A MODEL OF ONLINE TEACHING AND LEARNING

J Coldwell, D.A. Newlands

ABSTRACT

Deakin University has a long history of supporting distance education with technology. Such presentations have matured from a mix of remote-login/FTP/email in the 1980s through web mediated access in the 1990s to institution-wide learning management systems which are emerging currently. By the commencement of semester 1, 2003, online teaching at the University will be supported by a single, institution-wide, learning management system, which is expected to support approximately 28,000 students, who will each be accessing up to 4 of some 1500 undergraduate and 700 postgraduate courses. In this paper we describe a model for online teaching of both on-campus and off-campus students in the Bachelor of Computing, using various technologies to support different aspects of online teaching and learning. This programme has been running in a web-mediated environment for over six years. Each year the administration of the programme has been modified in a reactive manner, based on student feedback and the identification of failure points during the previous semester, resulting in the model maturing over that time. We discuss how the changes have impacted the model, the academics involved in the teaching of the unit and the students' experience of learning in the online environment. We also discuss the advantages and disadvantages of online teaching and learning, as well as some potential pitfalls and how to avoid them, or, at least, minimise their impact.

KEYWORDS
eLearning, distance education, learning management system, online teaching models

INTRODUCTION

Deakin University is a dual-mode university which has used online communication to present teaching materials and support on- and off- campus students since 1981. It currently has 43% of its students studying off-campus and a further 12% studying in mixed mode (Calvert, 2001). Such presentations have matured from a mix of remote-login/FTP/email in the early 1980s to web mediated access today. Deakin University is committed to distance education, encouraging the "… effective use of information and communication technologies to sustain and enhance teaching and learning" (TLMP, 2000). Deakin is also committed to creating a virtual campus through the use of "… flexible learning support services … to transform teaching and learning in on-campus, distance and flexible learning [modes] and … on-line course development and delivery" (TLMP, 2000). The university has recently completed a comprehensive, evaluation process and selected a single Learning Management System (LMS) which is being adopted to support eTeaching and eLearning institution-wide. It is expected that approximately 28,000 students will each access up to 4 of some 1500 undergraduate and 700 postgraduate courses (Deakin University, 2002) during each semester.

Within the School of Information Technology (SIT), the emphasis on using on-line technologies to support teaching has changed quite substantially over time. The 1980s saw the first generation of online learning tools which can be characterized by distance education students being provided with paper-based study guides and readers and online materials which could be ftp'ed from University computers or by mailing of computer discs. Access to tutors was comparatively infrequent using e-mail and by phone. There were no substantial subject oriented documents available online and those that were available were text-based rather than the richer modes now considered normal. Other online materials were enabling components such as compilers, manuals, program fragments and electronic submission software accessible only through a command line interface.

In the 1990s, the 2nd generation online learning tools, featuring browser mediated access to the web across faster networks, became commonplace and software tools, such as word processors and email systems, became widely available. With richer document formats, substantial subject oriented materials started to appear in online repositories for downloading. As email and bulletin board facilities became more readily available, one-to-one interaction between student and lecturer and one-to-many between lecturer and class widened to include student-to-student interaction. This change permitted online students to discuss class material and to develop some camaraderie previously only experienced by on-campus students. Facilities like electronic submission of assignments, automated assessment and return of results became easier to use with the user-friendly interface. Nonetheless, there were considerable short-comings in such web presences. Each lecturer could design their personal unit page structure and use such icons as they felt appropriate, resulting in a lack of uniformity of interface across subjects and navigation through the site could be confusing. Learners using the structure had to be able to use a suite of software packages for the various functions (such as email, web access, ftp, assignment submission) and the interfaces would have little regularity leading to confusion for all but expert users. For the institution, there was the problem of protecting intellectual property in an open site and this necessitated the implementation of access control methods for individual pages.

