students were turning up to do their assignments, as compared to those who were undertaking their assignments elsewhere. This information was important as it provided an indication of the magnitude of the problem of access to computer resources in the University. Students often claim that they are unable to submit their assignments on time because of lack of access to computing resources in the general students' computer labs on campus. Prior to the

commencement of the online module, preliminary enquiries were carried out among respondents to determine their competencies in using WebCT. The findings revealed that out of 97, 42 (43.3 per cent) used WebCT regularly; 40 (41.2 per cent) used it more than once a week; 12 (12.4 per cent) used it once a week, and 2 (2.1 per cent) used it once or twice a semester. Moreover, from the 97 respondents, 81 (83.5 per cent) acknowledged that WebCT was easy to use against 16 (16.5 per cent), who said it was not easy to use. This result suggests, perhaps, that respondents were generally conversant with WebCT at the commencement of the online information literacy module and were therefore able to use it for online instruction.

The online information literacy module consisted of various components, divided into six topics using the Australian Capital Territory Library and Information Services (Australian Capital Territory Library and Information Services, 2004) information literacy model. This model provides six stages for developing information literacy skills, namely:

- (1) defining the task;
- (2) locating resources;
- (3) selecting the most useful resources;
- (4) organising the information;
- (5) presenting the information effectively; and
- (6) assessing what has been done.

For the purpose of this project, each stage was taken as equivalent to a topic. Each subsequent topic was designed to build on the preceding one with increasing complexity, as based on Bloom's "Taxonomy of cognitive domain of knowledge". Bloom's taxonomy model consists of six levels, namely: knowledge, comprehension, application, analysis, synthesis and evaluation (Clark, 2001).

Each topic in the online module consisted of between 5-13 tasks that students were expected to tackle by reading various sources of information, which were provided online or sourced from information found on their own from the internet. At the end of each topic, they were expected to submit their completed assignments online to the respective tutors for grading. Before the commencement of the online course, students were brought together and addressed by the tutors involved in the administration of the online module. Similarly, an online dispatch was sent to the students' mailbox through their WebCT personal accounts, explaining what was required of them and what the new module entailed. The topics that were covered in the module were made more interesting by concentrating on those that were close to the students' lives, such as university strategic mission, vision and values, academic freedom, freedom of worship, cheating in exams, intellectual property rights and plagiarism, and career advisement. Prior to their first lesson, students were introduced to the features of WebCT. The first topic's exercise was based on strategic mission, vision and values of selected universities around the world. The purpose of this exercise was to enable students to demonstrate competency in understanding, comprehending, and interpreting the purposes of mission statements as core strategic frameworks that guide modern institutions to achieve their obligations and responsibilities in society. In so doing, they were required to determine their information needs, locate and retrieve relevant information, and identify relevant keywords. Figures 1-3 show some of the

Task 1. Using any appropriate search engines, write out the mission statement of the University of Western Ontario (UWO).

Task 2: Identify three key words that define the mission of Kingston University, London.

Task 3: What in your opinion is the specific purpose of a

- i. vision statement?
- ii. mission statement?
- iii. value statement?

Task 4: Identify common features in the mission statements of the following universities as posted on the Internet:

- iv. University of Botswana.
- v. University of Pretoria.
- vi. Kingston University, London.
- vii. University of Western Ontario.

Task 5: Which of the mission statements in the 4 above do you like most and why?

Task 6: Craft your own vision as a beginning university scholar.

Figure 1.
Topic 1

Task 1: With reference to topic 1, identify from the mission, vision and/or value statements the ‘declarations’ that embody those universities’ commitments to academic freedom.

Task 2: From the two definitions of academic freedom given above (passage was provided), search on the web and in your own words, explain the meaning of the three following concepts (remember to provide the URLs where you obtained your definitions):

- a) Freedom
- b) Coercion
- c) Censorship.

Task 3: From the goals of academic freedom given above, state whose freedom and rights you think the above goals fail to address. Explain why you think these freedoms have not been addressed.

Task 4: (omitted because of large size of table involved)

Task 5: Outline four concrete examples of how academic freedom may be abused in an academic environment.

