

Online Learning: The chicken or the egg?

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Abstract

While debates in the literature continue on the pedagogical validity of Information and Communication Technology (ICT) it is generally agreed that it is not enough to simply transfer classroom content to an online environment and expect equivalent learning outcomes. This paper explores the pedagogical and technical issues, challenges and outcomes of creating an online information literacy course from an on-campus course. In particular, the key aspects which the teaching librarians considered as they undertook the challenge of providing sound educational practices in the online environment. AIRS Online is offered as a parallel study option to Advanced Information Retrieval Skills (IFN001: AIRS) for QUT postgraduate students, a compulsory face-to-face course for all QUT doctoral students. The aim of this project was to optimise students' access to IFN001: AIRS and meet the University's objectives regarding flexible delivery and online teaching. AIRS Online extends beyond the current notion of static online information literacy tutorials by providing a facilitator-driven, student focussed learning environment comprising content and learning experiences enhanced by appropriate multimedia technology and resources which engage students in planned facilitated and/or self-paced learning events. The online content is reinforced with short succinct student-driven learning objects. Course assessment is formative and summative, and is comprised of a research log and reflective journal to provide a means for reviewing the content and key process of advanced information searching and retrieval.

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1. Introduction

Most research and discussion on faculty-library collaboration for online course development has focussed on the provision of effective library-related resources to deliver to students. Whilst this is important, very little focus has been given to the collaborative development of online courses to teach and assess information literacy in a discipline-specific environment (Edge, 2003). Information literacy is a critical skill for lifelong learning. Developing information literacy abilities is vital for researchers, as Garrison and Anderson (2003, p.11) state, *“The dominant issue in education today is not access to more information. In fact, making sense of the quantity of material they are exposed to is a serious challenge for students. The goal is to give the students the abilities and strategies required to manage this overwhelming breadth and depth of information.”*

Although e-learning is by no means a new concept, and although implementations of Information and Communication Technology (ICT) abound in education, at all levels, across many disciplines and fields, Queensland University of Technology (QUT) Library believes it is still ‘breaking new ground’ with AIRS Online.

Why? For many years, QUT has been the only university in Australia, possibly even outside of Australia to provide a fully accredited, postgraduate information literacy course run solely by the Library. This course IFN001: Advanced Information Retrieval Skills (AIRS) has been offered for many years to research students, staff and some postgraduate coursework students. The course provides an introduction to advanced information research concepts and skills, and is widely recognised in QUT as an essential prerequisite for any new students undertaking a research degree. Although a compulsory course component for Doctoral students, at the beginning of 2004 the Office of Research modified enrolment processes to automatically enrol all commencing Doctoral students at QUT.

This situation added to an existing challenge, as QUT also enrolls Doctoral students who are not geographically located in Brisbane, or indeed even in Australia. An equitable solution for distance students enrolled in Doctoral programs at QUT needed to be found. Thus AIRS Online was conceptualised and developed. We now believe AIRS Online will be the first, and only, accredited, compulsory e-learning course for information literacy in Australia.

1.1 What is AIRS Online?

AIRS Online is an online information literacy course developed in 2003 and 2004 at Queensland University of Technology (QUT). The newly styled e-learning format uses as its basis the accredited, face-to-face IFN001: AIRS course, designed in 1989 for the University’s postgraduate research community. In its current format, IFN001: AIRS aims to assist students in working toward their literature review by assisting them to develop as highly

proficient users of information. The curriculum of IFN001: AIRS includes (i) exploration of postgraduate student library services, search statement designs, including, the use of the various operators and evaluation of information; (ii) database searching and cited reference searching, allowing for demonstration and practice across a range of platforms; (iii) internet searching and tools, which guides students through comparative evaluation-based principles; and (iv) introductory EndNote¹ training and current awareness strategies, including saving searches and alert services groups. This design facilitates the development of information literacy abilities and critical reflective thinking for lifelong learning (Tranter & Warn, 2003).

In order that IFN001: AIRS remains relevant to its constituent client base and retains a pre-eminent role in information literacy education at QUT, it has been acknowledged that an on-line presence is now desirable. Thus, the Library has undertaken the development of AIRS Online to comprehensively and equitably address the advanced but fluid research and study needs of postgraduate students and staff and to facilitate learning outcomes for students in a changing environment.