As we enter the 21st century, 3rd generation online learning tools, in the form of integrated Leaning Management Systems, are starting to appear. These packages offer a uniform approach to site navigation, student and course management, page layout and access control providing the institution has appropriate policies in place. But, as Newlands and Coldwell (2002) suggest "the key to good policies is that they are sufficiently prescriptive to provide the intended guidance but not so prescriptive as to constrain innovation …". The students no longer need the skills required to use a range of software products as everything is accessible through a single interface. The downside of such monolithic, institution-wide solutions is that they lack the robustness of a suite of programs in the face of failure of non-redundant components of the infrastructure. One is faced with the prospect of *all or nothing functionality!*

ONLINE TEACHING AND LEARNING

The SIT aims to provide all students with the same learning outcomes but not necessarily by the same means. By using educational technologies, all students can be provided with the same access to electronic resources. With the adoption of WebCT in the mid 1990s, the School has been able to provide an online component for all units being offered at both the undergraduate and postgraduate levels. Depending on the requirements of the academic responsible for specific units, the online presence ranges from delivery of basic contact details through to delivery of unit outlines, content, assignments and other resources as well as electronic submission of assignments, online marking and feedback, class news, informal discussions, online tutorial discussions and collaborative group work.

Delivery of Content
Lecture presentations and lecture notes can be released to on-campus students before or after lectures via WebCT. This has led to some interesting tensions. Prior release can be justified from the lecturer's point of view in that students can be fully prepared for the lecture and that it will facilitate a broad discussion with full interaction by the students exploring interesting or difficult parts of the content.

Students will often suggest that, being relieved from most note taking, they can listen to the lecture. They see themselves changing from passive listeners and active note-takers to active listeners but not to the active participants the lecturer would like. Unfortunately, some students request prior access to lecture notes, ostensibly to be adequately prepared for the lecturer's presentation, but usually to decide whether to attend the lecture or go surfing! A strategy of providing moderately complete notes but which require key blanks to be filled in during the lecture is attractive but renders the lecture not usable by the distance education students who also request the lecture notes and presentations despite the fact that they do not attend the face-to-face presentations. Unfortunately this can add to the confusion if topics are presented in lectures in a different order from the study guide.

Online communication

Embracing educational technologies has enabled interactions between students and between students and academics in ways that previous technologies have not allowed. Staff are now able to communicate with their class electronically, allowing regular, timely announcements to be made to students, reminding them of deadlines, informing them of changes to requirements, providing frequently-asked-question type responses to all students and so on. This is particularly useful when changes to the programme have to be made on the fly to accommodate unforeseen circumstances, for example giving blanket extensions for submission of an assignment necessitated by network failures. Such announcements have a reasonably high probability of reaching all affected students within similar timeframes regardless of mode of study or location. The ability to communicate with all students enhances the learning experience for them by eliminating the stress of having insufficient or untimely information. However, it is now possible to create stress and confusion through information overload and delivery of misinformation. This can easily occur when a student takes it upon themself to respond to queries with incorrect information.

The ability for students to communicate amongst themselves has had the biggest impact on off-campus students. Traditionally, distance-education (DE) students have been "lone learners". They received the paper-based study materials, instructions and timetable and, in effect, were told to "get on with it" with minimal contact with academic staff and, probably, no contact with other students in the program. Online tools have provided the capacity to develop a community of learning among groups of learners who are geographically distributed and who would not otherwise have the opportunity for collaborative experience that is afforded online. However, availability of communication tools does not necessarily imply that students will know how to use them constructively to support their learning.

An early experience of using asynchronous, online discussions to complete tutorial work amongst groups of off-campus students indicated that the lone learner syndrome was very much in evidence despite being able to communicate in a many-to-many environment. Students were required to evaluate a real-life scenario in a professional practice unit by analysing and investigating professional ethical issues and formulating their response taking the role of a stakeholder in the situation. The plan was that the online communications would replicate, as far as possible, the type of conversations students would have in a face-to-face tutorial when presented with such a task. Unfortunately, the DE student reaction was to prepare their response and post it to the online discussion forum to complete the task! The notion of debate, reflection, critique and evaluation was simply not perceived as part of the learning process. Later instantiations of such exercises explicitly included exhortations to read and respond to other students' contributions. This elicited the desired response – up to a point. The parry and thrust of a face-to-face academic debate did not eventuate, but the students did at least comment on each others' postings providing some constructive feedback. The lack of enthusiastic debate could perhaps be attributed to the lateness of the hour at which DE students tend to be online; often after a day at work and with family activities happening around them. As for other students, maybe they completed the debate informally in face-to-face situations with classmates and what ended up in the online forum was the result of that debate.

