May, 2006

Course Management Systems, Libraries and Teaching: Exploring Relationships for Learning

Christine N. Turner, *University of Massachusetts - Amherst*

Course Management Systems, Libraries and Teaching: Exploring Relationships for Learning

Christine N. Turner
University of Massachusetts Amherst
cturner@library.umass.edu

ABSTRACT

With a literature review and four case studies this article presents current trends and practices in CMS use in higher educations. CMS influence on teaching, learning, academic library services and information literacy instruction in Australia and the United States is explored. CMSs have not yet fulfilled their potential.

INTRODUCTION

Over the past five to ten years course management systems (CMSs) have created a buzz of interest and a flurry of activity on higher education campuses. They have been embraced by many in Australia and the United States as a technology of importance for creating new revenue streams, reaching new markets, connecting with students in new ways, and/or teaching more effectively. Librarians have recognized that if a CMS is where teaching and learning occur, their continued relevancy depends in part on working with faculty and instructional designers for online courses to integrate library services and information literacy lessons through that platform. From an academic librarian's perspective, the scholarly pursuit of knowledge includes two fundamental purposes of librarianship: to provide relevant information content, and to teach the process of acquiring and synthesizing information in a context appropriate manner. The first is expressed through collections of resources and the services which deliver them to scholars. The second purpose is fulfilled through teaching information literacy. Conveying these intertwined strands of content and process directly supports the roles of teaching faculty.

Many elements — history, demographic shifts, pedagogy, policy and technology — factor into CMS implementations and use. Australia and the United States share some similarities and exhibit some differences in their higher education environments. Both countries have extensive technology infrastructures, though Australia has a much smaller population that requires services over a comparable geographic area to the continental United States. This article brings together a unique cross-cultural examination of current trends and practices in higher education; CMS use; the teaching and learning experience for faculty and students; and academic library services and information literacy instruction in the context of CMSs. First, the terms "course management systems" and "information literacy" are

defined, followed by a review of relevant literature. Then, a look at the implementations of CMSs in 4 higher education institutions -- two in Australia and two in New England – offers institution-wide perspectives on specific cases. Finally, the cases are discussed and a conclusion is presented.

ABOUT NOMENCLATURE AND DEFINITIONS

"Course management systems" and "information literacy" are two phrases which have numerous related terms, and to some, ambiguous meanings. In this discussion a course management system, or CMS, is used for a virtual learning environment (VLE), learning management system (LMS), online learning platform and courseware. Similar terms are used in both the United States and Australia, though for some in Australia at least, the preferred term is learning management system to avoid confusion with a content management system (L. Wright, pers. comm.). A *course* management system is, broadly stated, a suite of tools to perform the tasks of communication, resource sharing and assessment[1]. Instructors and students can interact synchronously or asynchronously, individually or collectively in various groupings through chat, email or bulletin boards. The "environment" can hold course syllabus, calendar, required and supplemental readings, lectures, teaching notes, guides and learning objects, all posted and presented in flexible ways. Instructors can deliver assignments at the start of the course, or staggered over its duration. Students can submit their projects and papers via the CMS, and instructors can record and manage student grades. The OCLC E-Learning Task Force describes CMSs as:

> … a tangible place where the work of teaching and learning can occur. When strategically placed, courseware environments provide a logical place for information and knowledge to be created, accessed and used. Students find that CMSs meet many of their information needs and tend to use them as a kind of primary gateway.[2]

While a course management system provides a platform for exchanging content, ideas and assessments, the term "information literacy" applies to a set of skills fundamental to the process of learning. It is a common and generally understood term among academic librarians, but it can be meaningless or misunderstood in the larger academic arena. "Information fluency" and "information competency" are also used for similar concepts and skills. The Australian Library and Information

Association (ALIA) states this information literacy principle: "A thriving national and global culture, economy and democracy will best be advanced by people who recognise their need for information, and can identify, locate, access, evaluate and apply that information."[3] In *Information Literacy Competency Standards for Higher Education*, the Association of College and Research Libraries (ACRL) begins its definition: "Information literacy is a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information."[4] ALIA emphasizes the importance of information literacy to the nation's economic interests, while ACRL notes the value of information literacy to an individual's job and career progression.

These references provide generic explanations of course management systems and information literacy, and in the following literature review and case studies they will be explored more in-depth within the contexts of higher education, libraries, teaching, learning and the critical use of information.

LITERATURE REVIEW

Trends in higher education

Since World War II an undergraduate education in the United States and in Australia has shifted from the pursuit of a privileged few to the expected right of many. But as the popularity of higher education ballooned, new methods of reaching more people were needed. Australia has developed a proud tradition of educating its widely dispersed citizenry through distance education, mostly via correspondence courses.[5] Distance education has been part of four significant movements since 1970 towards the "massification" of higher education. These have been: the British Open University, the University of Phoenix, recognition of the "Knowledge-Driven Era", and course management systems.[6] In both countries important characteristics of these developments include:

- standardized curriculum and delivery,
- reaching out to underserved populations,
- measurement and outcomes assessment,
- educational providers transcending national boundaries, and

- expanding technology infrastructures.[7]

As greater numbers of students have higher expectations for access and service, higher education providers face higher costs and greater competition for a diverse market, and industry has a critical interest in the development of a knowledgeable workforce.

Student demographics have changed along with the administration and delivery of higher education. According to a 2002 National Center for Education Statistics study of students in the United States, from 1970 to 1999 the undergraduate population was larger (by 72%), had more part time enrollments (28% to 39%), had more women (42% to 56%) and was older (28% to 39% over 25 years old). Furthermore, in 1999-2000, 8% of all undergraduates participated in distance education, mostly via the Internet (60%) and some through recorded television or audio (39%), or through live television or audio (37%).[8] Traditional students accounted for 27% of those enrolled in higher education.[9] By contrast, the vast majority of American college and university students are older, working full-time, parents or single parents, financially dependent, or without a high school diploma.[10] The iconic image of a young man or woman carrying several books across a green campus quadrangle between class and dorm room is a vision largely from the past.

In Australia the trends are similar. While the Australian population increased threefold since the 1950's, the higher education student population increased by 23 times.[11] From 1970 to 2000 student enrollment jumped from 161,455 to 695,485; fewer attended part-time (36.1% to 27.6%); substantially more were "external" (5.9% to 13.7%)[12] and many more were women (27.1% to 55.2%).[13] In addition to demographic changes, the funding mix has shifted from government to student fees[14], and the greater reliance on student fee revenue has brought larger class sizes, course offerings determined by their commercial viability, and a greater number of students from overseas.[15] Historically, Australian universities have been overwhelmingly dependent on federal government funding, and though that revenue source has dwindled, it is still significant. This has produced a culture where national education policy and funding criteria are highly influential upon the administration and faculty of Australian universities. Furthermore, as higher education costs increase, students are looking for stronger

justifications that their degrees will offer value in the job marketplace. University administrators have consulted with industry representatives about the basic skills expected of graduates. These are now commonly articulated by universities as graduate attributes or qualities. The government, in turn, is increasingly seeking assessment outcomes to measure achievement of these attributes. The intertwined relationship between the government, educators and employers is implicit in the name of the Commonwealth's oversight agency: Australian Government Department of Education, Science and Training.

Growing popularity of course management systems

The higher education student population has become a larger and more heterogeneous group, and for many, information and communication technologies (ICTs) have become critical threads in the fabric of their lives and learning. At this writing course management systems are a ubiquitous component of higher education information technology infrastructures. Design and use of online teaching technologies started as an initiative of select faculty, but unique tools have developed into course management systems embraced as part of institutional strategies.[16] CMSs have been perceived as a means to enroll more students and deliver more educational content without additional investments in physical infrastructure, thus increasing revenue. From its surveys about information technology environments and practices at member colleges and universities in the U.S. and abroad (including many Australian universities), Educause reported that over 90% of 890 institutions in 2004 had deployed course management systems.[17] These implementations included single commercial products, multiple commercial products, homegrown systems, or a hybrid of both commercial and homegrown.[18]

Information about and discussion of course management systems are prevalent, partly because they have become so commonly used in higher education, and also because of the financial investment colleges and universities have made in them. Costs for course management systems alone are usually hidden in private contracts and aggregate campus IT costs, but the OCLC report notes that the Consortium of Liberal Arts Colleges spent $31,200 on average annually on their CMSs, and University of Wisconsin and Ohio State University will each spend more than $5 million over 5 years for licensing,

installation and maintenance of enterprise-wide systems.[19] Above these are training and development expenditures for users of the systems. Such large financial investments raise questions about how CMSs are being used and the value they have added to higher education.

