Chapter 2

Course-Management Systems

Course-management systems—which will be abbreviated in this report as CMS (not to be confused with content-management systems, also referred to by the abbreviation "CMS" and also utilized by libraries and other institutions for online-content management and also mentioned in this report)—are difficult to define because they can encompass so much. As described by Morgan, the major goal of a CMS is "to integrate a suite of teaching technologies into a powerful set of tools that make it easy for faculty to use technology in instruction" (Morgan 2003, 16).

Commonly included within the functionality of a CMS are synchronous and asynchronous communication tools, such as discussion board, online chat, and email. Organizational tools, including online calendar and syllabus, announcement board, and digital drop box, assist the instructor in managing the flow of information and content within the class.

Through online exams and quizzes, grading tools, and tracking course site use by individual students, the CMS can also help to streamline student assessment. Within the CMS, students and faculty can share URLs and digital documents, including assigned reserve reading materials.

Although the terms "course-management systems" (or "CMS") and "courseware" will be used throughout this report, be aware that this class of technology has a plethora of names:

- virtual learning environment (VLE)
- course-management software packages (CMSP)
- learning-management systems (LMS)
- course-management software (CMS)
- e-Courseware
- e-Learning courseware
- managed learning environment (MLE)

The genre of CMS technology can trace its roots to the mid- to late-1990s. Many of the early CMS were created within higher education in direct response to the lack of tools that supported online teaching. For example, WebCT was conceived on the campus of the University of British Columbia, Blackboard at Cornell University, and ATutor at the University of Toronto. While some of these systems were transferred into the commercial sector, others have remained as homegrown institutional systems.

Campus Computing Project
www.campuscomputing.net

The adoption level of CMS has increased dramatically. The annual survey of the Campus Computing Project, which includes more than 600 colleges and universities in the United States, "focuses on campus planning and policy issues affecting the role of information technology in teaching, learning, and scholarship" (from the Campus Computing Web site). According to the 2004 survey, at public universities the percentage of classes using courseware has risen from approximately 18 percent in 2000 to 43 percent in 2004. CMS use at private universities has risen at a slightly faster rate, from around 19 percent of courses in 2000 to approximately 47 percent in 2004 (Green 2004).

In spite of recent consolidations, there are still more than fifty course-management systems available. Some are extremely large, complex enterprise systems, while others are more streamlined; some commercial, and others open source.

You can find the most comprehensive look at course-management systems at the Western Cooperative for

Educational Telecommunications' EduTools site, which provides independent reviews and side-by-side comparisons.

EduTools
www.edutools.info

Provided in this report will be brief overviews of some of the more commonly used or newsworthy systems, with particular emphasis on their levels of library integration.

Blackboard

Blackboard began as a project amongst students and faculty at Cornell University, but since has become one of the most popular commercial courseware systems available. Through the acquisition of competitors such a CourseInfo, Web-Course-in-a-Box, and Prometheus, the privately held company has grown in size.

Blackboard
www.blackboard.com

Blackboard demo site
http://coursesites.blackboard.com

Building Blocks Overview
www.blackboard.com/dev/DevOverview.htm

Blackboard targets both the educational and business sectors with different academic and commercial suites of its product. Blackboard can be mounted and maintained locally or hosted by Blackboard.

Using an software-development kit (SDK), Blackboard users have the Java application program interfaces (API) and documentation necessary to create Building Blocks, Blackboard's open-architecture initiative that permits Blackboard users to "build and launch applications on top of the Blackboard platform, create new functionality for existing Blackboard applications, and seamlessly integrate third-party applications" (from Web site).

Blackboard bases its annual licensing fees on the number of full-time equivalent students in an institution. Varying levels of for-fee support are available, including call centers for faculty and student end users.

A primary component of the Blackboard content system is Library Digital Asset Management (LDAM). Within LDAM is an electronic reserves (e-reserves) system that "enables integration of e-Reserve resources into online courses so that students and instructors no longer have to use the hard copy reserves or log in to separate e-Reserve systems" (Oerter and Everhart 2004, 8).