The ability to communicate widely has proved to be a double edged sword. The immediacy of electronic communication has led to an expectation, particularly on the part of students, of immediate

gratification – an instant response. It is not unknown for a student to email or post a request for information late on Friday evening then to send a follow-up message on Saturday asking if the original message was received followed by another, somewhat irate, one on Sunday asking why they have not yet received a response to their urgent enquiry!

Online research (the problem of plagiarism)
The ease with which students can locate information on the Internet is a boon to the overworked academic who can now direct students to gather information rather than provide all of it (whatever happened to the quiet searches in dusty libraries?). But, the ease with which electronic information can be downloaded, shared, manipulated and replicated has led to an increased incidence of plagiarism amongst the student population. The distinction between collaboration and cheating has become very difficult to define satisfactorily from a student's perspective. Students have also developed new, more subtle ways of cheating too. A considerable proportion of many class members remain as "lurkers" in online forums merely reading rather than contributing to the online discussion. Indeed a strategy we have noticed, particularly amongst on-campus students, is to wait till close to an assignment submission deadline, then read the conclusions of appropriate discussion groups and construct a solution without too much effort since the on-line group has already clarified the problem areas!

The ability to have anti-plagiarism software as part of the LMS suite gives a tool to control this evil which electronic media have made too easy. Tools which compare both the surface content and the underlying structure of a document are very powerful. Examination of invisible characteristics such as use of tabs and spaces, particularly at the ends of lines, offers a technique almost like fingerprinting in the identification of copied documents. Students may claim similarity due to discussion but 3 spaces at the end of this line, two at the end of that, point to sharing of an electronic document. One problem with plagiarism is prevalence. We may have convinced ourselves that there is little of it and that it is detected in the marking but with large classes no one person does all the marking and we may not realize how common it is. We have seen an instance where a whole class (11 students in a geographical group) appears to have one original submission and the rest are copies with superficial changes.

The prevalence of intellectual property and copyrighted material on the web has meant that academics have had to become aware of the implications of using such information in much finer detail then was previously needed. In Australia the Copyright Amendment (Digital Agenda) Act 2000 came into effect in March 2001 (Australian Federal Parliament, 2000). This amendment had ramifications for the presentation of digital information. For example, ensuring that a hyperlink to an external site opens in a new browser window meets the requirements of local copyright legislation relating to using and referencing intellectual property embodied in web sites. This is not an onerous restriction, but one which can be, and often is, overlooked.

Accessibility
The added flexibility of electronic delivery of content has overcome many problems encountered with various groups of students, particularly those with disabilities. The ability to view content online allows for font size, print colour, background colour and so on, to be manipulated by the student, catering for some perceptual difficulties. Text readers can be utilized allowing blind students access to materials which previously had to be manually converted to Braille or other suitable medium. However, unless the documents are stored in accessible formats and web sites are designed using accessibility guidelines such as Section 508 (U.S. Government, 2002) or the World Wide Web consortium's (W3C) guidelines (W3C, 1999), the flexibility built into the medium is lost due to poor usage. For example, scanned images are inaccessible to text readers unless suitable text-based tags are used in conjunction with the pictures.

Any time, any place delivery of content is a boon to many students, particularly part-time students. But again, thought must be given to such things as the size of the file being presented. If the student lives in a remote area for example, or is using a slow Internet connection, it doesn't matter how easily they can reach the information, if it is too big to download it is worse than useless to them.

Other Difficulties
There are other, not directly educational, difficulties which can arise in the implementation of an LMS. The institution must commit sufficient capital outlay for the initial establishment but must also budget for maintenance as well as staff and student training over the lifetime of the system or the system will gradually be used less and less.

To establish the system, it is common practice to appoint a business champion and there is a danger that the final system will be seen as the property of the department of the business champion. This may result in over regulation of access to the system making it difficult to use. Expert users, attempting to overcome the restrictions, may use the system interface to point to resources in areas in their own control, on another machine, rather than storing them directly in the LMS. Thus, the LMS becomes no more than an expensive method of providing access control and a uniform interface, at least at the top level.