Teaching and Learning with a Course Management System

At a minimum, students expect web-based components to their courses, and as class numbers and sizes increase, many faculty are looking for ways to better manage larger numbers of students and digital resources. Educause reported that in 2004, higher education institutions used CMSs in 40.1% of classes[20] and 65.7% of faculty report using a CMS in some selective way.[21] A study by the Educause Center for Applied Research (ECAR) of mostly traditional age students at 13 institutions in 5 of the United States showed that 83% of students reported having used a CMS and 76.1% were "positive or very positive" about the experience.[22] In this same study, students also reported that CMSs had a higher impact on class management and convenience than on improved learning.[23] Though usage by faculty and students is increasing, many are dissatisfied with the commercial CMSs because of high costs, inconsistent service, and lack of needed features.[24]

Employing a CMS is not a matter of business as usual. The tradition of the lecturer and textbook as the means of conveying acquired knowledge has lived on, but a traditional lecture-based course does not translate well to a CMS.[25] Course management systems are complex packages within complex campus ICT systems. A tension has grown between the systems that support faculty delivering lectures to students in a face-to-face environment and the systems that have the potential to support computer-mediated, collaborative learning. In today's higher education environment, numerous barriers can break up effective connections between students, faculty, content, infrastructure, administration, and learning.

For faculty, resistance to e-learning and CMSs may stem from an initial loss of productivity while learning a new system; concern about ownership and usage rights of their intellectual property; technical difficulties with making the system do what they want, to teach the way they want; and unease with losing some gatekeeper and authority roles in a more collaboratively-driven learning system. For administrators, challenges arise in the forms of costs – of ICTs and maintaining educational environments

more generally – and rapidly evolving technologies which do not naturally work together — though faculty and students expect to use seamlessly integrated electronic services. However, the trend towards more CMS use is not reversing. The next step is moving from a class management system to an online learning environment. As Katz notes, "The challenging question for educators and for those who manage these enterprise investments is whether or not and when faculty attention can shift from preoccupation with the adaptation of existing course structures and the mastery of difficult and newly evolving technologies to a thoughtful experimentation with customizable pedagogies."[26]

Historically entrenched ways of teaching, costs, competitive markets and new technologies are causing tensions, but student learning is at stake. Some suggest that online learning research has focused on pedagogy, technology and management, not on how students engage with information and construct knowledge.[27] Understanding how students learn is critical. In *Educating the Net Generation*, Oblinger and Oblinger present data and portraits of today's learners. Students born since 1980, roughly 60% of the higher education market, have grown up gathering information from sources on the World Wide Web, communicating with their peers via digital networks, and playing games online. These technologies are not new to them; they are the means by which they live their lives. Technology becomes notable, not as an end in and of itself, but only when it enables them to do something they want to do. These students have never known life without the Internet; they are the "Net Generation".[28]

The affects of using technology in multiple facets of life extend beyond just those of a certain age group. Those who have actively engaged with digital networks and technologies as they socialize, work and learn have formed certain behaviors and expectations. These have had implications for *how* they learn. They absorb more with:

- A strong connection to communities and social networks, whether they be physical, virtual or a hybrid;
- Experiential learning through doing and practicing, again either in physical, virtual or hybrid environments;

- Interactivity, combining social inclinations and activity-based learning to process the lessons in a collaborative way;
- Immediacy from connectivity to speedy networks;
- Multi-media presentations (graphical, aural and textual), with more graphics than text.[29]

Perhaps counter-intuitively, Net Geners express a preference for a combination of face-to-face class-time and online learning, rather than an exclusively online environment. Older students are more satisfied with purely online courses.[30] Thus, educators face the ongoing challenge of adapting teaching methods for a variety of evolving learning styles.

> "There is a movement from contact and distance education to flexible learning. Distance education programs are introducing strong elements of face-to-face and internet tutoring programmes, while contact institutions are using distance education techniques to present both traditional distance education courses and on-campus part-time courses. There is also a move towards greater flexibility based on the principles of open learning, with its freedom of place, time, pace, exit and curriculum. Students can structure their own learning experience by selecting from a range of learning opportunities. These shifts are also assisted by the ever-expanding use of technology."[31]

Distance education produced purely through online course management systems was once thought to offer great opportunities for attracting new students, but preferences are more varied. A hybrid or flexible (the term more commonly used in Australia) approach is now embraced.

Producing flexible learning options for students in higher education calls for collaboration between policy makers, administrators, faculty, librarians, instructional designers, ICT experts and students. Selecting, acquiring and implementing new systems is most effectively conducted by those who install, maintain, modify and use them as well as those who pay the bills. Course management systems are most beneficial when they support the ways that students and faculty work, and therefore they must be flexible. To achieve this, those who manipulate CMSs for the purpose of student learning need to communicate and cooperate to bring together different expertise, methods, content and

objectives. In the United States and in Australia some colleges and universities have attempted to reorganize or combine departments to forge this collaboration.[32] It has proven difficult, and approaches to CMS implementations have not been holistic. The reasons often cited are political and cultural differences, including resistance to change, lack of a common strategic vision, lack of a common language or understanding of the issues, etc..[33] And yet a rapidly evolving educational environment — with more services, more courses and programs, more specialization and customization, and new approaches — demands pooled resources and coordinated actions. The imperative for collaboration is commonly acknowledged.

Academic Libraries and Course Management Systems

The business of higher education is about research, teaching and learning, and libraries have always been central to that enterprise. Just as they have transformed classrooms, so too have information and communication technologies transformed library operations, whether they be to store and deliver information, or teach skills for knowledge-building over a lifetime. The ICTs used in course delivery have not been integrated, let alone seamlessly, with library technologies. As noted, for the most part institutions of higher learning have not formed or pursued strategic initiatives with an integrated approach to ICT applications. Nevertheless, online learning has grown along with the proliferation of internet search engines and digital content. As libraries are disconnected from campus platforms and student information-seeking practices, they risk irrelevancy. Following an early absence of library services, resources and teaching within CMSs, however, evidence suggests that libraries are making connections.

Shank and Dewald provide a useful framework for examining library – CMS relationships. One category is Macro-Level Library Courseware Involvement (MaLLCI) and the other is Micro-Level Library Courseware Involvement (MiLLCI.) MaLLCI examples include virtual reference desk services; OPAC and database links; global pathfinders and help sheets; and document delivery services. These generic services are added to the courseware platform as a result of librarians working with designers, developers and programmers at an institutional level. A MaLLCI approach offers the benefits of library service visibility and access with minimal maintenance, but the drawbacks of missing human contact and

context-specific precision of links. Gibbons notes that the lack of customization of MaLLCI falls well short of student expectations.[34]

Librarians, faculty and instructional designers are experimenting with different approaches to library – CMS integration. At Cornell University librarians first set up a sample course web site using a CMS to see what library services and resources they could potentially offer through it. Working with the University's Academic Technology Center, librarians conducted a survey of faculty using CMSs to determine if and how they were using library services or collections in their online courses. As a result of this collaboration with academic computing, the library icon was included in the CMS course template. This is an example of the most basic generic link between a CMS course and library, but the survey results informed a series of recommendations to library management about ways to better integrate the library into CMS courses.[35] Cornell illustrates a strategic approach to addressing the library's presence in the University CMS.

At the University of Wyoming librarians worked with campus CMS administrators to add links to library resources and guides into the course template, refining them over time. In addition to the library's web site, they included links to a guide to help distance learners access the library and search its resources; an online chat service; an inter-library loan form; reserve readings; style and writing guides; resources; and an interactive tutorial with five modules covering information literacy basics. These are all macro-level connections, but they intend to produce more specific resource links for the nursing discipline.[36]

As an alternative approach, MiLLCI engages individual librarians with individual faculty members to provide more customized services within a CMS course site. This approach includes:

- customized library instruction;
- pathfinders, bibliographies and Webliographies for specific courses;
- recommended databases for particular assignments;
- citation stylesheets as appropriate;

- reference service;
- tutorials;
- quizzes; and
- questionnaires for students.

Context-sensitive, strategic positioning of services and resources is the primary advantage of MiLLCI, with additional benefits of increased collaboration between faculty and librarian and opportunities for more librarian – student contact outside of class.

Two librarians worked with an accounting professor at Stetson University to produce lists of web-based resources relevant to class topics within the courses. With permissions granted by the campus CMS administrator, the librarians uploaded these lists and links to the resources themselves into the CMS at the appropriate class module. In addition to including selected resources in context-specific places within the CMS, the librarians also met the students in face-to-face instruction sessions. During class they presented the resources to students from within the CMS site, and the students practiced accessing and using the resources with guidance. The librarians conducted a survey about the instruction class at the end of each session and a survey about the presence of the resource lists in the CMS at the end of the course.[37] This example demonstrates a course specific micro-level service, as well as a combined CMS and face-to-face approach to presenting the library resources.

