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Faculty Use of Course Management Systems

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Faculty Use of Course Management Systems

EDUCAUSE is a nonprofit association whose mission is to advance higher education by promoting the intelligent use of information technology.

The mission of the EDUCAUSE Center for Applied Research is to foster better decision making by conducting and disseminating research and analysis about the role and implications of information technology in higher education. ECAR will systematically address many of the challenges brought more sharply into focus by information technologies.

Contents

Foreword

The relevance of course management systems to higher education is indisputable. For the past three years, the issue of faculty support and training in instructional technologies has consistently been identified as one of the most important information technology issues in the annual EDUCAUSE Current Issues Survey.[1–3] Higher education is clearly investing resources, energy, and human capital to explore issues relating to the value that course management systems bring to the academy. This EDUCAUSE Center for Applied Research (ECAR) study, the second of 2003, presents the results of quantitative and qualitative research into questions that ultimately impact institutional funding priorities, faculty and student recruitment and retention, and the fundamentals of teaching and learning. It focuses specifically on the current state of faculty course management system (CMS) practices and does not attempt to measure the impact of these systems on learning outcomes or pedagogical effectiveness.

Most CMS studies focus on attempts to deal with rising costs, CMS marketplace volatility, and buy-versus-build dilemmas. Considerably less research and analysis has been invested in asking whether course management systems are, in fact, being used effectively in higher education and, if so, under what conditions. Even less has been written about what the future of course management systems is likely to bring. This study takes an early step toward more in-depth research by investigating how faculty members currently use course management systems, to what extent they use them, which features they use, in which learning environments they use them, and what would motivate them to increase their usage. Not surprisingly, readers will reaffirm their understanding that technological innovation outpaces technological assimilation and socialization.

The University of Wisconsin System (UWS), with 6,500 faculty and more than 150,000 students, provides the focus for this study. UWS includes two doctoral/research institutions, 11 universities that award bachelor's and master's degrees, 13 freshman-sophomore campuses forming the UW Colleges, UW-Extension outreach programs, and UWS Administration, which includes the Office of the President. Because course management systems are used throughout UWS, the research findings apply broadly to higher education institutions of all types and sizes.

Important Contributions

Faculty Use of Course Management Systems in the University of Wisconsin System is the result of eight months of collaborative research conducted under the direction of Glenda Morgan, learning technology analyst in the UWS Office of Learning and Information Technology. Morgan holds a Ph.D. in political science from the University of Minnesota. Her dissertation focused on the use of information technologies by groups of experts making law and policy in three issue areas: intellectual property, electronic privacy, and controls on strong encryption use and export. Applying her extensive experience with the study and evaluation of technology use in teaching and learning, she works with UWS faculty and staff to assess how faculty members are, and how they could be, using technology in instruction.

This study should be read in conjunction with several other ECAR Research Bulletins on the topic of course management systems and instructional technologies. In addition, ECAR will release later this year research studies and case studies on how campus organizations are providing support for the increasing instructional uses of information technologies.

Higher education is fortunate to enjoy a professional IT community characterized by intelligence, generosity, ingenuity, and commitment to the common good. ECAR has benefited enormously from its collaborations with this community, as evidenced by its collaboration with Glenda Morgan in the production of this study. We wish to specifically acknowledge the following individuals for their major contributions to and participation in this study: Alan Aycock, UW–Milwaukee; Kathy Christoph, UW–Madison; Kathy Finder, UW–Eau Claire; Dirk Herr-Hoyman, UW–Madison; Robert Kaleta, UW–Milwaukee; Tammy Kempfert, UWS Administration; Kathy Konicek, UW–Madison; Peter Mann, UW–Madison; Kathy Pletcher, UW–Green Bay; Kelly Smith Stevens, UWS Administration; Nicholle Stone, UW–Stout; Alan Wolf, UW–Madison; Lorna Wong, UW–Whitewater; the UWS Course Management System Site Administrators Group; and the UWS Learning Technology Development Council. These individuals and their campus colleagues were extraordinarily generous with their time. ECAR is grateful to EDUCAUSE Vice President and ECAR Director Richard Katz for contributing the insightful Chapter 10 of this study, "Balancing Access and Tradition: Technology, Teaching, and Learning in Higher Education," and to ECAR Senior Fellow Robert Albrecht for his thoughtful contributions to the study's final report.

ECAR Background

ECAR was launched on January 1, 2002, to create a body of research and analysis on important issues at the intersection of higher education and information technology. ECAR fulfills its mission through a program of symposia and through the publication of

- biweekly research bulletins oriented to senior campus functional executives;
- detailed studies designed to identify trends, directions, and practices in an analytically robust fashion; and
- case studies designed to showcase campus activities and highlight effective practices, lessons learned, and other insights from the practical experience of campus leaders.

Since ECAR's inception, two symposia have been held and more than 50 ECAR research publications have been issued.