Figure 2.
Topic 2

Task 1: In your own words, discuss, with necessary detail, the four forms of intellectual property rights.

Task 2: Clearly explain how plagiarism in a university setting can undermine intellectual property rights.

Task 3: In your own words, clearly outline five reasons why students cheat in their academic work.

Task 4: Explain ways by which universities, in general, manage to detect cheating in exams.

Task 5: In what ways can universities deal with students who have cheated in an exam?

Task 6: From your research, how does cheating harm a university’s reputation?

Figure 3.
Topic 4

screenshots about the exercises to which students were exposed. However, actual scenarios leading to the questions in the exercises have been excluded.

Similarly, the second topic was on academic freedom and took the previous lesson a notch higher. Students were expected to explore the concept of academic freedom in a university environment, and evaluate how it affects the teaching and learning process.

They were also required to investigate and determine how the concept of academic freedom had been factored into the strategic mission, vision and values of the universities that they had encountered in topic one. The purpose of this topic was to enable students to, among other things: effectively find the information they needed to perform a task; use the knowledge they had already gained to link to new tasks in order to carry out more sophisticated assignments; decide what information they needed; and identify relevant sources of information. The topic 2 questions are reflected in Figure 2.

Topic 3 was on freedom of worship and built on the previous topic of academic freedom. Students were expected to explore the issue of freedom of worship in universities that they had encountered in previous lessons. The purpose of this topic was to enable students to build on the information skills that they acquired in topic one and two respectively. In particular, they were expected to evaluate the information they had gathered, sieving out that which was undesirable. Moreover, they needed to determine the relevance and credibility of the information they found. Finally, they were expected to present the results clearly, logically and conclusively in tabular form. For example, they were expected to tabulate various types of religious freedoms that were presented in a given website, and the extent to which various universities, which they had encountered before, integrated them into their values, missions and visions using the Likert scale of 1-3 (1 = Mostly, 2 = To some extent, 3 = Not at all).

Topic 4 addressed the issue of intellectual property rights and plagiarism in university learning environments (Carol, 2000), with some emphasis on cheating in exams. The purpose of this topic was to enable students to organise, process and present information that they had researched, by writing clearly, accurately, and by exhibiting problem-solving ability in both the form and content of their work. The assignment that followed is reflected in Figure 3.

Topic 5, on the other hand, covered career paths for prospective university graduates. Through this topic, students were expected to demonstrate information literacy competencies that they had acquired through the preceding topics, such as the ability to determine information needs; formulate a search plan; locate information in a mesh of internet sources; identify and retrieve information from online sources using different methods; critically evaluate, synthesise and use the information; cite sources that were referenced using appropriate citation schemes; and finally, choose the best ways to present the information they had found. Finally, during the sixth week, students were given a questionnaire to complete in order to share their experiences about the online information literacy module. The results were analysed using WebCT and SPSS. The findings were presented in the form of descriptive statistics and frequency tables discussed in the next section.

Findings and discussion

The number of students involved in this project was 103 but only 86 (83.5 per cent) responded to the questionnaire that was administered at the end of the delivery of the online information literacy module.

Perceived level of competencies of respondents prior to administration of the online information literacy module

Respondents were asked to state their perceived level of information literacy competency before they undertook the online information literacy course. Out of 86 who responded to this item, 11 (14.0 per cent) of them perceived their competencies to be poor; 41 (47.7 per cent) noted that their competencies were fair; 31 (36.0 per cent) felt that their competencies were good; and only three (3.5 per cent) thought their competencies were excellent. Prior knowledge of students' entry level competencies in any learning program is critical because as Savery and Duffy (1995) note, the instructional principles for the design of a constructive learning environment is to design an authentic task and also the learning environment that supports and challenge the learners' thinking. On the other hand, Becta (2004) points out the need for teachers to be aware of the pupils' previous learning experience in the use of ICT, as this would have a direct bearing on their abilities to use it as a resource.