The biggest drawback to librarian involvement in individual courses is the time and effort required from a librarian.[38] Most librarians work with several academic departments and the ratio may not be favorable for scaling this level of engagement to the number of courses offered. Librarians may also be hindered by lack of permissions to add or edit content or participate in interactive communications within the CMS. Permission levels are often symptomatic of campus politics. Technical issues, such as authentication service incompatibilities, ephemeral urls, metadata shortcomings, and non-standard search protocols between library, commercial content provider and course management systems are additional

hurdles, though strategies and a will to solve many of these are growing among administrators, vendors and programmers. [39]

Course Management Systems and Information Literacy

It is important to keep distinct the three elements under discussion: linking to library services; introducing specific resources and how to search them; and teaching information literacy. Awareness of and ready access to library services and scholarly resources are important aspects of academic research. In the process of learning how to conduct secondary research and ethically use information, however, these are preliminary steps. To be information literate one must understand and be able to perform tasks from defining the scope of an information query, to identifying and using relevant search tools, to evaluating resources relative to others, to attributing sources accurately to presenting new information in a meaningful way. It is an iterative, multi-faceted process which requires students to think critically about the effectiveness and impact of their research activities. The progressive components of the information literacy continuum are well documented in *Information Literacy Competency Standards for Higher Education* (ACRL) and *Australian and New Zealand Information Literacy Framework: Principles, Standards and Practice* (ANZIL).[40]

In addition to detailing the manifestations of information literacy, the ACRL and ANZIL treatises make explicit that information literacy is a basis for lifelong learning, and lifelong learning is a goal of higher education. The ACRL Standards committee writes:

> Developing lifelong learners is central to the mission of higher education institutions. By ensuring that individuals have the intellectual abilities of reasoning and critical thinking, and by helping them construct a framework for learning how to learn, colleges and universities provide the foundation for continued growth throughout their careers, as well as in their roles as informed citizens and members of communities … Information literacy competency extends learning beyond formal classroom settings and provides practice with self-directed investigations as individuals move into internships, first professional positions, and increasing responsibilities in all arenas of life.[41]

As central as libraries are to higher education as scholarly content repositories, so too are librarians critical to educating students about skills which will guide them through their careers.

How and if colleges and universities address information literacy skills certainly varies, and libraries with instruction programs take different approaches. Individual skills, divorced from the continuum, can be taught on a class by class basis; information literacy can be taught as a course or unit unto itself; or skills can be progressively developed through activities and assessments embedded in the curriculum of a discipline. And these lessons may be conveyed in face-to-face classes, online tutorials, through CMS platform, or a combination of these. DeWald et al. (2000) rightly argue that in the pursuit of information literacy the instruction method depends on the instructional goals or learning objectives.[42] Generally though, lessons designed with components that the learner can readily follow and absorb, and that can be self-directed, interactive, and relevant to student interests and experiences will be characterized by understanding associated with deep learning, as opposed to surface learning associated with memorization. Deep learning is lasting, and to achieve it, faculty and students must construct a context which is meaningful to students.[43] Ladner et al (2004) further advocate a shift from "content transmission to cognitive immersion" by strongly connecting information resources and retrieval exercises, sequenced within a course's syllabus.[44]

The Utah Academic Library Consortium designed an entirely online information literacy course using web pages and email. This Internet Navigator course was designed with pedagogical principles of online learning to address ACRL Information Literacy Standards. The course was adapted for different subjects by different teachers, and in fact some converted it to CMS platforms.[45] At Austin Peay State University, a communications professor, user education librarian, and library web master together collaborated to design and team teach a graduate level multimedia literacy course through a CMS. The ACRL Information Literacy Standards were applied to progressive exercises leading to a capstone project in which students integrated multiple skills. In addition to producing content for the course, the user education librarian participated in discussion threads and chat sessions to provide support for student

learning. Students completed an anonymous survey at the course's end and provided encouraging and useful feedback for fine-tuning the course.[46]

These examples have all required extensive collaboration among faculty, librarians, and academic computing professionals to add links to library services and resources and to teach information literacy within an online course environment. Still, they are examples of macro-level connections or individual course efforts to teach information literacy. Truly embedded information literacy is defined as "curriculum design where students have ongoing interaction and reflection with information".[47] The information literacy competency standards are a continuum of skills, too many and too complex for students to learn in a deep way in a single class or a single course, especially if they are related to a specific discipline. Just as one does not expect students to become experts in biology on the basis of one undergraduate course, neither can one expect them to become information-fluent in one class or course. To thoroughly address information literacy competency, a programmatic approach is necessary. Wright and McCurk (2000) and George et al. (2001) describe efforts and methods at the University of Wollongong and the University of South Australia, respectively, to implement institution-wide information literacy programs.[48] In these cases, collaboration runs from top level university administration across academic programs and through departmental support staff. Their information literacy programs are founded in specific graduate attributes at each university and driven by policies intended to achieve measurable positive outcomes.

This literature review has addressed the evolution of higher education and library services as shaped by demographics, course management systems and pedagogy. General statistics and characteristics of CMS implementations, as well as specific examples of ways in which library services have been added to CMS classes within the United States and Australia have been cited. The following case studies will examine the impact of CMSs on institutions and library services from the perspectives of librarians, instructional designers, faculty and administrators at specific colleges and universities. They provide comparative data for different environments in two countries and cultures. This kind of study,

presenting multiple environments as described by people in several roles, has thus far been absent from the literature.

CASE STUDIES

Introduction

How faculty, instructional designers and librarians have come together to create learning environments within course management systems was the subject of inquiry during campus visits to four colleges and universities. The four institutions — Boston College (BC), Connecticut College (CC), University of South Australia (UniSA) and University of Wollongong (UoW) — were chosen to represent different traditions of education delivery (distance, online or face-to-face, campus-based learning,) sizes, policies, cultures, and organizational structures. Beyond the common criteria of a CMS implementation, each had compelling features. Boston College Libraries have had a reputation as early adopters of new technologies. Connecticut College reorganized its library and information systems departments to unify them within one administrative unit, Information Services. As a member of a three college consortium, it was the recipient of a Mellon grant to collaboratively develop information literacy programs. The University of South Australia has the most international students of any university in Australia, a long history of distance learning delivery, and librarians involved in national information literacy initiatives. The University of Wollongong has a well-articulated institutional approach to information literacy. Most importantly, contacts at each of these places responded positively to an invitation to participate in a qualitative study on libraries and course management systems at their institutions in late 2005, early 2006. They received questions in advance that were intended to guide conversations with people at each campus (See Appendix 1). Interviews with librarians, instructional designers, faculty and some students form the basis of the following sketches. They are presented in chronological order of site visit.

University of Wollongong

In 2004 UoW enrolled about 21,000 students on 8 campuses — 7 in New South Wales, Australia and one in Dubai, United Arab Emirates. Established in 1951, UoW's main campus is in the city of Wollongong, about 80 km south of Sydney. Its programs are offered through 9 "faculties" or divisions:

Arts, Commerce, Creative Arts, Education, Engineering, Health & Behavioural Sciences, Informatics, Law and Science. *The Australian* national newspaper ranked the University of Wollongong first among 37 Australian universities in 2005 for teaching performance based on five criteria used by the Australian Government's Department of Education Science and Training.[49]

UoW has a strong reputation in Australian higher education for its information literacy programs and supportive high level policy.[50] The Library has an Information Literacy Coordinator, and its information literacy program is guided by the University of Wollongong Graduate Attributes, University policies and the *Australian and New Zealand Information Literacy Framework*. Of the 9 attributes UoW expects of its graduates, the seventh is "A basic understanding of information literacy and specific skills in acquiring, organising and presenting information, particularly through computer based activity".[51] The attributes are interrelated, however, so information literacy development supports other goals. Policies guide priority-setting, planning and implementations.[52] From "best practice" examples to curriculum design support to policies, the University provides an infrastructure to assist faculty address and assess these attributes in their curricula and teaching. The Academic Services Division (ASD) includes the Library, Learning Development Services (LDS) and the Centre for Educational Development and Interactive Resources (CEDIR). Each faculty division has at least one librarian designated to support it, and they work with LDS and CEDIR professionals. Faculty Service Agreements (FSAs) between Faculty deans and CEDIR have been one formal articulation of curriculum development projects. Depending on the learning outcomes or graduate attributes identified in these FSAs, LDS, library and CEDIR staff may collaborate to address them.

UoW chose its first CMS, WebCT Campus Edition (CE), in 1999 in conjunction with its expansion to new campuses around the south coast of New South Wales. At the main campus as well as the satellite campuses, the preference and intent have always been for the CMS to support a "blended" teaching environment, with both online and face-to-face components. No undergraduate courses and very few graduate courses have been taught entirely online. Still, the CMS has played a role in course delivery. Now 60 subjects are taught at off-site locations using a CMS, and the subject coordinators are said to be

early adopters and high level users.[53] Overall, about 40% of the subjects taught use a CMS to some degree.[54] In 2004 the campus engaged in a review for a CMS to replace WebCT CE, and WebCT Vista was selected. Librarians participated in campus-wide committees presiding over the original CMS selection and then its replacement review. The transition to Vista began in 2005, and over an 18 month period, instructional designers in CEDIR will convert 840 courses from the old platform to the new one. Two librarians have taken half-time reassignments to work in CEDIR on these course conversions.