Additionally, content created and stored in Blackboard, such as learning objects, can be tagged using information management system (IMS) and Dublin Core metadata standards, which in turn can be included in library searches (Oerter and Everhart 2004).

In spite of the LDAM component, Blackboard users share many of the same barriers to the seamless integration of library resources and services with the course sites.

WebCT

WebCT began as a grant-funded project to study the impact of online teaching on learning at the University of British Columbia. Professor Murray Goldberg distributed WebCT as a commercial product from 1997 to 1999, when Universal Learning Technology acquired the software.

WebCT
www.webct.com

WebCT demo site
www.webct.com/software/viewpage?name=software_demo_webinars

WebCT PowerLinks
www.webct.com/powerlinks

Content Partners
ww.webct.com/powerlinks/viewpage?name=powerlinks_content_partners

Currently, two versions of WebCT are available. WebCT Campus Edition is a streamlined version that focuses specifically on teaching and learning tools. WebCT Vista, on the other hand, is an enterprise system that extends beyond online instruction tools to include a learning objects manager, community-level branding and customization, and a developers' kit.

The developers' kit, PowerLinks, is quite similar in functionality to the Blackboard Building Blocks. "With the PowerLinks Kit for software development, institutions can integrate custom applications fully with WebCT Vista as though they were natively part of the platform, creating a seamless experience for faculty and students" (WebCT Vista 2005, 4).

WebCT provides instructors with tools to create online course packs (e-Packs) using digital content provided by WebCT's content partners. Current partners include publishers Glencoe/McGraw Hill, Houghton Mifflin, John Wiley and Sons, Elsevier Science, and Pearson.

ANGEL

The ANGEL course-management system evolved from research conducted on the Indiana University–Purdue University Indianapolis (IUPUI) campus. The software is now developed and sold commercially by ANGEL Learning, Inc.

ANGEL provides a suite of pedagogically sound course templates to help expedite the migration of in-class course materials into the online environment. ANGEL's accessibility features go beyond the base requirements of Section 508 of the U.S. Rehabilitation Act (ADA). For example, aural style sheets that offer "auditory cues to help the listener understand the context of the information they are hearing" are provided (from Web site).

ANGEL is compliant with the Sharable Content Object Reference Model (SCORM) and supports the IMS Enterprise specification, both of which will be explained in the following chapter. Migration support between Blackboard and WebCT to ANGEL is available. Annual licensing fees are based on number of user accounts.

ANGEL
www.angellearning.com/default.asp

ANGEL Account Request
www.angellearning.com/Global/AccountRequest/accountRequest.asp

Desire2Learn

Desire2Learn (D2L) is a commercial course-management system founded in 1999. D2L is actually a suite of systems that includes a learning platform, learning object repository, portal, and an e-commerce system.

D2L includes a fine-grain level of customization, which system administrators can carry down to the level of the individual user. To foster integration with other systems on campus, D2L uses open APIs and open standards, which support the building of D2L customizations and enhancement, called D2L widgets.

The learning object repository provides a space into which learning objects can be deposited easily and discovered and reused by other instructors. The repository supports SCORM, Dublin Core, and CanCore Profile metadata standards. D2L bases its licensing fees on the number of user accounts and includes version upgrades and administrative support.

Desire2Learn
www.desire2learn.com/welcome.html

CanCore
www.cancore.ca/en

Moodle

Moodle is an open source CMS designed by Martin Dougiamas as part of his PhD research at Curtin University of Technology, Australia. The aim of the project was to try to answer the question: "How can Internet software successfully support social constructionist epistemologies of teaching and learning?" (Dougiamas and Taylor 2003). For an explanation of "social constructionist epistemologies," see http://moodle.org/doc/?file=philosophy.html.

Moodle includes local customization in fifty-six languages, including those with non-Latin characters, such as Chinese and Korean. Although not as robust as the larger, commercial course-management systems, Moodle has an active developers' community that continues to expand and refine the software's functionality.