While the Library currently provides various resources via its *Information Literacy* website, the OLT² system, and *PILOT: Your Information Navigator*³, there is currently no online option available to support the advanced needs of QUT's part-time and distance postgraduate research students. Indeed, from the results of a recent environmental scan and national survey conducted by QUT Library (Fell, 2001), there appears to be no such compulsory, online, postgraduate level course offered by any tertiary institution in Australia.

The AIRS Online project commenced in 2002 with conceptualisation and preliminary development of the online curriculum and technical infrastructure, and continued throughout 2003 and 2004. The production teams were responsible for designing and developing the content, technical infrastructure and learning objects in cooperation with QUT's Web Solutions group and instructional designers in TALSS⁴ at QUT.

While online learning is becoming more popular with students, institutions are still exploring associated educational theories and pedagogical practices inherent in the process. This paper explores issues relating to the development of AIRS Online as an educationally rigorous course, the content, structure, presentation and delivery of which is enhanced, rather than driven, by effective and appropriate technology.

1.2 Why create AIRS Online?

Research shows that students' preference is for face-to-face teaching (Keefe, 2003). Lujan (2002) insists that educators must have a valid motivation for

¹ Bibliographic management software produced by ISI ResearchSoft

² Online Learning and Teaching, QUT's in-house course management system

³ A web-based, self-paced online information literacy tutorial for undergraduate students

⁴ Teaching and Learning Support Services

moving to online, that it is not simply enough to provide content for e-learning and that it should not be provided simply because it seems 'new' or 'exciting'. An e-learning experience must still be a valid, pedagogical learning experience for students. However, as the OECD (2001, p.25) notes, "It is a classic chicken and egg problem. The infrastructure, personal computer penetration and Internet connectivity must be in place for the software and applications to work."

E-learning requires a high degree of interactivity, the flexibility for self-directed learning, the use of technology to enhance, but *not* to determine or direct learning, the contextualisation of learning, and the use of active learning and reflective practice (Gabriel, Ostridge, & Doiron, 2003; Garrison & Anderson, 2003). The learning experience must shift control from teacher to student in the online environment, to create a learner-centred, constructivist approach. The learner constructs meaning, based on their previous knowledge and experiences, therefore learning activities must be rich and diverse (Ibrahim, Silong, & Samah, 2001).

In creating an online course, it is best to focus on existing strengths of quality or distinctiveness for moving to the online market (Lujan, 2002). IFN001: AIRS highly respected as an educationally valid course and is unique within Australia. Additionally, there is a strong, valid reason for the move to e-learning for AIRS Online; that is the need to provide a viable alternative to offshore and geographically remote students who are compulsorily enrolled in AIRS.

E-learning does have its advantages, both in theory and practice. The students' preference for face-to-face learning is largely due to the interactive experience. By creating more interactive online learning experiences, the gap in students' expectations and experiences is lessened (Keefe, 2003). Other advantages of online learning include the potential for self-paced learning; the ability to provide learning anywhere, anytime; and the ability to complete, submit and mark assessment electronically (Martin & Lee, 2003; Reid, 200?). Thus a highly interactive version of AIRS Online has been designed to provide online course content, learning objects and experiences, and electronic assessment, feedback and marking.

2. Designing AIRS Online

2.1 Best practice in design for achieving learning objectives and outcomes

In designing e-learning, any educational outcomes depend on the learner's acceptance of responsibility for their own learning (Garrison & Anderson, 2003). It is also vital to know the students' readiness and attitude to online learning, and therefore to set learning outcomes and objectives, as students need to understand the expectations of the course and the educators (Ibrahim

et al., 2001). In this case, the learning outcomes and objectives were set around the information literacy standards and examples in the *Australian and New Zealand Information Literacy Framework: principles, standards and practice* (Bundy, 2004). The students can cross-check their learning against the objectives *and* the standards, thereby providing clear development of information literacy for lifelong learning.

It is important that the students also have the opportunity to discuss learning outcomes and expectations (Garrison & Anderson, 2003). This can perhaps best be achieved by use of a learning contract that the students read, complete their own contribution, and 'sign' by electronic acceptance. The Australian Faculty of Public Health Medicine (*Developing a learning contract*, 2002) advocate the design of a learning contract that allows the learner to create meaningful learning experiences. The contract assists both learner and facilitator to define learning needs, understand resources and build on strengths to overcome gaps, by:

- exploring needs;
- establishing objectives;
- identifying learning resources;
- developing a plan with timeframes;
- establishing responsibilities; and
- including evaluation.