Librarians have collaborated in many ways with teaching faculty, learning development staff and CEDIR staff on integrating information literacy into the curricula, and library services and resources into the CMS. In 1990 the Library created the Information Literacy Introductory Program (ILIP), an online tutorial (http://www.uow.edu.au/student/attributes/ilip/index.html, May 16, 2006) of several modules with associated quizzes. ILIP is now compulsory for all undergraduate students and postgraduate students who have not completed it within the past 5 years. Students can access the content in the tutorial anytime, but they can only pass the quizzes once. They are strongly encouraged to complete the tutorial within the first 6 weeks of their first semester. Learning Development staff manage the ILIP student requirement, and faculty librarians create and revise the content as needed. ILIP is designed to raise new students' awareness and teach the basics of the research process and acquiring information sources. Research Edge (http://www.library.uow.edu.au/helptraining/tutorials/resedge/index.html, May 16, 2006), is a more comprehensive online tutorial. First designed as a workbook for postgraduates, Research Edge evolved into an online tutorial. In 2004/2005 a group of librarians and CEDIR staff reworked the tutorial to appeal to different learning styles, making it more interactive and adding more graphics.

ILIP and Research Edge are standalone, generic information literacy teaching tools, but faculty and librarians use more context and subject specific approaches as well. Research Edge was designed so sections can be used independently of the whole, and faculty have integrated specific sections into their courses. One librarian has worked extensively with a faculty to create a WebCT module on evaluating information within a study skills course (for Wollongong University College, a university preparatory program), adapting content from Research Edge. Some faculty use specific subject guides created by

faculty librarians, linking to them from within their WebCT courses.[55] Librarians have also worked with faculty to develop subject-specific research skill components embedded within courses. The faculty librarian for the nursing program works with those students in each of the three years of their program, teaching them through sequences within their courses about particular resources, search strategies, citation analysis and styles, and plagiarism. Her presentations and models have been included in the CMS for the course, and some of the topics include assessments.

The faculty librarian for Informatics (Electrical, Computer & Telecommunications Engineering; Information Technology & Computer Science; and Mathematics and Applied Statistics) collaborated with a teaching faculty to design lectures, activities and assessments that would improve students' information literacy skills in a compulsory information technology course. The faculty recognized the gap between students' information technology proficiency and their information literacy, and she sought to "make the critical connection between understanding content and developing academic skills".[56] Though students considered themselves "computer savvy", they lacked an understanding of the research process. Lecture notes and content materials were added to the course WebCT site to supplement the face-to-face class meetings. Similarly, the Law faculty librarian has worked with students in a compulsory first year course. She meets with students for two hours a week of class time for three weeks. Students work through modules of an online legal research tutorial (http://www.library.uow.edu.au/helptraining/tutorials/legal/index.html, May 16, 2006) and take quizzes on the content from a WebCT site. During this stage in the course they are also conducting research for a capstone paper and presentation, making content and activities highly relevant to their coursework. In these cases and others, faculty have worked with librarians to help students develop skills along the information literacy continuum.

On a more generic, institution-wide level, the conversion from WebCT CE to Vista provided CEDIR staff, librarians and faculty the opportunity to revisit the standard CMS template from which all courses are generated. Two librarians working on the conversion team aided the library's visibility in the

template. They consulted with their faculty librarian colleagues and determined that every CMS course would include links to the following services:

- E-readings (http://library.uow.edu.au/search/r),
- Catalogue (http://library.uow.edu.au/),
- Databases (http://www.library.uow.edu.au/eresources/databases/),
- Resources by Faculty (http://www.library.uow.edu.au/eresources/),
- Teach Yourself (http://www.library.uow.edu.au/helptraining/tutorials/),
- Ask Your Librarian (http://www.library.uow.edu.au/helptraining/askus.html),
- What's New (http://www.library.uow.edu.au/about/news/faculty/index.html).

Teaching faculty can modify or suppress this module, but they have not. Rather, they are pleased that a significant library presence is included in the environment for them.[57]

For many faculty, the driving force to using a CMS is to manage required and recommended readings in electronic format. As a result of federal copyright legislation, Australian universities have had to become highly accountable for their management of electronic resources. The Australian 2001 Copyright Act Statute covers digital materials in the educational environment. With a license and the payment of commensurate fees, educational institutions can offer 10% or one chapter of a book or an article to students without requesting permissions. Copyright Australia Ltd. (C.A.L.) administers statute compliance and license agreements. Universities are audited regularly, and violations expose universities to substantial fines and officials to jail sentences. Consequently, UoW has since mandated that all electronic readings must be processed through the library; faculty cannot personally load or link to electronic texts from their course sites. The UoW Library has streamlined a process for collecting, scanning and storing (when necessary) and cataloging electronic course readings. The electronic readings module in a WebCT course site now generates a list of readings from the library catalog with links to the full-text of those citations.

Administrators, faculty, librarians, instructional designers, and learning services staff at the University of Wollongong are actively engaged in bringing together information resources and academic skill-building activities in their CMS. Their vision and intent to improve student learning outcomes are apparent in their current activities and plans, generated from University policies, to map information literacy skill development across the courses in each Faculty.

University of South Australia

UniSA enrolled approximately 33,000 students in 2004, with 21% of its student population "offshore" or transnational, 31% international studying in Australia, and 13% external or not studying on a campus.[58] The University maintains 4 campuses around Adelaide and a campus at Whyalla, about 400 km northwest of Adelaide. Its programs are offered through four academic divisions: Business; Education, Arts and Social Sciences (EASS); Information Technology, Engineering and the Environment (ITEE); and Health Sciences. UniSA is a partner of the Australian Technology Network, an alliance of 5 universities which aims "to help secure Australia's reputation as the clever country, and contribute to its social and economic wealth, while championing the principles of access and equity that have ensured its members are the universities of first choice for more students".[59] UniSA was the first Australian university to articulate "Graduate Qualities" (http://www.unisa.edu.au/etd/gradqual.asp, May 16, 2006), and others followed suit.[60] The second quality addresses lifelong learning, and information literacy is an indicator of preparedness.

The Library and the Flexible Learning Centre (FLC) provide critical services to support the University's and academic divisions' goals. The Library and FLC are in the same "administrative portfolio," and they collaborate in a number of capacities. The FLC is responsible for maintaining the online learning environment, providing specialist support for distance education, providing instructional development support to teaching faculty, consulting on teaching and learning, and supporting student learning. Online learning and curriculum development projects are guided by faculty service agreements between the academic deans and FLC. The deans set the teaching and learning priorities and the FLC professional developers work with the teaching faculty to achieve them. Through these formal agreements

or more informal requests, librarians collaborate with teaching faculty and FLC staff to infuse library services and information literacy skill-building into courses and programs. The Associate Director for Academic Library Services has been a leader in producing the Australian and New Zealand Information Literacy Frameworks,[61] and she manages the teams of academic librarians which consult with each academic division. These teams were an outcome of a library organizational restructuring in 2004, intended to make service levels more consistent and to clarify areas of responsibility.[62]

UniSA espouses flexible, student-centered learning processes, and one of its delivery platforms is the CMS developed in 1998 by the FLC's Online Services department. Many University interests, including the library, had input on the design of the CMS, and the developers built it based on stated priorities of interoperability, scalability and functionality/features.[63] It is one aspect of the University's portal infrastructure. Each program and course has a homepage. Teaching faculty, professional developers and academic librarians can choose from multiple templates and modify their pre-set elements extensively, allowing many different approaches to content presentation. The flexibility extends to modes of faculty/student interactions. Very few courses are taught entirely online, and the blended approach is the preferred and dominant one of options: face-to-face, print (remote or correspondence) and online.

The CMS and library services intersect in many places. As at the University of Wollongong, electronic readings are managed by the Library and cataloged in the integrated library system. Course sites in the CMS commonly have links to e-readings generated by the library system. The UniSA library offers a host of online tutorials and training videos on research skills and strategies which complement face-to-face classes (http://www.library.unisa.edu.au/infoskills/onlinetrain.asp, February 22, 2006). These tutorials can stand alone, or teaching faculty, professional developers and librarians refer to a module from an assignment section of a CMS course site. InfoGate (http://www.library.unisa.edu.au/infogate/index.htm, February 22, 2006) and Strategies for Successful Research (http://www.library.unisa.edu.au/research/ssr/default.asp, February 22, 2006) tutorial modules are commonly used for undergraduate and graduate courses, respectively. Consistent both with the goal to foster learning at points of assessment and with the notion that subject, context specific lessons are more

lasting, academic librarians also create modules or guides in support of specific course assignments. The academic library services team for the Division of Business created a "Writing the First Essay" module in a core business course "Communication and the Media" which uses a progressive, layered approach to teach skills. It includes a video on how to search and refers to content in the InfoGate tutorial. The academic library services team for ITEE developed assignment worksheets for courses in that division. These are linked in the body of an ITEE CMS template page called "Library – Finding Information – ITEE Division" with pre-set links to the library's homepage, catalogue, database list, 7 step search strategies tutorial, and summary of other library guides and tutorials. Academic library service teams have created virtual libraries with assignment guides for each division (http://www.library.unisa.edu.au/resources/VL/default.asp, February 22, 2006) and subject resource guides. Elements of these have been integrated into CMS course pages.