Moodle
http://moodle.org

Moodle Language Packs
http://moodle.org/download/lang

Sakai

As an alternative to the high-priced commercial products, some higher education institutions elected to build their own, homegrown CMS. However, sustaining a locally developed courseware system can become as costly as the commercial alternatives charge for yearly licensing and maintenance fees. The Sakai Project, funded by the Andrew W. Mellon Foundation and the William and Flora Hewlett Foundation, offers a third option.

Sakai is an open source courseware system being built by a growing collaboration of higher education institutions. The four core institutions of the Sakai Project each have their own homegrown CMS:

- Indiana University's Oncourse
- MIT's Stellar

Sakai Project
www.sakaiproject.org

- Stanford University's CourseWorks
- University of Michigan's CHEF

All of these systems were built in the late 1990s and were in need of significant upgrades by 2003. Instead of continuing to work individually, the four institutions decided to collaborate; they were joined by the UPortal Consortium and the Open Knowledge Initiative (OKI). The strongest components of each homegrown CMS are being combined into a best-of-breed courseware, named Sakai, in reference to Hiroyuki Sakai of TV's *Iron Chef*.

Each of the four Sakai core institutions contribute developers to the project, which, when combined, equate to twenty-seven FTE at a two-year cost of $4.4 million (Thorin 2005). While the developers are paid by and reside at their home institutions, they report to the Sakai Board. In this way, the overall goals and objects of the Sakai Project, rather than local needs, remain the focus of the developers.

Sakai is available free as open source software under the Educational Community License. However, institutional users are encouraged strongly to become part of the Sakai Educational Partner's Program. The educational partners commit to paying $10,000 annually, for three years. In exchange, the partners have a voice in the development of the software and receive training and support from the Sakai staff. As of February 2005, Sakai had more than sixty educational partners.

In fall 2004, the University of Michigan was the first to rollout Sakai 1.0 under the local branding name of CTools. While intended only to be a pilot rollout, the UMichigan community quickly adopted CTools. Presently UMichigan has more than 25,000 users of CTools, with more than one-half of faculty CMS users having migrated to CTools (Hilton and Wheeler 2005).

Indiana University rolled out Sakai version 1.5 in the first week of January 2005. As of mid-February, the Indiana pilot release has gone very smoothly (Hilton and Wheeler 2005). MIT has scheduled a Sakai deployment for fall 2005, and a full deployment at Stanford is planned for the 2005/2006 academic year.

According to Hilton and Wheeler, version 2.5 of Sakai, scheduled for release in December 2005, will be the closest to a plug-and-play version, and probably the best version to assess in terms of the required on-site technical support.

For those institutions that do not want to support open source software of Sakai's size and complexity, a growing number of commercial firms exist that will provide for-fee support.

In spite of Sakai's higher education and Mellon foundation origins, "few development resources . . . as yet have targeted the complex issues inherent in content integration" (Thorin 2005). Consequently, it is presently no easier to integrate library resources into Sakai than WebCT or Blackboard. However, steps are being made to remedy the situation.

In early March 2005 librarians from the four core Sakai institutions were scheduled to meet with Sakai representatives "to shape requirements and development priorities for bringing library content and services into Sakai" (Thorin 2005). The group's plan is to examine integration issues for licensed journals and books, as well as multimedia, data, finding aids, library catalog, and course Web sites.

In addition, Indiana University, a core Sakai institution, has launched the Twin Peaks project. Twin Peaks is a collaboration project between library and CMS staff "to develop a user interface for accessing digital library resources from within Sakai v1.0" (from project Web site). If the project is successful with a proof-of-concept demonstration, then the functionality will be targeted for inclusion in the Sakai 2.0 release scheduled for this summer.

These brief CMS overviews do not come close to exploring the broad spectrum of available features, functionalities, and decision factors. Rather their purpose is to provide a taste for the complexity and variety of today's course-management systems.