As each new student begins AIRS Online and logs into the site for the first time, they are prompted to complete a learning contract that states the educational outcomes, expectations for learning, technology, and assessment, and the provision of assistance and teaching. The students can also identify their own expectations and concerns with the course. Having completed the learning contract the students can further explore the course objectives and outcomes through the general information provided and are prompted to begin the course by watching a welcome video from the Director of Research and Research Training at QUT, Professor Rod Wissler.

The learning outcomes are further stated at the beginning of each module, and reviewed at the end of that module. Students can track their progression through the course, and therefore their achievement of the learning objectives as the course includes "My Learning Path". This is the first screen students will see each time they log into the course and can access the learning path at any time to check their progress. The final, detailed check of the overall course learning outcomes and objectives is part of the course, in 12.1.2, the students can check their learning; and link directly to any course content they feel they need to review or revise.

2.2 Best practice in design for interactive learning and learning style

Research has shown that increasing the quantity and quality of interactions improves both the students' perceptions of, and performance in online

learning (Keefe, 2003). In e-learning, the focus must be on comprehension; the students must be engaged in active learning. Additionally, there is the need to accommodate multiple learning styles; those who learn best by seeing a demonstration or completing a task are not satisfied by merely reading content. Active learning demands contextualisation to a real-world experience. Text-based learning is not particularly effective; students need easy linking to real-world applications of concepts (Han, Dresdow, Gail, & Plunkett, 2003; Keefe, 2003).

An interactive e-learning experience assists the students to make valid meaning of concepts and create knowledge from the information provided, through the integration of text, visual, audio, spatial and behavioural elements in digital media (Burnett, 2001). AIRS Online uses interactive experiences to increase learner participation and provide a range of learning experiences. These activities include:

- textual descriptions;
- graphical illustrations;
- demonstrations of concepts in animation (Macromedia Flash);
- demonstrations of live applications of concepts in animation (ViewletBuilder);
- audio recordings and transcripts;
- video recordings;
- interactive elements that students type in words or click-and-drag to answer queries; and
- JavaScript quizzes on content to check understanding and provide formative evaluation.

One of the major forms of interactivity, strongly advocated for e-learning, is the use of synchronous and asynchronous discussions. To this end, AIRS Online will make use of asynchronous discussion through assessed discussion forums where the students may discuss a specific issue among themselves and with the facilitator. Where the facilitator provides the opportunity for students to contribute with each other, they can build an 'online community' and improve the students' perceptions of online learning (Tobin, 2004). Additional asynchronous discussion will employ email for direct facilitator-to-student feedback and discussion.

Synchronous discussion will make use of the QUT Online Learning and Teaching (OLT) chat. E-learning research has shown that chat is an extremely valuable and vital tool that not only helps to socialise online learning experiences, but also has valid pedagogical uses in quizzing the students on content, brainstorming concepts and ideas, and debriefing students on activities. The transcripts can also be used as study tools for the students (Lieberman & Stovall, 1999; Lujan, 2002).

Experience in e-learning has shown that students, on a voluntary basis, will participate in online interactions 1-3 times throughout the course on average (Ibrahim et al., 2001). The facilitator must encourage participation and interaction through assessing interactivity and by encouraging the students to

discuss issues amongst themselves, acting as 'mentors' to one another (Fontenot, Hagler, & Chandler, 2001). Scheduled discussions and chats, with a weighting in overall assessment, will ensure this for AIRS Online. Some learning styles will benefit more than others from the interactive experiences of chat and may also benefit those learning in a language other than English, as the written communication allows these students to follow and understand a discussion more easily to facilitate learning (Ibrahim et al., 2001). Students in AIRS Online can follow the threaded discussion forums and also access chat transcripts, using the OLT system.

2.3 Best practice in design of assessment

James and McInnis (2001), recognised that assessment literally defines the curriculum for most students. By clearly articulating the learning and the reward, assessment becomes a "potent strategic device for educators and a powerful tool for improving the quality of student learning" (ibid).