Timing of the information literacy module

Respondents were asked to provide their views about when they felt were the appropriate times to offer the online information literacy module. From the 83 respondents who answered this item, findings showed that majority, 51 (61.4 per cent), preferred the module to be offered during the first semester, while 32 (38.6 per cent) felt that it should be offered during the second semester. Furthermore, respondents were asked to indicate the reasons why the online information literacy module should be offered during either semester 1 or 2. From the 83 respondents who answered this item, 49 (59.0 per cent) preferred the information literacy course to be offered during semester 1 because the semester was long, and this would give them the opportunity to gain maximum benefit from WebCT; nine (10.8 per cent) felt that the semester is long enough and would give them the opportunity to work under less pressure, while seven (8.4 per cent) noted that during the first semester, there is less workload. The remaining 18 (21.7 per cent) did not provide well-formulated responses to the query.

Similarly, of the 32 respondents who preferred the online module to be offered during semester 2, 26 (81.3 per cent) felt that they would have gained more computer literacy competencies to be able to undertake online learning effectively. The rest of respondents had such answers as: it would enrich semester 2 courses through knowledge gained in semester 1; too much work is introduced in semester 1, so doing it in semester 2 would be fine, etc. Becta (2003) points out that a lack of self-confidence, negative past experiences with ICT and training differentiated according to existing ICT skill levels, and are some of the barriers limiting the effective integration of ICTs in education.

Impact of online teaching on cheating

Respondents were asked to state the extent to which they felt that online teaching could minimise students' cheating or copying of each other's work (on Likert's scale, 1 = Minimise considerably, 2 = Minimise moderately, 3 = Minimise to a limited extent, 4 = Not minimise at all). Out of the 86 respondents who answered this item, 28 (32.6 per cent) noted that online teaching would only reduce cheating or copying of each other's work to a moderate extent; 36 (41.9 per cent) felt that online teaching could reduce cheating and copying of each other's work to a limited extent. On the other hand, 11

(12.8 per cent) felt that online teaching could reduce cheating or copying of each other's work to a considerable extent; and 11 (12.8 per cent) felt that online teaching would have no impact on cheating or copying of each other's work. These results perhaps dispel the feeling among teaching staff that the adoption of online teaching could in many ways assist in solving the problem of cheating among students. Indeed, a couple of students from all three groups initially divided were penalised by their respective tutors for presenting answers that were largely similar.

The problem of cheating in exams or assignments using ICTs needs to be addressed by using multi-pronged approaches that border on the technical, managerial, ethical, spatial (seating arrangements) and many more. Stockholm Challenge (2006), a global networking program for ICT entrepreneurs, conducted a study to alleviate problems of falling standards of education in the State of Haryana in India due to rampant cheating, through the conduct of examinations employed by the use of technology interventions. They found that ICT interventions brought out transparency, connectivity and, thus, reliability in the conduct of examinations. Moreover, the ICT interventions ensured the eradication of cheating in the examinations to the extent of 95 per cent for the State. The ICT interventions included integrated character recognition (ICR) scanning for pre-phase work, optical magnetic recognition (OMR) scanning for post phase work, re-engineering the enrolment procedure, automation of centre allocation and e-results.

Potential to offer all LIS courses online

Respondents were asked to state whether or not they believed that all courses in the Department of Library and Information Studies should be offered online. From 86 respondents, results suggested that the majority, 50 (58.1 per cent), subscribed to the idea of offering all LIS courses online, while 36 (41.9 per cent) were against. Those who preferred the idea of all LIS courses being offered online were further asked to give reasons why. From 50 respondents, 21 (42.0 per cent) indicated that this would save time in submitting assignments, enhance computer literacy, encourage independent learning, and make it easier to learn. In general, through WebCT, the publishing of online course materials, online quizzes, and online discussions can be enhanced. In addition, WebCT provides lecturers with a variety of other tools including an online calendar, an assignment box and a facility to post announcements about courses. Furthermore, the system keeps track of students' discussions, submission of assignments and evaluation of multiple-choice questions. The importance of information or computer literacy in education needs no emphasis. Proponents of computer literacy emphasise the need to provide students with a complete set of computer skills and information on how computers are used, and knowledge of their effects. Goodson and Mangan (1996) assert that computers will dominate the workplace of the future and that students must therefore have some knowledge of how computers function in order to be comfortable and competent in such a workplace. Similarly, the Department of Education and Youth Affairs (2001) pointed out that effective integration of ICT in schools would require a policy environment that mandates the use of ICTs to improve learning in every subject, at every level of an academic programme.