ECAR's success as research center and business enterprise depends in large measure on our reception with EDUCAUSE members and sponsors. Our members, as always, have shown great confidence in us and have shown their support by subscribing to ECAR

despite a difficult economic climate for higher education in 2003. These members understand that particularly in tough times, investments in good research and analysis can save money in the long run. ECAR has been especially fortunate to enjoy the support of an unparalleled group of sponsors. While Cap Gemini Ernst & Young, Datatel, Hewlett-Packard, Microsoft, PeopleSoft, SCT, and WebCT provide significant financial support to ECAR, they are truly more than financial sponsors. These companies believe that impartial applied research on critical issues in higher education generates a more informed marketplace of both sellers and buyers. These firms are committed to understanding their customers and helping them make the most effective decisions related to their technologies and products. Most impressively, these sponsors understand deeply and respect the importance of intellectual independence in the marketplace of ideas.

Finally, as we have toiled in this field, other ECAR fellows are managing other elements of the ECAR program. Under the energetic leadership of Director Richard Katz, Fellows Robert Albrecht, Mary Beth Baker, Robert Kvavik, Dewitt Latimer, James Penrod, and Gail Salaway have proved to be remarkable colleagues whom higher education is lucky to have in its midst. The EDUCAUSE staff under Brian Hawkins's leadership is unfailingly superb and cooperative. EDUCAUSE is an organization that truly takes pride in excellence and strives for stellar performance. It is an honor to be a part of this exciting enterprise.

Judith Caruso and Toby Sitko, ECAR Fellows

Endnotes

1. P. Gandel and the EDUCAUSE Current Issues Committee, "Top 10 IT Challenges of 2000," *EDUCAUSE Quarterly*, Vol. 23, No. 2, 2000, pp. 10–16, <http://www.educause.edu/ir/library/pdf/eq/a002/eqm002a.pdf>.
2. R. L. Lembke, J. A. Rudy, et al., "Top Campus IT Challenges for 2001," *EDUCAUSE Quarterly*, Vol. 24, No. 2, 2001, pp. 4–19, <http://www.educause.edu/ir/library/pdf/eqm01211.pdf>.
3. P. Kobulnicky, J. A. Rudy, et al., "Third Annual EDUCAUSE Survey Identifies Current IT Issues," *EDUCAUSE Quarterly*, Vol. 25, No. 2, 2002, pp. 8–21, <http://www.educause.edu/ir/library/pdf/eqm0222.pdf>.

1
Executive Summary

Course management systems play an increasingly critical role in fulfilling strategic academic goals of higher education. In both pedagogical impact and institutional resource consumption, course management systems form the academic system equivalent of enterprise resource planning (ERP) systems. For most faculty members, course management systems have been the primary entry point into using technology for instruction. These systems are also the major vehicle for offering online courses to students in universities and colleges throughout North America and, increasingly, throughout the world. Yet higher education administrators know relatively little about how faculty members actually use course management systems and what their pedagogical effects might be. We undertook this study to investigate course management system (CMS) use, satisfaction, and adoption among faculty in the University of Wisconsin System (UWS).

For this study, we define a CMS as a software system specifically designed and marketed for faculty and students to use in teaching and learning. Most course management systems include course content organization and presentation, communication tools, student assessment tools, gradebook tools, and functions to manage class materials and activities. Today, common course management systems in the higher education environment include WebCT, Blackboard, LearningSpace, and eCollege. This study doesn't include other technologies used in teaching and learning, such as PowerPoint and other content management systems and presentation software.

Methodology and Study Participants

This study consisted of three research components:

1. a quantitative survey of 730 UWS faculty and instructional staff who currently use course management systems,
2. qualitative interviews with 140 UWS faculty and instructional staff, and
3. manual counts and examination of CMS usage logs.

The faculty participants in the quantitative survey constitute approximately 11 percent of the 6,500 UWS faculty. The UWS also includes

- more than 150,000 registered students,
- approximately 27,000 total full-time-equivalent faculty and staff,
- 11 universities that award bachelor's and master's degrees,
- two doctoral/research institutions (UW–Madison and UW–Milwaukee),
- extended-degree programs,

- 13 freshman-sophomore campuses forming the UW–Colleges,
- UW–Extension outreach programs, and
- UW System Administration, which includes the Office of the President.

The faculty and instructional staff surveyed primarily use two course management systems: Blackboard (74 percent) and WebCT (22 percent). As of November 1, 2002, 43 percent of these current CMS users had previously used a different CMS. A total of 5,160 fall 2002 UWS courses included CMS use as a part of instruction.

Key Findings

This study has yielded some noteworthy findings. Some confirmed our initial hypotheses; others surprised us.