In designing the assessment of AIRS Online two major objectives were identified. Firstly, AIRS Online had to provide interactive learning experiences appropriate, and of interest, to students of all disciplines. Secondly, the assessment in AIRS Online was required to match the assessment of IFN001: AIRS in terms of student input, learning outcomes and product. To achieve this aim, the assessment profile of AIRS Online will comprise formative assessment (quizzes, discussion forum activities and chat) and summative assessment items (Resource Log and Reflective Journal).

The current assessment of IFN001: AIRS, a Resource Paper (weighted at 100%) that directly relates to the research topic of the student, is a collection of resources (electronic or print) reflecting a culmination of the skills learnt in the modules. It meets four main objectives: (i) developed understanding of the key aspects of information searching; (ii) raised awareness of key searching tools within individual research areas; (iii) skills development in resource evaluation and (iv) bibliographic management of the literature.

The design of the assessment of AIRS Online required a review of the IFN001: AIRS Resource Paper. With a move to an online environment and the subsequent impact upon monitoring of students' reactions, responses and progress, the allocation of 100% weighting to one single assessment item was deemed as undesirable. Therefore, the AIRS Online equivalent (i.e.: "Resource Log") has been assigned an 80% weighting.

Steiner (2001) reported success in using a "Weekly Reflective Diary" in ITB/N322 *Information Resources* (designed by Sylvia Edwards) as an effective formative assessment item. ITB/N322 employs the reflective diary as a means to provide feedback to the lecturer on activities conducted in class and as a gauge of students' understandings of the content delivered. Formative feedback is provided to students in a timely fashion as they progress through the semester, to aid developmental learning.

The format of the “Weekly Reflective Diary” was adopted for AIRS Online. Titled a “Reflective Journal” and with a principal purpose of encouraging reflection upon the course content, the journal has been carefully aligned with the online environment, content level and the technology used in AIRS Online. Specifically the journal will (i) help students to maintain an awareness of how well they are progressing with the content; (ii) provide students with a means to identify any difficulties they may be experiencing in the unit; (iii) assist the facilitator in identifying areas where more help may be needed; and (iv) act as a prompt when students are completing the research log.

The students critically reflect upon set questions presented at the completion of each module at which point a question (or range of questions) designed to promote critical analysis of the module content, will be presented. The ten contributions for the Reflective Journal are an undemanding 50-100 words each, with the assessment items comprising 20% of the overall assessment.

Formative assessment has also been stringently built into the format of AIRS Online to aid the student and facilitator in monitoring progress and to facilitate the social and personal needs of students via such assessment. Stubbings and Brine (2003) emphasise that by providing interactive learning experiences, online learning can be very motivating and provides an excellent vehicle for formative feedback. Interactive learning experiences, such as MCQs, discussion forums and facilitated chat sessions, have been incorporated into the design of AIRS Online to address inherent factors of learner isolation.

Finally, a third form of assessment - Online Consultation - was incorporated to combat some of the disadvantages of assessing at a distance and in an online environment (Kerka & Wonacott, 2000). In AIRS Online, synchronous and asynchronous discussion will provide alternative methods of consultation and allow students to regularly communicate with lecturer and peers at prescribed times throughout the course. Discussion forums will be used as both a source of information and a forum for exchange of views between students and lecturer, while chat will provide the opportunity for students to communicate in real time with their lecturer and colleagues. The online consultation, with a satisfactory / unsatisfactory rating, seeks to encourage active discussion between students and the facilitator and develop each cohort as a “learning community”.

2.4 Best practice in technical infrastructure design

In planning the technical infrastructure needed for AIRS Online, several factors were considered, including the technological features required for developing learning objects, e-learning interface design principles, and the programming support available to the project.

There are a wide variety of combinations of technological features possible in online course delivery (Clarke, 2001; ION, 2001). The typical delivery platform makes use of both asynchronous communication methods (e.g. e-

mail, mailing lists, threaded discussions, forums) and synchronous (real-time) communication (e.g. chat rooms, live video/audio streaming, and electronic white boarding). Much of the face-to-face course involves demonstrating practical examples of online databases and tools, so it was important to have a way of providing equivalent demonstrations in an online environment. The software chosen to fill this need was ViewletBuilder⁵, which takes screenshots, allows for captions and audio voiceovers, and outputs in Flash.