Collaborations between teaching faculty, professional developers and librarians have evolved mostly from personal relationships, on a course-by-course basis. The Associate Director for Academic Library Services and the professional developer for Health Sciences both noted a need to take a more programmatic approach to information literacy. To better address the graduate attributes, they want to map the curricula and identify places to address information literacy elements in a sequential, progressive way. Generally faculty accept the information literacy philosophy, but they may create assignments which are not appropriate to the skill levels of their students. Librarians and FLC staff (study advisors, career advisors, professional developers) need to work with the academics who are course coordinators to integrate information literacy in a more systematic way. FLC's approach is "how can we embed and then support?"[64] Part of the embedding process involves helping teaching faculty use more CMS tools.

Boston College

BC enrolled 14,500 students in 2005, about 2/3 as undergraduates and 1/3 in graduate or professional programs. BC's main campus is in the Chestnut Hill suburb of Boston, Massachusetts, and the Law School is on another campus in nearby Newton, MA. Its academic programs are offered through 7 divisions: the College of Arts and Sciences: Carroll School of Management; Lynch School of

Education; Connell School of Nursing; Graduate School of Social Work; Law School; and the Woods College of Advancing Studies. Boston College was founded in 1863 by the Society of Jesus of the Catholic Church and maintains a commitment to a Jesuit, Catholic mission.

Boston College Libraries and staff aspire to "leadership in the use of networking technology", to produce original and converted digital collections, and to offer a virtual service point.[65] The Libraries have an instruction program, a manager of instructional services, an information literacy task force, and a professed focus on e-learning.[66] The Connors Family Learning Center is part of the library organization, and it supports teaching and learning for faculty and students. A separate department under the purview of the Academic Vice President, Instructional Design and eTeaching Services (ETS) assists faculty integrate technology into their teaching through instructional design, consulting, training and project management. ETS sponsors a process for faculty project proposals, and an instructional designer manages the time and resources for accepted proposals. ETS consults with librarian subject specialists on alternative content sources, and the strongest relationship is with the Libraries' Media Center which digitizes or acquires digital content. Librarians add metadata for the digital content to records in the catalog, with links to the sources on a streaming server. Instructional designers facilitate connections with library services, staff and resources as needed to complete the faculty projects. Some of these projects involve WebCT course sites.

ETS manages Boston College's course management system, WebCT. Law school and other faculty started the CMS initiative in 1999. WebCT first became available to faculty in 2002. In 2005, 47% of faculty used WebCT and 90% of students used WebCT for at least one course per semester. BC faculty still adhere to traditional teaching forms, and WebCT course sites supplement face-to-face classes.[67] Most faculty who use WebCT post syllabus and readings to reduce "paper shuffle" but some use assignment, survey and discussion board features.[68] WebCT has also served faculty as a password protected container for audio-visual content. Librarian involvement in WebCT courses has been more opportunistic than systematic, with some notable exceptions.[69]

The Head of the Graduate School of Social Work (GSSW) Library made an agreement with the GSSW faculty that her staff would create a WebCT course site for each of their classes, add the syllabus and course reserves, and assist with adding any other content. All GSSW Library staff have administrator access to the WebCT courses with one generic password. Though every WebCT course has a default set of institutional links, including many to library resources and services, the arrangement with the GSSW faculty provides the SSW librarians with an opportunity to suggest specific databases, guides, tutorials and resources. In addition to course-specific additions to WebCT sites, the Social Work Librarian also created a WebCT site, "Social Work Central", for GSSW students, that includes tutorials on doing research, using specific databases, using RefWorks, using professional writing styles, etc. The GSSW offers some of its courses off-campus and employs a number of adjunct faculty. The WebCT platform provides uniformity of presentation, convenience, and a good communication tool.[70]

Though the Libraries do not handle all the electronic readings for which faculty provide student access, many faculty use the Libraries' course reserves service. For those faculty with both library e-reserves and a WebCT course site, library staff will add a link or icon from the WebCT course site to the e-reserves, then notify the faculty of it. Two library staff members in the course reserves department have WebCT administrator privileges. The Media Center has digitized course reserve music files, saved them on the streaming server and provided links to them from WebCT course sites. Because access to WebCT is password protected and the music files are streamed rather than offered for download, these files are copyright compliant.

For some other courses, WebCT has served as a container of library-produced or maintained content. ETS designed a course site using WebCT, and library staff acquired or digitized audio and video clips of great speeches for a course, "Rhetorical Traditions," in the Communications Department. Again, the password protected environment and streaming server created a "legal" environment, in the copyright sense. Subject librarians also researched and provided links to sources, some free and some licensed, of speaker autobiographical information and speech texts. From this WebCT course site students could review examples they had discussed in class, or look at new examples of rhetorical styles. Teaching

assistants for the course moderated weekly discussions in which students were required to participate. A similar collaboration produced a WebCT site for a core undergraduate philosophy course, "Perspectives on Western Culture." The faculty and ETS project manager consulted with the art librarian, who researched and provided images from proprietary databases. Other librarians offered supplemental content and resources.

Library content has been integrated into the CMS, but examples of a guided research process in which students are assessed based on how they search for, evaluate, cite or use information are few. One was an online course on immigration law research created in WebCT by a law librarian. She researched online teaching methods, developed her syllabus and produced instructional video clips and a tutorial on print-based resources. She required students to participate in online discussions about content and research. Another project to address information literacy skills was in development. At the behest of the Dean of Arts and Sciences and the University Librarian, a group of library staff along with instructional designers, programmers and design consultants were producing an online tutorial on academic integrity. They created sections on planning for research; plagiarism and information re-use; documentation and citing; and ethical use of information. In a survey, faculty responded overwhelmingly that completion of the tutorial should be required. One version will include randomized questions and another version will not have questions. Faculty wanted the content to be in modules so they could use sections within their WebCT courses.

Across BC programs there were pockets of micro- and macro-level links between library services and resources and course WebCT sites. These were the result of specific projects or individual librarian initiatives. Evidence of context-specific, subject based information literacy skill development through academic programs was not apparent.

Connecticut College

CC is a small, residential liberal arts college located in the southeastern corner of Connecticut, on the outskirts of the city of New London. Founded in 1911 as a women's college, today CC enrolls about 1,900 students, both men and women, who take courses produced through 30 academic departments. The

College is predominantly an undergraduate institution, though it offers three graduate programs with a current enrollment of 25 students.

In the 1990's Connecticut College restructured its computing and library services, creating a new Information Services department lead by the Vice President for Information Services and Librarian of the College. Information Services (IS) includes teams for instructional technology; research support and instruction; information resources; technical support; and special collections and archives. Administrative computing, desktop support, media, telecommunications, and web support are among the campus services offered by IS, in addition to traditional library functions such as circulation, acquisitions, cataloging and reference. From this division comes support for the course management system, library services and the information literacy program.

After a review of CMS products, a team led by the director of instructional technology recommended the purchase of WebCT in 1999. In 2000, CC held its first Temple Summer Institute (TSI), an annual, two week program for 10-15 faculty to learn about and create a course in WebCT. The TSI is designed and produced jointly by Information Services and the Center for Teaching and Learning (CTL). The first day of the seminar covers pedagogy, specifically course design and objectives. Subsequent mornings are devoted to training on particular WebCT functions, such as course calendar, syllabus, e-readings, discussion forums, assessment and class management. Faculty have guided work time in the afternoons. Librarians participate to present the College's copyright policy, library resources and the liaison program. Since the start of the TSI, about 50-60% of CC's 152 full-time professors have been trained to use WebCT.[71] The degree to which faculty use WebCT varies. The ability to contain and distribute e-reserves is the primary motivation for faculty to use WebCT. While the Library maintains print reserves, faculty are responsible for creating and maintaining digitized versions of their print readings in WebCT, and they are responsible for complying with College's copyright policy. The policy encourages faculty to use materials from the CC libraries' collections whenever possible.