On the other hand, the 29 (58.0 per cent) respondents who opposed the idea of offering all LIS courses online felt that computers are not enough and some courses are difficult and need lecturer explanation. The results did confirm the widely held view at

the University of Botswana that there are insufficient computer resources in the University to meet the demands of the students. However, during the implementation of the online information literacy module, most students were not turning up in the smart computer laboratory to undertake their assignments, suggesting perhaps that they accessed computers from elsewhere on campus and/or outside. The smart computer laboratory remained open during evenings, when most students had left for home. Such students would look for computers elsewhere during their convenient time to carry out the assignments.

Adequacy of time to complete and submit assignments

Respondents were asked to indicate whether or not they felt that the time they were allocated was sufficient to complete and submit the online assignments. The findings from 83 respondents who answered this item showed that 45 (54.2 per cent) of them felt that the time given was sufficient, while 38 (45.8 per cent) felt otherwise. These results perhaps depend on whether the students had information competency skills or not. Those with information literacy competencies would tend to find the time allocated sufficient, while those with limited skills would need more time to undertake the assignments. These results perhaps point to the need for content designers to cater for the different learning abilities of the students. Peck *et al.* (2002) pointed out that one of the problems affecting the use of ICT for instruction delivery was the time constraints, as technology use requires a sizeable time investment.

Respondents who felt that the time provided for them to work on assignments was inadequate, were further asked to show why the time was insufficient. From the 86 who responded to this item, 43 (50.0 per cent) felt that online tasks required more time to do research. This result was consistent with the generally held view that though online courses are efficient to administer, they require more time to prepare (Maslen, 1999). The other 43 (50.0 per cent) respondents variously felt that: searching the internet was time consuming, assignments were too long, lack of computer literacy competencies, etc.

Place of accessing computer facility

Respondents were asked to state where they gained access to computer resources. From 86 respondents who answered this item, 44 (51.2 per cent) accessed computers in the smart computer laboratory, while 31 (36.0 per cent) accessed computers in the faculty computer labs, and nine (10.5 per cent) gained access to computers in the library. One respondent, who is employed in the neighbourhood of the University, accessed computers in the workplace. Similarly, one respondent accessed the computer facility through cyber cafes. During the duration of the online information literacy project, the smart laboratory was reserved for students on Mondays, Tuesdays and Thursdays in the evening from 5.00 pm to 8.00 pm. However, these results may suggest that almost an equal number of students used other computer facilities elsewhere, other than those that were provided in the smart computer laboratories. This may indicate that the need for computer labs may not be as acute as generally claimed at the University of Botswana.

Becta (2003), discussing the deployment of ICT in education, noted that there were several barriers associated with the digital divide, such as the lack of ICT equipment; high cost of acquiring, using and maintaining ICT; and a lack of access to ICT

equipment, due to organisational factors such as deployment of computers in ICT suites rather than in classrooms. Bamberger (2002) emphasises the importance of ICT infrastructure for effective online learning to take place.

Online support during implementation of the online module

Respondents were asked to state whether or not they obtained adequate online support in the information literacy online module. From the 86 respondents who answered this item, 56 (65.1 per cent) felt that support was adequate, while 30 (34.9 per cent) felt that support was not adequate. The result about inadequate online support could be due to the assumption on the part of the tutors that online learning should instill independence amongst students, and hence the tendency to remain less involved.

Becta (2003) noted that there were several barriers to the use of ICTs in instruction delivery, such as the lack of technical support, administrative support, institutional support, and inadequate involvement of teachers as well as managers in implementing change. Moreover, the lack of training differentiated according to teachers' existing ICT skill levels, and lack of training that focused on integrating technology in classrooms rather than simply teaching basic skills, were identified as the other barriers. On the other hand, Pianfetti (2001) notes that there should be technical support for teachers in the use of ICT, and enabling of adequate access to ICT for both teachers and students.