The QUT OLT software provided many technical elements, such as quizzes, chat and discussion forums. However, the OLT system did not support a learning contract and user-tracking system (intended to give clear indications to students of where they are in progress in the course, what they have so far completed, and what they need to do next). Both an in-house web site and an OLT course site were developed to meet the different needs, and relevant IT professionals with programming experience were used to develop these extra features for the in-house site.

To make the transition between sites seamless, we integrated the same navigation system into both sites. The overall look and feel of the web interface was designed by graphic designers to engage the learner and provide an attractive and simple template; and also aligned with QUT standard web site guidelines. The aesthetics of the site were important to enhance a student's experience, as supported by Lockee, Moore & Burton (2002, p.22) stated "*Even an instructionally sound online course can fail to produce learning outcomes if the students encounter a poorly designed web site.*" While visually appealing, the design is also practical and provides a consistent navigation system, clearly marked instructions and help, and is familiar to students as it uses similar navigation to other QUT web sites.

3. Developing AIRS Online

3.1 Overview of development process

Development of AIRS Online began with conceptualisation and initial design in 2002. During 2003, a project team came together to develop the preliminary design, the web interface, and begin content development. This group included Stephanie Bradbury (Liaison Librarian), Peter Fell (AIRS Librarian), and Kurt Vollmerhause (Library Systems Officer). Library Systems expertise was also provided by Glen Cook and Ursula Then. This initial phase of development achieved a great deal in establishing the 'look-and-feel' of AIRS Online and the technical and pedagogical infrastructure to support the course. The team established the overall structure of the course, developed a variety of learning objectives and three complete modules and completed the research on the background of the course itself.

⁵ Software for creation of screenshot animations in Flash, produced by Qarbon <http://www.qarbon.com/>

In 2004, Robyn Tweeddale (Liaison Librarian) was employed as the Project Manager. Michelle Conkas (Library Systems Officer) was employed as the Project Officer to assist and provide the vital technical expertise to the team. Peter Fell continued to contribute part-time and the entire project was overseen through all of its phases by Judith Peacock, the Information Literacy Coordinator. As the Project Officer was offered a position at another university, Kurt Vollmerhause was able to step back into the position until the project was completed. The team was also assisted by a visual designer; a student in the Faculty of Creative Industries at QUT, Tim Robinson worked tirelessly to create the interactive Flash components of the course. Technical support and infrastructure was provided by Julian Kapitzke in QUT Library Systems.

Over three months, the team:

- designed the learning outcomes and objectives across the course;
- designed and developed the content, learning objects, demonstrations and animations;
- designed and developed the assessment;
- consulted with student groups, and TALSS staff to develop learning activities and content;
- tested and evaluated the course; and
- ensured the technical infrastructure and documentation was completed.

Now AIRS Online stands ready for implementation in 2005 with QUT offshore and remote Doctoral students. It is an exceptional interactive e-learning experience with a strong focus on development of information literacy abilities for research, and for lifelong learning.

3.2 Feedback and formative evaluation during development

When developing an e-learning course, it is vital to obtain feedback and formative evaluation of the material under development. Formative evaluation during development process improves learning products and activities as it is still early enough to make improvements while the system is still malleable (Lockee et al., 2002).

Formative evaluation should evaluate whether instructions are well written, learning objectives are clear; sufficient opportunities are provided for practice and feedback to learners; sufficient examples are provided; and that assessment correlates to instruction.

According to Lockee, et al., formative evaluation should take the form of:

- Expert review – which was achieved by consultation with the library experts on information literacy and the Information Literacy Coordinator, as well as with instruction design experts in QUT Teaching and Learning Support Services.
- One-on-one review with sample learners – which was achieved through individual testing of modules as they were developed.

- Small group review, practising and testing – which was achieved through two series of focus groups of past IFN001: AIRS students; early in the process to ensure that relevant and valid material was included; and after all modules were completed to test content, language, activities, examples and outcomes.
- Design review with those familiar with the underpinning theory and teaching components – which was achieved through group review and testing with the QUT Reference Librarians after all modules were completed.

This rigorous formative evaluation provided an invaluable set of comments, suggestions, enhancements and improvements, some of which have already been incorporated and others which are marked down for future development.