The system may not be supplied with sufficient communication bandwidth or may be too difficult to use, particularly in terms of placement and replacement of materials, or the operating system or LMS software may not be stable enough for reliable usage. These will result in the same effect as over-regulation – expert users will by-pass the system.

DISCUSSION

The wealth of technological solutions, although useful from a teaching perspective, can be, and often is, confusing from a learning perspective. Students have difficulty in anticipating where materials are, where online activities take place and where they can find important information. Further, our experience is that students do not necessarily use online materials in a fashion which meets instructor expectation and research is required on how materials are used to better understand how to construct them.

A view of eLearning
It may seem that eLearning is more difficult for students to negotiate than conventional, or classroom, learning because student numbers will often be much larger, there may be no face-to-face contact with academic staff and, thus, no opportunity for early feedback to reinforce good practice or to extinguish bad practice. However, there is some evidence that this may not be a correct view of the situation. Hiltz (1994) presents findings comparing eLearning and classroom learning in a range of fields suggesting mastery of course material was at least as good as that of students in a conventional classroom and that the students felt they had improved access to academics and resources. This was reflected in higher satisfaction with the courses. This last finding might be surprising given that students may never physically meet the instructor. Our experience at Deakin is that email has become culturally acceptable as personal contact and, in principle, the instructor can be contacted more readily and regularly by this medium than by visiting their office, even by on-campus students. An important difference in eLearning is that, lacking regular personal exhortations from the instructor, the student must be responsible for meeting all deadlines, planning preliminary tasks required to reach the deadline, initiating courses of action and individually pursuing them to completion and, on a practical level, students must possess the skills to use the online system itself as well as associated software tools (Kearsley, 2000, p 62). This requires that students must either possess these attributes from prior study (secondary or post-secondary) or must be equipped with these skills before embarking on eLearning.

There are subtle problems concerning use of language to confound the issue further. Many students, especially those who have not learned a foreign language, tend to speak ungrammatically. Compensation for ambiguities and uncertainties in the uttered text is gained by the respondent asking for clarification, rewording or rephrasing until an agreed version of the content has been reached. This mode of discourse is not suitable for electronic media and students often reply to a message as they would to a spoken one with the result that the electronic response is unaccompanied by any context. An email from a student saying "I agree with what you say" with no context often leaves one wondering

what they are agreeing with. Similarly, uncontextualised questions often arrive leaving the instructor to initiate, reluctantly, a clarifying exchange of emails. Most students will learn these skills quickly because they need to make use of the medium. Additionally, inexperienced users will sometimes get into difficulty because the electronic medium has stripped all non-verbal cues such as inflection of the voice and facial expression. What one participant sees as business-like another may see as offensively abrupt. As Shea stated:

> "When you communicate electronically, all you see is a computer screen. You don't have the opportunity to use facial expressions, gestures, and tone of voice to communicate your meaning; words -- lonely written words -- are all you've got. And that goes for your correspondent as well." (Shea, 1994, p.35)

Deakin University attracts a relatively large minority of overseas students whose first language may not be English. For these students, operating in a virtual environment can be beneficial as they have the opportunity of reviewing what has been said and composing what they want to say asynchronously and with the use of a dictionary. This observation is supported by Seufert (2002), but he also points out that other cultural differences may have a negative impact on overseas students.

As well as the process of acquiring the skills to use the medium effectively, students must also learn to learn (Castells, 2001 and Collis and Meeuwsen, 1999 for example). The modern technological world especially, changes almost daily and skills become unwanted in the market place. In the programming world for example, required language skills changed from the 3GL family, through 4GLs in the early 1980s; a paradigm shift to object oriented (OO) languages occurred in the late 1980s; and then to web oriented languages in the 1990s. Learning new languages is a natural hazard for a programmer but the paradigm shifts to OO and then web-based languages were much more challenging and are an illustration of the need for continuous, or lifelong, learning. Gaining generic learning skills will allow students to address the need for new knowledge, and to use new technologies which will emerge during their working life. The problem, as it manifests itself in an eLearning environment, has been most aptly stated by Collis and Meeuwsen:

> "For instructors in higher education, most of whom have had no formal training themselves in educational theory and learning psychology, guiding their students toward increasingly professional and mature learning-to-learn skills generally occurs in an intuitive manner. For students, the expectation may be a more painful and explicit confrontation as those who do not meet it are frequently those who drop out or are dissatisfied." (Collis and Meeuwsen, 1999, p.26)

The problem is further confounded by the fact that the early adopters of information technology to support teaching and learning are often those who are most familiar with the technology and feel comfortable using technology, i.e. those researching and lecturing in computer science and information systems. Such academics often fit Collis and Meeuwsen's categorisation of instructors suggested above.