Faculty use of library materials for e-reserves is the natural connection between the CMS and library resources; any others come as the result of faculty and librarian initiatives. The instructional

designer/developer who manages WebCT does not use templates, therefore macro-level, generic links to library or any other services or resources do not appear automatically for faculty in their sites. Beyond e-reserves, faculty use WebCT to manage handouts or student grades, or conduct course evaluations. For most it is simply a shell which contains the course e-readings and syllabus. The instructional designer/developer noted that the CMS is used mostly to enhance the classroom experience, rather than as a teaching tool.[72] The emphasis at CC is on face-to-face teaching and learning interactions. The Director of the Center for Teaching and Learning cautioned against using the number of courses in WebCT as a measure of success, preferring instead to focus on course objectives; if WebCT could help attain those, then it should be used for that purpose.[73]

Faculty from the CTL actively participate in IS and Library committees, including the Information Literacy Grant Advisory Committee, and they encourage their colleagues to collaborate with their subject liaison librarians. The CC library has a well-established information literacy program which has been made stronger by a Mellon Foundation grant to Connecticut College, Trinity College and Wesleyan University (CTW). The CTW Mellon Project for Information Literacy commenced in 2002 with the intent for "... library and computing staff members at each institution ... [to] work with academic departments and programs to develop tools and practices for information literacy instruction".[74] All the institutions shared the same goal, but each approached it in their own way. Over the four year life of the grant, CC has developed an information literacy tutorial, "Research 101", on the WebCT platform, and awarded stipends to faculty based on their proposals to collaborate with librarians and the instructional designer to develop information literacy skill building activities in a course or throughout a program.

The Vice President for Information Services and Librarian of the College has been a strong advocate for information literacy in higher education. He set as a goal that 99% of incoming freshmen to Connecticut College would have an introduction to information literacy fundamentals through the Research 101 interactive online tutorial. In the first year of the grant, a CC librarian modified an existing University of Washington online tutorial with six modules. One version is accessible openly through the College's website, and a second version is loaded into a WebCT site and includes assessment quizzes.

Incoming freshmen receive account information with a strong recommendation to complete the tutorial prior to arrival on campus. About two-thirds of incoming freshmen complete it, and though they may not actually develop skills, they do gain an awareness of a research process.[75] Faculty are encouraged further to use segments of the tutorial to support course assignments or discussion. The Music Librarian has included a link to the Research 101 online tutorial from within an information module she created for a Creative World of Music course WebCT site. The Chair of the Gender and Women's Studies Department has made completion of the tutorial a requirement of the major.

The Gender and Women's Studies Department and the Human Development Department were both recipients of stipends to develop progressive information literacy components to infuse through their programs. Stipends were also awarded to 16 individual faculty following the review of their proposals by the Information Literacy Grant Advisory Committee. Liaison librarians assisted each of these faculty on their projects, and as a result of these collaborations some faculty reworked other courses to include information literacy skill development. For one project the music librarian worked with a music faculty to create an information literacy module to which she linked from her WebCT course site. The module contained guides and links that complemented a classroom session. In it the music librarian showed students how to find music materials in the library's catalog. This was in preparation for a final assignment for which the faculty explicitly required library research. The music librarian has plans to collaboratively develop an interactive online tutorial about the music library.

Though difficult to prove a direct cause/effect relationship, since the start of the CTW Mellon Grant the CC library has had more requests for class instruction from a greater variety of faculty, and they have had more repeat requests from faculty. As faculty and librarian relationships strengthen and as faculty gain confidence in the impact of course integrated information literacy activities, they may look to transfer these resources and interactions to a WebCT course site. This was the case for an Anthropology faculty who received a CC information literacy stipend. After re-working four courses from the 100 to 400 level with librarians and the instructional designer, her next step was to build a WebCT course site for Medical Anthropology with syllabus, e-readings, film clips with study guides, filmography, annotated

bibliographies and portfolio assignments. The course site had links to a citation style guide and the Research 101 tutorial. In face-to-face classes, the subject liaison librarian taught students evaluation skills by having them compare the core subject literature included in the annotated bibliographies with what they found searching the free internet or library databases. Another of the professor's course objectives was visual literacy, and she is working with two librarians to tie in library research and resources with her assignments.

Connecticut College has demonstrated a commitment to information literacy on the basis of leadership from the Vice President for Information Services and Librarian of the College, attention to it from faculty involved with the Center for Teaching and Learning, and the initiatives of individual faculty and librarians. The CC commitment to WebCT is to support those faculty who choose to use it with the requisite software, professional support for creating digital materials and course sites, and training. The CMS in itself is not central to institutional values, but rather it is one option to support teaching and learning.

Discussion

The CMS implementations at these four higher education institutions share similarities and differences. At three - UoW, UniSA, and CC – the initiatives were driven by administrative sectors, while faculty were the movers behind the CMS adoption at BC. UoW and UniSA were certainly looking for additional means of reaching new students, using the CMS as a complementary technology rather than an exclusive platform. Perhaps Connecticut College was seeking to provide both faculty and students with a tool which was becoming expected in the higher education market, and Boston College faculty were actively pursuing it. At none of these colleges or universities, however, did the administration mandate faculty use of the CMS. If, how and to what degree a course is taught with a CMS is completely at the discretion of the faculty. They may have adopted a CMS for their own interests, and each institution has its training or incentive programs to encourage them to adapt courses for online learning. UoW and UniSA have faculty service agreements between division deans and the instructional design department to assist faculty with converting courses. Boston College's ETS sponsors a faculty project proposal process,

and Connecticut College has the Temple Summer Institute. Instructional design departments at all 4 institutions manage the CMS, and their training and development programs each address pedagogical issues with teaching online. This approach encourages faculty and librarians to explore the CMS as a learning environment.

Aside from guidance provided by instructional designers, some faculty employ the CMS strictly as a container for their course materials, or as a class management tool. The CMS is a central "shell" that holds content, freeing them from providing time and place dependent distribution services. The Social Work Librarian at Boston College provided compelling reasons – and assistance – for the program's faculty to use the CMS to hold course materials. This is one example of many in which librarians proactively sought to assist faculty, however possible, in the hope that it would lead to further collaboration. At each institution, librarians spoke of the importance of cultivating working relationships with faculty to earn their trust, to learn their preferences, and to impress upon them how librarians could support their teaching and research. While the Social Work faculty at BC found the CMS valuable as a repository for course materials and means of posting class bulletins to off-campus cohorts, another BC faculty and a CC faculty expressed their firm convictions that students were more likely to read materials that were handed directly to them than those available solely on a WebCT course site. Professors' intentions and teaching practices vary, and though time-consuming, librarians and instructional designers need to explore, understand and develop support services and learning activities with them which are complementary to their particular teaching nuances.

Though efforts to standardize educational delivery and outcomes are widespread, the teaching and learning process still comes down to the elemental exchange between faculty and student, with the faculty dictating the environment. This has been true historically, and it remains true today. Student learning styles and preferences have changed, but they still rate a knowledgeable faculty as the most important factor to their successful learning.[76] Students at BC were ambivalent about the role the CMS played in their courses, noting it made some transactions, such as listening to foreign language audio recordings or viewing video clips of different speeches, more convenient. Rather, they emphasized

foremost the positive or negative impression the course's faculty had on them. A dull professor who posted his lecture notes on his WebCT site encouraged student absenteeism, whereas a charismatic, provocative professor had waiting lists of students wanting to attend his classes. This is certainly not a legitimate measure of student learning (or the value of a CMS), but it is an indication of the potential influence faculty can have on students. All four of the higher education institutions in this study acknowledge the importance of at least some – but more often significant – face-to-face contact between faculty, librarians and students because they believe it is the best means of fostering meaningful learning interactions.

Assuming that an expert faculty who ably facilitates student learning is fundamental to education, a librarian's inclination to work collaboratively with faculty is the right one. Whether a professor's intent is to convey information or to develop a procedural approach critical to a particular discipline, a librarian can contribute resources and expertise. A CMS, or other technologies, may serve as a means of teaching, and if so, then a librarian should know how to work with those options. Faculty and librarians are responsible for investigating and evaluating if and how a CMS can serve their purposes. A CMS cannot provide all the right tools to all faculty and students in all situations. At BC the CMS proved the best means of serving proprietary multimedia sources to students outside of the classroom, but at UoW an Education faculty found that the multimedia assignments she was requiring of students were too large for them to submit via the CMS. UoW had WebCT course accounts set up so that students had access only while they were enrolled in the class, and both faculty and librarians said that locking course content to a finite time period limited how they would use the CMS.

In fact, administrators, instructional designers, librarians and faculty on each campus noted issues with managing learning objects and student work portfolios. A CMS is structured around curriculum and class units, but research, teaching and learning occur across a broader spectrum of courses or a program. UniSA and UoW were both exploring repository systems that would store digital learning objects (audio/video clips, graphics, data sets, text, etc.) and their metadata so they could be retrieved and re-used across subjects and platforms. BC was using the DigiTool product for this purpose. At CC students were

assessed on a suite of work following a series of courses or independent activities. In these contexts where student proficiencies are developed through different but related scenarios, learning objects and student assignments lose significance if they are bound to one curriculum. Each institution had its strategies for working around the constraints of the CMS. BC and CC enabled student access to all their courses on WebCT as long as they were enrolled at the colleges. UniSA was enabling students to store and manage their assignments and projects through their student portal rather than the CMS. The law librarian at UoW removed tutorial content from the WebCT platform (though she retained the quizzes there) so it could be referenced outside of a particular course. The CC librarian who developed the Research 101 tutorial made two versions, one in WebCT and one with freely accessible html pages. Through experimentation and trial, faculty, librarians and instructional designers created solutions where the CMSs failed them.