3.3 Collaborative development

As discussed, the librarians involved in the development of AIRS Online were selected for their knowledge of research and pedagogical teaching of information literacy concepts and skills. However, to further ensure the pedagogical validity and educational rigor of the course, an Instructional Designer from the QUT Teaching and Learning Support Services (TALSS) was contracted to check the learning design and outcomes of the course.

Other TALSS staff also collaborated in the development of AIRS Online. The QUT Online Learning and Teaching (OLT) system was readily selected to host the assessment of the course. Lockee, et al. (2002) point out that e-learning courses need reliable, robust systems to support them, as well as the provision of easy assistance and technological advice to learners, as is available for the OLT system at QUT. Martin and Lee (2003) advocate the use of standardised systems to provide a consistent learning experience for students, as well as using standard university login and passwords. Using the OLT provides this consistent experience for QUT students and gives AIRS Online the credibility of a QUT online course.

TALSS staff involved in the Educational Television (ETV) unit provided collaborative support and development of video content. Staff in Library Systems were deeply involved in ensuring the technical design, development and robustness of AIRS Online. AIRS Online was also developed in consultation with the QUT Office of Research and Research Training.

3.4 Interface and technical development

Major goals of the design of the course included making the course easy to use, providing sufficient help and guidance, integrating text, graphics and multimedia elements and catering for people with disabilities (Tabbers, Kester, Hummel, & Nadolski, 2004).

At the beginning of the course, students are introduced to the common elements of the course, technological requirements (including defining what

software users need and where to download plugins), how to progress through the course, and how to access alternative versions of learning objects.

Each module is consistent in layout and structure, and includes an introduction to the learning objectives of the module, and also includes a summary of the module. Students are given an estimate of the time usually required to complete the module and the recommended order of modules. They then can control when to complete each section. Learning objectives and assessment for the course are mapped to identify to students at what point each objective is addressed in the content, or at which point assessment items are drawn from. Quick quizzes and interactive animations throughout the course give immediate feedback on student understanding of concepts.

To cater for both users with disabilities and different learning preferences (Lockee et al., 2002), we provided many variations in the format of various learning objects. For example, case studies are sometimes presented in text boxes on screen, audio snippets or short videos, using real-life students and drawn from a variety of subject areas. Concepts such as Boolean operators that are discussed in the text are also backed up by visual and interactive elements such as interactive Flash animation to enhance understanding. Transcripts are provided for multimedia elements and voiceovers are provided for many Flash animations to aid with accessibility or for learning style preferences. Low bandwidth and low resolution was catered for with alternative versions of Flash screen animations.

The course was required to have user authentication to provide for the learning contract and tracking system, thereby requiring that only QUT staff and students have access to the system. However, we have identified from discussions with past students of the face-to-face course that having access to the course materials upon completion of the unit would be advantageous, as many still frequently refer back to their notes from the course. As most students complete this unit at the beginning of their research degree, providing access after finishing the unit should help keep their skills current.

4. Implementation and the Future of AIRS Online

4.1 Implementation of AIRS Online

As previously discussed, AIRS Online is an accredited unit; the e-learning alternative for students who are physically or geographically unable to undertake IFN001: AIRS. Since the inception of the project, the Library has been working with the QUT Office of Research and Research Training to ensure that the two courses are equivalent in workload and assessment.

Once the course has been finalised and tested, it will be available in Semester 1, 2005 for offshore and remote Doctoral students enrolled at Queensland University of Technology.

4.2 Administration and management of AIRS Online

As previously discussed, a “teaching presence” is a critical component of successful online course management, including: defining and enforcing rules; facilitating discussion; and providing direct instruction and feedback (Han et al., 2003). Tobin (2004) describes in detail the process for administration and management of e-learning. Among the issues listed by Tobin are the needs to: set deadlines; encourage critical reflection and problem solving; encourage student-facilitator and student-student interactions; and respect diversity in interactions.

AIRS Online does not necessarily have to be completed by students in a linear fashion. However there are certain deadlines and milestones that students need to be aware of to successfully complete it. The course runs for a maximum of 12 weeks for each cohort, and although students manage their engagement with it they must log on to the chat sessions at the designated times set for the cohort they are in. If they require formative feedback for their assessment they must submit their log by the eighth week of the course to give the facilitator time to comment. This is returned to them by week 10 and the final version of the assessment is then lodged by week 12. A copy is then made of the students work and no changes are permitted after that deadline. The course aims to encourage critical reflection and problem solving skills through both content and assessment.