Most enjoyed aspect of online information literacy module

Respondents were asked to indicate aspects of the online information literacy module that they enjoyed most. Out of the 80 respondents who answered this item, 23 (28.6 per cent) indicated that they were happy with their enhanced computer literacy, especially with respect to searching and retrieving information from the internet; while 13 (16.3 per cent) enjoyed submitting assignments online the most. Moreover, nine (11.3 per cent) enjoyed independent learning, convenience of doing assignments at own times, and communicating online; 10 (12.5 per cent) did not enjoy any aspects of the online information literacy module. The rest of the respondents gave various answers such as: enjoyed working in the smart computer lab, online communication, and enhanced critical thinking. Lack of appreciation of any aspect of the online module by some respondents would perhaps be attributed to difficulties associated with online learning, which according Livingstone (2004), include increased online workload, inadequacy of digital literacy, and difficulties of gaining access to computers.

Level of competencies of respondents at completion of online module

Respondents were asked to indicate their perceived level of information literacy competency at the conclusion of the online information literacy module. The results from 86 respondents revealed that none of them perceived their information literacy competencies as poor; three (3.5 per cent) perceived their skills as fair; 56 (65.1 per cent) perceived their skills as good, while 27 (31.4 per cent) thought that their skills were excellent. The respondents in general felt that the online information literacy course increased their competencies. This result on its own cannot be definitive unless it is corroborated further through objective statistical measures. However, subjectively, the result suggests that an online approach to learning may improve quality of learning.

The perceived level of their competencies by the respondents are in some way consistent with the pattern of results shown in Table III, which reflect overall improved performance across the three different groups, in which the students were categorised in all the five assignments in which they were assessed. However, the high mark of 59.0 per cent in the first assignment, dropped to 55.0 per cent in assignment 2, and is perhaps due to the fact that students would seem to find it easier to grasp knowledge questions (on Bloom's taxonomy of cognitive knowledge domain) than higher levels of the cognitive knowledge domain. Nevertheless, the improvement, as small as it is, may be significant because Bloom's higher levels tend to require more sophisticated competencies. The last assignment (topic 5), which dealt largely with analysis, synthesis and evaluation, was on average performed poorly by respondents, showing perhaps that more time was needed to focus on these areas when imparting information literacy competencies.

Kozma (2003), in discussing the impact of ICT in education, found that students developed positive attitudes towards learning, and acquired new subject matter knowledge or collaborative skills. Students were also reported to have acquired new skills for studying, communicating, handling information or solving problems.

Problems that were faced in learning the online information literacy module

Respondents were asked to identify problems that they faced in learning online. From the 86 respondents who answered this item, 35 (40.7 per cent) identified a shortage of computers; 22 (25.6 per cent) decried the lack of clarity and difficulty of questions; 13 (15.1 per cent) cited poor internet connectivity; nine (10.5 per cent) identified difficulty of locating information on the internet; and four (4.7 per cent) noted that they had difficulties coping with the workload. Finally, three (3.5 per cent) had problems presenting information in particular formats, such as tables. Respondents further identified several issues that designers of online courses needed to pay attention to. They pointed out that questions in the assignments were difficult to understand; readings were too many to cope with; more lab sessions and occasional contact with tutors was needed; online learning was tedious; there was inadequate lecturer support; presentation of content in WebCT needed to be more appealing; online content needed to relate to what is taught in class; and the inability of WebCT to create tables. Maslen (1999) enumerated costs associated with implementation of ICT for education. Such costs related to developing modules and courses online, developing learning materials, uploading time, communicating with participants, internet access, and high cost of equipment.