CONCLUSION

At a time when more students in more varied life circumstances are pursuing higher education in Australia and in the United Sates, course management systems have been widely adopted as a means of better delivering education to a larger population. Though colleges and universities have invested heavily in CMSs, they are not a panacea. Naturally administrators seek efficiencies in how their institutions deliver education, but these do not emerge from one magic technology. Content management systems, institutional repositories (for scholarly research), digital repositories (for learning objects) and portals are some of the evolving technologies that offer complementary services for teaching and learning. Their adoption should be determined within the context of clearly articulated institutional values and policies. They provide the “what” to focus a community on its purpose, serving as important common targets towards which students, faculty, librarians, IT professionals and other staff can strive together. The UoW and UniSA graduate attributes/qualities and the CC core values state what the institutions are about. However, in a holistic and systematic approach to education, the value statements and policies are but one element. To achieve them, faculty, librarians, instructional designers, IT professionals and others also need tools, training, resources and programmatic support. These support the “how” for teaching and learning. Given the range of circumstances in which instructors teach and students learn, as well as the

number of specialized disciplines, standardized delivery mechanisms can serve the process only to a point, and that must be determined on a case by case basis. Educators must also have license to be creative and flexible to apply their expertise to given situations.

Each of the four colleges and universities in this study is actively engaged in the discovery of how their CMS can best serve faculty, students and their educational goals. To their credit, the Australian universities address information literacy in their values statements, and librarians were involved in the original design or selection of the CMS. Connecticut College benefits from the shared reporting lines of information technology, instructional design and library functions, as well as strong collaboration with the Center for Teaching and Learning. All these institutions are struggling with the challenge of integrating information literacy skill building into the curricula progressively through a student's tenure at the institution. In some cases, their CMS is a valuable tool to deliver library services and resources to students, but for no one is it the exclusive means.

Historically central to higher learning, libraries have collected and provided access to collections of knowledge, and librarians have taught students enduring skills to find and appropriately use information. Faculty, librarians and instructional designers at the University of Wollongong, University of South Australia, Boston College and Connecticut have collaborated to explore the best means of drawing together CMSs, library services, and information literacy development to support student learning. Consistent with what is presented in the literature, librarians, instructional designers and faculty at these institutions have experimented with links to generic library services from the CMS platform and more specific approaches to individual CMS course sites. Institutions, libraries, and faculty continue to explore if and how a CMS can support information literacy development and learning through a student's academic career.

Appendix: Guiding questions for administrators, instructional designers, librarians and faculty on site visits

- What is the history of learning management systems at your college/university, and how has the library been involved with their development?
- What is the rate of adoption and use of your current LMS(s) by faculty and librarians?
- In what contexts are your LMSs being used, ie. distance, on-campus, hybrid courses/programs?
- Through what department(s) is the LMS managed and supported?
- How are librarians collaborating with faculty, information technology staff, instructional designers and academic support staff to integrate library resources and information literacy skill-building within course management systems? Can you offer examples of generic research and evaluation skill training and context or discipline specific research and evaluation skill training?
- What assessment mechanisms do you use within learning management systems to determine effectiveness of information literacy components?
- Are there differences in pedagogical approach between a curriculum that is delivered entirely through a LMS, a curriculum that employs both LMS and in-person (hybrid) classroom delivery, and a curriculum delivered entirely in a face-to-face environment? If so, please elaborate.
- What are technical challenges, if any, to integrating electronic library content and services, and how have you addressed them?
- From your experience what have you learned about using a learning management system? What changes or new directions would you like to pursue with it?

Notes and References

[1] John D. Shank and Nancy H. Dewald, "Establishing Our Presence in Courseware: Adding Library Services to the Virtual Classroom," *Information Technology and Libraries*, 22 (2003): 38*ff*. http://proquest.umi.com/.

[2] Neil McLean and Heidi Sander, eds., "Libraries and Enhancement of E-Learning" (white paper, OCLC E-Learning Task Force, OCLC Online Computer Library Center, Inc. Dublin, Ohio, 2003): 5. Available: http://www.oclc.org/index/elearning/default.htm (May 5, 2006).

[3] *Statement on information literacy for all Australians* (Canberra: ALIA, 2003). Available: http://www.alia.org.au/policies/information.literacy.html (January 31, 2006).

[4] Association of College and Research Libraries, *Information Literacy Competency Standards for Higher Education*. Chicago: Association of College and Research Libraries, 2001. Available: http://www.ala.org/ala/acrl/acrlstandards/standards.pdf (January 27, 2006).

[5] Gaynor Austen, Janine Schmidt, Philip Calvert and Rowena Cullen, "Australian University Libraries and the New Educational Environment," *Journal of Academic Librarianship*, 28, no. 1/2 (2002): 63*ff*. http://www.epnet.com (November 14, 2003).

[6] Richard N. Katz, "Balancing Technology and Tradition," *Educause* (July/August 2003): 53-54.

[7] Austen et al., "Australian University Libraries"; Katz, "Balancing Technology," p. 53.

[8] National Center for Education Statistics, *Special Analysis 2002: Nontraditional Students* (Washington, D.C.: U.S. Department of Education, 2002). Available: (http://nces.ed.gov/programs/coe/2002/analyses/nontraditional/index.asp, (February 1, 2006).

[9] A traditional student is defined as one who "earns a high school diploma, enrolls full time immediately after finishing high school, depends on parents for financial support, and either does not work during the school year or works part time." NCES, *Special Analysis 2002: Nontraditional Students*. (February 1, 2006).

[10] NCES, *Special Analysis 2002: Nontraditional Students*. Available: http://nces.ed.gov/programs/coe/2002/analyses/nontraditional/sa01.asp (February 2, 2006).

[11] University of Melbourne, *Changing Australian Higher Education System*, Available: http://www.unimelb.edu.au/vc/consultation/changinghighered.html (February 2, 2006).

[12] "External" students are the distance education population, defined as those for whom all educational materials are delivered to them, and attendance at the institution is incidental and voluntary. (Australia) Department of Education, Training and Youth Affairs, *Higher Education Students Time Series Tables: Selected Higher Education Statistics 2000.* Available: http://www.dest.gov.au/NR/rdonlyres/AE11F01D-E517-4BF7-8ECA-8553C31EF206/2481/timeseries00.pdf (February 2, 2006), p. 52.

[13] Ibid., p. 9.

[14] In 1981 Commonwealth government funding accounted for 80% of university sector income; by 2002 it was at 40%. University of Melbourne, *Changing Australian Higher Education System.*

[15] Overseas students accounted for 2.7% of the university population in 1988 and 6.6% in 2000. Dept. of Education, *Higher Education Time Series Tables,* p. 35.

[16] Katz, "Balancing Technology," p. 54.

[17] Brian L. Hawkins, Julia A. Rudy and Robert Nicolich, *Educause Core Data Service Fiscal Year 2004 Summary Report.* Available http://www.educause.edu/ir/library/pub8002.pdf (January 31, 2006) 35-36.

[18] Susan Gibbons, *Library Course-Management Systems: An Overview,* Library Technology Reports: Expert Guides to Library Systems and Services (Chicago: American Library Association, 2005). EduTools (http://www.edutools.edu) provides reviews and comparisons of commonly used commercial course management systems, and *Library Technology Reports* (Gibbons, 2005) dedicates a volume to library course management systems in which numerous products are described.

[19] McLean, "Libraries and Enhancement of E-Learning", p. 5.

[20] *2005 Educause Pocket Guide to U.S. Higher Education*, Available: http://www.educause.edu/ir/library/pd/PUB2201.pdf (February 1, 2006) 29.

[21] Hawkins, *Educause Core Data … 2004*, p. 36.

[22] Robert B. Kvavik, "Convenience, Communications, and Control: How Students Use Technology," in *Educating the Net Generation*, ed. Diana G. Oblinger and James L. Oblinger, 7.14 (Educause, 2005).

[23] Ibid., p. 7.14.

[24] David L. Smallen, "A Liberal Arts IT Odyssey"*EDUCAUSE Review,* vol. 39, (January/February 2004). Available: http://www.educause.edu/apps/er/erm04/erm0412.asp (February 2, 2006).

[25] Katz, "Balancing Technology," p. 52.

[26] Ibid., p. 56.