Song et al (2004) found that participants were able to form connections with their peers and the facilitator with the use of multiple chat sessions. This proved to be important as they assisted with the formation of a community within the online learning environment. This is in part the rationale for AIRS Online chat sessions. Another powerful reason to incorporate chat sessions is to encourage students to help each other through peer evaluation of each others' search strategies and methodologies. In chat sessions AIRS Online attempts to replicate the same sort of activity that occurs within a face-to-face training session.

Most students will experience problems with chat and discussion and other online elements. Problems may include technical failures or communication issues. The facilitator must be able to assist, help must be available (Ibrahim et al., 2001). To this end there is a link to technical help built into the toolbar containing information of a general nature and links to required software. Finally there is a link to help via email as well as the facilitator's telephone details

Lieberman & Stovall (1999), in discussing the use of chat tools in e-learning, describe how the facilitator must: manage it; establish small groups or cohorts; schedule start and finish times; limit topic discussions to relevant topics; and have rules and etiquette.

It is most important that the facilitator manage the chat session to ensure smooth communication flows. During testing of AIRS Online chat it quickly became obvious certain guidelines must be adhered to, to ensure participants

were able to follow the threads of discussion clearly. AIRS Online will run using small cohorts of students. This makes the chat session more manageable. Each cohort in AIRS Online will be directed to specific chat sessions. Two chat sessions have been planned per cohort. Students are advised when these are to occur, thus cohorts are kept separate and students interact with the same peers each time they chat. The sessions themselves relate to specific aspects of the course and are triggered from specific modules. It is the Facilitator's responsibility to ensure that the sessions are kept on track

The Facilitator will lay down ground rules that all participants need to understand. It is the Facilitator that leads the discussion and therefore is in a position to set the tone of the online sessions. Lieberman and Stovall (1999) point out that a published list of protocols or rules will help to maintain order in the discussion, and facilitate communication. How students are expected to interact with the Facilitator and their peers can be laid down clearly in such a list.

In the absence of face-to-face interaction, evaluation is the only way to gauge student response and progress toward goals (IDE, 1998). The evaluation has been designed to be an integral part of the course. Formative feedback opportunities have been afforded to students who wish to take advantage of it. This enables students to assess what they've learnt, and if there are gaps that need to be filled before submitting a final draft of their assessment. This, in turn, encourages students to explore issues in depth leading to deeper understanding of the concepts.

Further evaluation will determine if the learning products, programs and activities have achieved the desired goals and objectives. QUT Library will plan evaluation that will assist in management of the e-learning students, including:

- budget & Personnel – costs of running and staffing the online course;
- performance Outcomes – whether learners are achieving the learning outcomes and developing the knowledge, skills and abilities;
- attitude Outcomes – student perceptions, participation and concerns; and
- issues with implementation – such as technical problems, student usage, access, involvement and accreditation (IDE, 1998).

Although no formal online evaluation of e-learning teaching or unit design is currently possible at QUT, a formal evaluation system exists for face-to-face teaching and unit design called SET/SEU⁶. These forms can be customised with questions to suit the content, design and teaching of the unit, and may be posted to AIRS Online students for completion and return in prepaid envelopes. Thus formal evaluation will be conducted. Students are also afforded the opportunity to provide more informal comments and suggestions

⁶ Student Evaluation of Teaching/Student Evaluation of Unit

via a form at the end of module 12. This feedback will assist with the future development and enhancement of AIRS Online.

4.3 The future of AIRS Online

Naturally, AIRS Online will require additional testing and modification as it is implemented. Small cohorts of students, consisting only of non-metropolitan Brisbane, Doctoral and Research Masters students will be enrolled in 2005 in four sessions over the year. This will allow for testing of facilitation and management of the course with the AIRS Librarian, as well as testing of the course material and learning outcomes. Workload and administrative issues will be monitored throughout 2005. This will also assist QUT Library in determining if AIRS Online may be offered as an alternative to metropolitan Brisbane students.

AIRS Online has already been demonstrated to members of the Australian Technology Network (ATN) University Libraries committee. These library directors are meeting at the ATN conference in February 2005, and are maintaining a 'watching brief' over the QUT development for its viability for use in other institutions. AIRS Online may also link into the development of a broader ATN set of research skills courses for postgraduate research students.

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