Implications for eTeaching
Does gaining basic IT literacy skills prepare faculty staff to develop appropriate eLearning objects? What other skills and knowledge are required to prepare an online course or run a programme of study online? Further, how should eTeachers ensure that students are adequately prepared to eLearn?

Barker (2002) suggests that, in general, faculty are not adequately prepared for online teaching. He proposes that new models of teaching and learning are needed "if e-learning strategies are to be effectively deployed for the efficient transfer of skills and knowledge" (ibid, p.3). He also suggests that "a fundamental premise that forms the basis of online [learning] communities … is that knowledge and understanding are promoted through dialogue, discussion and debate." (ibid, p.5) This is in accordance with Engagement Theory (Kearsley and Schniedermann, 1998), which was constructed with computer-based learning as its focus, and which recognises that the learning experiences should be collaborative,

project-based and have a real-world or authentic focus. Fortunately, the collaborative aspect is easily facilitated by email, discussion groups and bulletin boards and our experience is that they are used extensively by both on- and off-campus students. However, our own experience suggests that the skill set required to successfully manage such learning communities go well beyond those normally associated with being a traditional tertiary educator. To date these skills have been acquired through trial and error, modifying online programmes from one semester's offering to the next, in an effort to reduce workload, improve student learning and increase student and academic satisfaction.

Various methods of helping faculty to become competent eTeachers have been discussed within Deakin University. Professional development programmes which address ePedagogy are essential. However, should they be targeted toward particular programmes of study or online developments or should they be addressing generic issues? The literature suggests that such development programmes should be run online (Barker, 2002 and Kearsley and Schniedermann, 1998 for example). One successful professional development programme run at Deakin has been reported in Spratt, Palmer and Coldwell (2000). Here, existing eTeachers from various Faculties held an online discussion forum over a number of weeks with staff who were thinking about adopting the technology to support their teaching. Participants indicated that they gained considerable insight into eLearning:

> "Participants' reasons for becoming involved and staying involved in the [discussions] were diverse … some participated to share their experiences and to develop new ideas about [computer conferencing]; others participated to find out about [computer conferencing] … and use and experience its potential prior to using it in their teaching."

The outcomes were very positive with many of the traditional teachers indicating that they would be including online technologies in their programmes in the upcoming semester.

Another successful scheme, described by Morgan and Smith, is online mentoring. Mentoring is traditionally undertaken in a face-to-face environment and generally:

> "… takes the form of staff-staff mentoring, where experienced teachers provide support for new academic staff, or student-student schemes, where on-campus students provide support to new learners." (Morgan and Smith, 2001, p160)

They suggest that mentoring schemes can be successfully extended to open and distance learning situations. We contend that such a scheme can be facilitated by undertaking the mentoring programme in the online environment that the students and staff will be using for eLearning and eTeaching respectively.

Other suggestions to assist faculty staff into eTeaching are that key academics should be seconded to the educational development support unit to gain the necessary skills, or educational development support staff be seconded to Faculties to assist academics on a one-to-one basis or in small groups. The latter option seems to be favoured by Deakin University at the moment, but the resource implications have not been investigated fully. Unless resources are provided to replace teaching staff on secondment, the workload of colleagues will be further increased. If support staff are seconded into the Faculties, who will bear the cost? It will be interesting to see what solution is actually implemented.

CONCLUSIONS

Learning Management Systems represent the 3rd generation of online learning technologies. They offer the possibility of a uniform interface and consistent navigation through an institutional web site as well as supporting a wide range of capabilities for enhancing the delivery of online education. They provide a framework in which novel learning strategies can be built and presented. However, the establishment

of an LMS is fraught with technical, financial and political difficulties as well as providing challenges to our current conceptualisations of eTeaching and eLearning.