[27] Hamish Coates, "Leveraging LMSs to Enhance Campus-Based Student Engagement," *Educause Quarterly*, no. 1 (2005): 66; Katz, "Balancing Technology," p. 56.

[28] Diana Oblinger and James Oblinger, "Is It Age or IT: First Steps Toward Understanding the Net Generation," in *Educating the Net Generation*, ed. Diana G. Oblinger and James L. Oblinger, (Educause, 2005), pp. 2.1-2.3

[29] Ibid., pp. 2.9 -2.15.

[30] Coates, "Leveraging LMSs," p. 67; Oblinger, "Is It Age or IT," p. 2.11.

[31] J. C. Henning "The Challenges of Flexible Delivery Education for Information Services." Address to Forum 2001: An Education Odyssey: Issues in Open Flexible and Distance Learning, Sydney Australia, September 21-24, 2001. Available: http://www.tsa.ac.za/corp/research/papers/jhenning2001flexible.doc (May 15, 2006).

[32] McLean, "Libraries and Enhancement of E-Learning", p. 7; Austen et al., "Australian University Libraries".

[33] McLean, "Libraries and Enhancement of E-Learning", p. 7; Gibbons, *Library Course Management Systems.* p. 19.

[34] Shank and Dewald, "Establishing Our Presence in Courseware"; Gibbons, *Library Course Management Systems,* p. 26.

[35] Oya Y. Rieger, Angela K. Horne, Ira Revels, "Linking Course Web Sites to Library Collections and Services," *Journal of Academic Librarianship* 30 (2004): 207.

[36] James P. Kearly and Lori Phillips, "Embedding Library Reference Services in Online Courses," *Internet Reference Services Quarterly* 9 (2004): 71-72.

[37] Rob Lenholt, Barbara Costello and Judson Stryker, "Utilizing Blackboard to Provide Library Instruction: Uploading MS Word Handouts with Links to Course Specific Resources," *Reference Services Review* 31 (2003): 212-216.

[38] Shank and Dewald, "Establishing Our Presence in Courseware".

[39] Gibbons, *Library Course Management Systems,* p. 26, p. 45; McLean, "Libraries and Enhancement of E-Learning," pp. 10-16.

[40] Association of College and Research Libraries, *Information Literacy Competency Standards for Higher Education*. Available: http://www.ala.org/ala/acrl/acrlstandards/standards.pdf (May 16, 2006); Australian and New Zealand Institute for Information Literacy, *Australian and New Zealand Information Literacy Framework*, 2nd ed. Adelaide, Australia: Australian and New Zealand Institute for Information Literacy, 2004. Available: http://www.anziil.org/resources/Info%20lit%202nd%20edition.pdf (May 16, 2006).

[41] Association of College and Research Libraries, *Information Literacy Competency Standards for Higher Education*. Specifically see "Standards, Performance Indicators, and Outcomes". Available: http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm#ilhed (May 16, 2006).

[42] Nancy Dewald, Ann Scholz-Crane, Austin Booth, and Cynthia Levine, "Information Literacy at a Distance: Instructional Design Issues," *Journal of Academic Librarianship*, 26 (2000): 34.

[43] Nancy H. Dewald, "Web-based Library Instruction: What is Good Pedagogy?," *Information Technology and Libraries*, 18 (1999): 26*ff*. http://proquest.umi.com.

[44] Betty Ladner, Donald Beagle, James R. Steele and Linda Steele, "Rethinking Online Instruction: From Content Transmission to Cognitive Immersion," *Reference and User Services Quarterly,* 43 (2004): 329-337.

[45] Amy Brunvand, "Integrating Library Reference Services in an Online Information Literacy Course: The Internet Navigator Model," *Internet Reference Services Quarterly,* 9 (2004): 159-177.

[46] Lori E. Buchanan, DeAnne L. Luck, and Ted C. Jones, "Integrating Information Literacy into the Virtual University: A Course Model," *Library Trends*, 51 (2002): 144*ff*. http://www.epnet.com (October 11, 2005).

[47] Australian and New Zealand Institute for Information Literacy, *Australian and New Zealand Information Literacy Framework*, p. 6.

[48] Lynne Wright and Catriona McGurk, "Integrating Information Literacy: University of Wollongong Experience" in *Information Literacy Around the World: Advances in Programs and Research*, eds. Christine Bruce, Philip C. Candy and Helmut Klaus (Wagga Wagga, N.S.W.: Centre for Information Studies, Charles Sturt University, 2000); Rigmor George, Holly McCausland, Dale Wache and Irene Doskatsch, "Information Literacy – An Institution-wide Strategy," *Australian Academic & Research Libraries*, 32 (2001): 278*ff*. http://infotrac.galegroup.com (November 13, 2003).

[49] This ranking was noted to the author in discussions with Lynne Wright, (Associate Librarian for Client Services at the University of Wollongong) and Margaret Hicks, (Coordinator of Teaching and Learning Services at the University of South Australia), November 2005. The ranking was also noted on the University of Wollongong website, http://www.uow.edu.au/about/awards.html (February 15, 2006) and the Australian Universities website, http://www.australian-universities.com/rankings/ (May 16, 2006).

[50] Suzanne Lipu (Information Literacy Coordinator, University of Wollongong) in discussion with author, November 2005.

[51] "Attributes of a UOW Graduate" Available: http://www.uow.edu.au/about/teaching/graduate_attributes.html (May 16, 2006).

[52] University of Wollongong, "Information Literacy Integration Policy," Approved 2005. Available: http://www.library.uow.edu.au/about/planning/pdfs/b05.pdf, (May 16, 2006).

[53] Craig Littler (Remote Services Manager, University of Wollongong) in discussion with author, November 2005.

[54] Russ Pennell (Coordinator, Learning Design, University of Wollongong) in discussion with author, November 2005.

[55] Examples of these include "Disasters: Human error", http://www.library.uow.edu.au/eresources/subjects/hbs/hbsdisaster.html; "Refugee: The process of asylum seeking in Australia", http://www.library.uow.edu.au/eresources/subjects/sci/scigeo142.html; and "How to find statistics", http://www.library.uow.edu.au/helptraining/guides/findstats.html (May 16, 2006).

[56] Holly Tootell, "Integrating Information Literacy into Curriculum – Academic Services Division, Faculty of Informatics," Available: http://teaching.uow.edu.au/ltgp/search.aspx?RT=CS19&TT=0&FT=0&KT=, (May 16, 2006).

[57] Chris Brewer and Michele Jones (both Faculty Librarians, University of Wollongong) in discussion with author, November 2005.

[58] University of South Australia, "Pocket Statistics 2004", Available: http://www.unisa.edu.au/pas/bai/statistics/pocket/pocket-stats2004.asp, (February 21st, 2006).

[59] Australian Technology Network of Universities, "About ATN", Available: http://www.atn.edu.au/about/overview.htm, (February 21st, 2006).

[60] Margaret Hicks, (Coordinator of Teaching and Learning Services at the University of South Australia), in discussion with author, November 2005.

[61] Australian and New Zealand Institute for Information Literacy, *Australian and New Zealand Information Literacy Framework*, 2.

[62] Irene Doskatsch (Deputy Director: Library Services (Academic and International), University of South Australia) in discussion with author, November 2005.

[63] Ian Reid (Coordinator, On Line Services, University of South Australia) in discussion with author, November 2005.

[64] Dale Wache (Lecturer, Professional Development, University of South Australia) in discussion with author, November 2005.

[65] Boston College Libraries Vision Statement. Available: http://www.bc.edu/libraries/about/vision/ (February 23, 2006).

[66] Members of the Boston College Libraries Information Literacy Task Force in interview with author, December 2005.

[67] Elizabeth Clark (Director, Instructional Design and eTeaching Services, Boston College) in discussion with author, December 2005.

[68] Sarah Castricum and Jeanne Po (Instructional Designers, Instructional Design and eTeaching Services, Boston College) in discussion with author, December 2005.

[69] Information Literacy Task Force with author, December 2005.

[70] Katie McInnis-Dittrich, "SW800 Basic Skills in Macro Social Work Practice"(Presentation at mini-conference *Library and eTeaching* Collaborations, Boston College, December 13, 2005).

[71] Diane Creede (Instructional Designer/Developer, Connecticut College) in discussion with author, January 2006.

[72] Ibid.

[73] Michael Reder (Director of the Center for Teaching & Learning, Connecticut College) in discussion with author, January 2006.

[74] Connecticut College, "CTW Mellon Project for Information Literacy," Available: http://www.conncoll.edu/is/infolit/index.html (May 18, 2006).

[75] Kathy Gehring (Research & Instruction Librarian, Connecticut College) in discussion with author, January 2006.

[76] Gregory R. Roberts, "Technology and Learning Expectations of the Net Generation," in *Educating the Net Generation*, ed. Diana G. Oblinger and James L. Oblinger, (Educause, 2005), p. 3.4