UPortal
http://mis105.mis.udel.edu/ja-sig/uportal

OKI
www.okiproject.org

Educational Community License
www.opensource.org/licenses/ecl1.php

Sakai Educational Partners
www.sakaiproject.org/partners.html

CTools
https://ctools.umich.edu/portal

Sakai commercial support vendors
www.sakaiproject.org/support.html

Twin Peaks
https://twinpeaks.dev.java.net

CMS from Student and Faculty Perspectives

It is important to have an understanding of courseware from the users' perspectives in deciding if and how a library can participate. Therefore, included is some information about the benefits of CMS use from the perspectives of

students and faculty. The author has culled the findings of three recent studies in particular for use in this report:

- cms@wbw.edu Project—A 2002–2003 collaboration of Wesleyan University, Brandeis University, and Williams College "to identify and quantify the benefits provided by Web technology" (cms@wbw.edu Project 2003, 1);
- *ECAR Study of Students and Information Technology, 2004*: *Convenience, Connection, and Control*—This 2004 study by Kvavik, Caruso, and Morgan "used survey and interview data to create a portrait of today's student experiences with and skill using information technology" (Caruso 2004, 1). Chapter 5 deals specifically with course-management systems; and
- *Faculty Use of Course-Management Systems*—A 2003 ECAR study by Morgan of more than 730 faculty members throughout the University of Wisconsin system.

CMS use is relatively common amongst undergraduate college students. Kvavik, Caruso, and Morgan's survey of students across twelve higher education institutions found that 83 percent (n=4374) had used a CMS. Of those, just over 76 percent found it to be a "positive" or "very positive" experience (Kvavik, Caruso, and Morgan 2004, 63).

While some students believe that courseware use can improve learning, it appears to be the efficiencies of online access to course materials that makes courseware popular with students (Kvavik, Caruso, and Morgan 2004, 68; cms@wbw Project.edu 2003, 7). In both studies, "convenience" or "saves time" was perceived to be the highest benefit of using a CMS by students, followed by "improved learning" (ibid; cms@wbw.edu Project, 14).

The most frequently used CMS features by students are the syllabus and online readings, followed by grade tracking and sample exams (Kvavik, Caruso, and Morgan 2004, 67). Faculty appear to be using many of the same features, with announcements, syllabi, and course documents registering as top functions used by faculty in both the Morgan (Morgan 2003, 39) and cms@wbw.edu (cms@wbw.edu Project 2003, 6) studies.

While "saves time" was the top CMS benefit perceived by all faculty, when limited to just those who actually use courseware, the benefit of "saves time" falls to just 7 percent. Instead, "better access" is found to be the top benefit by faculty with CMS use (cmc@wbw.edu Project 2003, 6).

In faculty interviews, two CMS-related tasks were the targets of most of the time-related complaints. First, faculty must put in time up front to get their course ready for a CMS. This often requires that they substantially redesign course materials and gather the necessary resources. Next, they must load the materials into the CMS itself . . . faculty found the time required to load materials to be onerous, and this was a time expenditure they strongly resented. (Morgan 2003, 48)

Morgan found 80 percent of CMS use is in addition to in-class instruction, "either to enhance regularly scheduled classes or to create hybrid courses in which online activities and exercises replace part of meeting time" (Morgan 2003, 73). The majority of faculty try to adapt the CMS technology to their current teaching practices and predispositions. "In this environment, most of us abandon large parts of a system's functionality in a quietly desperate attempt to master at least part of what is new" (ibid, 87).

However, it is at the point when faculty become comfortable with the technology they will begin to explore ways in which the CMS can have a pedagogical impact. According to Carmean and Haefner, deeper learning occurs when learning is social, active, contextual, engaging, or student-owned (Carmean and Haefner 2002, 29). Course-management systems provide tools that can foster all five of these principles of deeper learning. When this is fully understood and achieved, the pedagogical impact of courseware will be significant.