Several approaches to the presentation of material on an LMS have been discussed as well as difficulties which may arise. The suitable preparation of academic staff for eTeaching and of students for eLearning has been identified as an essential component of a successful project. Without appropriate skills the eTeaching and eLearning experiences for staff and students respectively may be unsatisfactory. Online teaching and learning has generally been adopted on an ad hoc basis. Future research needs to systematise our knowledge and experience. Very little is known, for example, about how individual learners become a learning community in an environment enabled, supported and enhanced by LMSs.

Recent LMSs provide a considerable range of functionality to support teaching and learning. The combinations of functions lead to very different educational paradigms. In one LMS a discussion forum can be "attached" to a range of content resources allowing students to discuss the topic they are currently studying. In the same LMS, content resources can be associated with a discussion forum, thus becoming resources to support the discussion. How the functionality and characteristics of LMSs are used to build the learning tasks and online environments to support different pedagogies requires further investigation.

Finally, we cannot make assumptions about how students learn online or staff teach online. The use of technology to support teaching and learning is not new, but the tools to support these activities are developing and improving all the time. Innovation, experimentation and evaluation are the keys to increasing our knowledge of and improving best practice in online teaching and learning.

REFERENCES

Australian Federal Parliament (2000) Copyright Amendment (Digital Agenda) Act, 2000 no. 110, 2000. Available: http://scaleplus.law.gov.au/html/comact/browse/TOCCO.htm. Accessed 11 November, 2002.

Barker, P. (2002) On Being an Online Tutor. Innovations in Education and Teaching International. 39(1)

Calvert, J (2001), Deakin University: Going Online at a Dual Mode University, International Review of Research in Open and Distance Learning, 1(2).

Castells, M. (2001), The Internet Galaxy, Open University Press.

Collis, B. and Meeuwsen, E. (1999) Learning to Learn in a WWW-based Environment. In French, D. Hale, C. Johnson, C. and Farr, G. (Eds) Internet based learning: an introduction and framework for higher education and business. Sterling, Virginia: Stylus Publishing.

Deakin University (2002) Undergraduate Studies Handbook, vol 1.

Hiltz, S.R. (1994), The Virtual Classroom: learning without limits via computer networks. Norwood, New Jersey: Ablex Publishing Corporation.

Kearsley, G. (2000), Online Education: learning and teaching in Cyberspace, Wadsworth–Thomson Learning.

Kearsley, G., and Schniedermann, B. (1998), Engagement Theory, Educational Technology, 38(3).

Morgan, C. and Smith, A. (2001) Mentoring in open and distance learning. In Lockwood, F. and Gooley, A. (eds) Innovation in Open and Distance Learning: successful development of online and web-based learning. London: Kogan Page Ltd.

Newlands D. and Coldwell J. (2002) Supporting eLearning: the Deakin Experience. International Conference on Information Technology, Communications and Development. December. Katmandu.

Seufert, S. (2002) Cultural Perspectives, in Adelsberger, H. H., Collis, B. and Pawlowski, J. M. (eds.) Handbook on Information Technologies for Education and Training. Berlin: Springer-Verlag. pp.411-421.

Shea, V. (1994) Netiquette, Albion Books. Available: http://www.albion.com/netiquette/index.html. Accessed Aug 14 2002

Spratt, C., Palmer, S. and Coldwell, J. (2000). Using technologies in teaching: an initiative in academic staff development. Educational Technology & Society 3(3): 455-461.

TLMP (2000) The Deakin Advantage: guidelines for developing the attributes of a Deakin Graduate. Deakin University. Internal Report.

U.S. Government (2002) Section 508. Available: http://www.section508.gov/. Accessed 13 Nov. 2002

W3C (1999) Web Content Accessibility Guidelines 1.0. Available: http://www.w3.org/TR/WCAG10/. Accessed 13 Nov 2002

J. Coldwell and D. Newlands
School of Information Technology
Deakin University,
Geelong, VIC 3216
Australia
Email: jojo@deakin.edu.au, doug@deakin.edu.au