Group	Assignment 1 Average mark (%)	Assignment 2 Average mark (%)	Assignment 3 Average	Assignment 4 Average mark (%)	Assignment 5 Average mark (%)
1	51	57	58	66	56
2	62	53	57	60	43
3	64	56	56	61	53
All groups average (%)	59	55	57	62	51

Table III.
Performance in all
assignments

The shortage of computers is often cited at the University of Botswana as one major reason hampering effective learning processes. In addition, students often complain of poor connectivity to the internet. The problem of poor connectivity was also cited by Gerhan and Mutula (2005) in their study of bandwidth problems at the University of Botswana. Similarly, Presidential Task Force (1997) noted that Botswana faces significant challenges in providing access to ICTs due to, among other factors, lack of broadband internet access.

As far as the adequacy of learning materials is concerned, from 86 respondents, 28 (32.6 per cent) felt that it was too much to cope with; 47 (54.7 per cent) said it was enough; and 11 (12.8 per cent) noted that it was inadequate. On the question of how well materials were presented online, out of 86 respondents who answered this item, 70 (81.4 per cent) said materials were usefully presented; 14 (16.3 per cent) felt that materials were not well presented; while two respondents did not respond to the query. As to whether the online course was designed with their needs in mind, from the 86 respondents who answered this item, 58 (67.4 per cent) said yes, 17 (19.8 per cent) said no, and 11 (12.8 per cent) did not know. Maslen (1999), commenting on workloads in online learning environments, observed that the introduction of online instruction delivery caused a massive increase in the workloads of many teachers, and represented the most contentious issue facing educators.

Recommendations on how to improve delivery of the online information literacy module

Respondents were asked to suggest ways that they believed could improve the design and implementation of the online information literacy module. From 86 respondents, 14 (16.3 per cent) suggested that the number of tasks in each assignment needed to be reduced; six (7.0 per cent) felt that the number of computers and computer laboratory sessions needed to be increased; four (4.7 per cent) wanted clarity of questions improved and more time to be provided for submitting assignments. A total of 62 (72.1 per cent) did not make any suggestions, perhaps showing the difficulty by respondents to tackle the higher-level questions on Bloom's model. On the other hand, the need to reduce tasks could perhaps be symptomatic of the inability of the students to effectively cope with more work, presumably due to the lack of information literacy competencies. On the clarity of questions, it probably underlines the need for content designers to pay attention to the needs of the users.

Becta (2003) observed that the way to address problems hindering effective integration of ICT in education is to carry out further research, so that such problems can well be understood. Department of Education and Youth Affairs (2001) suggests an area of further research: best practices of professional development activities involving the use of ICT. Pianfetti (2001) notes that the focus on professional development should be to tailor training opportunities to subject-specific requirements, and concentrate on pedagogical skills in the subject context. On the other hand, Becta (2003), citing Ertmer *et al.* (1999), noted that training can help to reduce and overcome barriers associated with ICT. The training needs to be differentiated, taking into account teachers' varying levels of computer experience and learning styles. For those tutors that are novices, it would be important to teach them basic skills before addressing pedagogical integration of technology. Woherem (1993) argued that ICT required skilled staff to run, upgrade, maintain and repair.

Conclusion

The purpose of the online information literacy project was to investigate the effectiveness of using online teaching to impart information literacy competencies to students at the entry-level programmes within the University of Botswana. The study was motivated in part by the failure of the GECs to equip students with requisite literacy competencies needed to effectively study the mainstream academic programmes at the University of Botswana. The findings in general revealed that online instruction might provide an effective way to impart information literacy competencies, provided that sufficient computer resources are provided. The findings further revealed that contrary to expectations, online instruction may not address the problem of cheating and students copying from each other's work. Moreover, online instruction delivery does not necessarily reduce the amount of workload for staff and students. On the contrary, more time is needed on the part of tutors to design the course, administer it and also answer queries that users frequently raise. Students have to frequently check the discussion forum, respond to discussion, search for information and design their responses.

The findings generally pointed to the need to review the mode of delivery of the general education courses at the University of Botswana, and perhaps offer them through blended or online instruction. The findings have in part demonstrated that online delivery of courses may improve the information literacy competencies of students, however, several issues relating to adequacy of ICT infrastructure, content design, digital literacy among students, and online support need to be addressed.

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