CMS Technology Challenge for Students

Faculty members believe that some students have difficulty in using a CMS. A prevailing myth is that technologically savvy students drive a faculty member to use a CMS. This might be true in some cases, but only 3.15 percent of faculty surveyed reported a push from students to use a CMS. Some faculty reported that their students actually discouraged them from using a CMS in their instruction because the students had difficulty gaining access to the CMS and were uncomfortable with technology in general. Faculty members are not confident that they can rely on the CMS's being available whenever the students need access, nor can they rely on the students' computers to have sufficient power to adequately utilize the CMS. We had difficulty determining the degree to which this assessment resulted from faculty's projecting their own fears and inadequacies with instructional technology onto their students. Nonetheless, despite students' prowess in chat and e-mail technology, many don't have the skills necessary to use a CMS without additional training.

Faculty Control

Some faculty are reluctant to adopt course management systems because they believe the systems reduce their control of instruction and the instructional environment. Some faculty members also express concern about relying on CMS technology as part of their class curriculum. By their nature, course management systems are structured and have limited customization capabilities. Faculty worry that this structure excessively constrains their teaching and places additional bureaucracy between them and their course materials. This is especially true in fully online distance education classes, where multiple faculty and support staff are involved in the setup and maintenance of course materials. As Professor Ann Zarinia of UW–Whitewater observed, "[Course management systems] constrain you through idiocy. The inflexibility of the structure gets in the way of good pedagogy."

Campus Leadership

Leadership is important in faculty adoption of a CMS. An important finding of this study is the important role that strong leadership by campus executives and department chairs plays in shaping and encouraging faculty to use course management systems. While only 7 percent of the faculty participating in the quantitative study stated that departmental and/or administrative pressure or persuasion caused them to begin using a CMS, in subsequent interviews numerous faculty members noted that campus leadership had a significant impact on their adoption of the technology. Mary Wierenga of UW–Milwaukee said, "The dean of the School of Nursing at UW–Milwaukee was among the first to use a course

management system in her teaching, and she constantly stressed to her faculty how easy it was to learn and use. This sent a strong message to the faculty, and it resulted in widespread adoption of the technology in the school."

Lack of Measurement Tools

Data from this study seem to indicate that today's CMS products are weak in the area of measurement tools. While trying to measure actual CMS use for this study, we found the system's standard tools and reports to be insufficient. We needed manual counts of courses and instances of tools used to get an accurate picture of functional use. The challenge in obtaining usage statistics made it extremely difficult to monitor usage over a period of time. If a better understanding of usage levels and patterns could be readily obtained, it would be easier for institutions to monitor system growth and identify needed training. CMS vendors should refine the measurement tools and reporting at both the course and tool levels. These improvements would let institutions better plan for hardware and software upgrades and routine maintenance resource requirements.

Primary CMS Usage

Course management systems are used primarily in face-to-face courses. Eighty percent of UWS faculty and staff use a CMS to augment face-to-face instruction, either to enhance regularly scheduled classes or to create hybrid courses where online activities and exercises replace part of the meeting time. This result comes as no surprise to those involved in supporting CMS use on campus, but, given the traditional association of course management systems with distance education, especially among campus administrators, we need to rethink how to support and implement course management systems. Fewer than 27 percent of faculty and instructional staff we surveyed used a CMS for fully online courses.

CMS as a Management Tool

While there is evidence that the CMS increases interactions between faculty and students and among students, faculty use the CMS primarily as an administrative tool to facilitate quiz administration and other classroom tasks rather than as a tool anchored in pedagogy or cognitive science models. This observation seems to suggest more about how new technologies are assimilated than it does about the nature of the tools themselves. The notion of using new tools to automate routine administrative tasks is neither new nor unique to this class of technologies, but it changes the dialogue from one focused on the CMS as a pedagogy transformation tool to one of "unburdening the faculty of administrative tasks." Faculty members and instructional staff value the administrative capabilities because, among other things, the CMS framework, with its structured course-based architecture, handles routine and repetitive organizational tasks.

Managing Software Change

Change management is important to CMS success. Of the faculty and instructional staff surveyed, 11 percent expressed reluctance to use a CMS because of concerns about constant system changes. This might reflect the current UWS situation. At the time we conducted this study, a system-wide request for proposal was in progress to look at new course management systems for the entire UW System. Faculty uncertainty was understandably high, and this is reflected by respondents who said they were reluctant to further use a CMS because they feared a product change. Even faculty members who were increasing their CMS use expressed some concern about a potential product change. As Rebecca Stephens of UW–

Stevens Point explained, "If people could be assured that the technology would be kept around, then they would be far more enthusiastic about using it [and we] would get new adoption."

As with all important technologies, the technical implementation of a CMS is easy compared with the socialization required. Change management of teaching and learning—one of the institution's core and most highly personalized processes—is radical, painful, and likely problematic. As with other enterprise initiatives, such as enterprise resource planning, CMS implementation often reflects a conscious or unconscious move toward standardization. In this case, it is not about standardizing accounting transactions but one of the institution's most durable, mission-critical, and idiosyncratic activities.

Educational institutions must plan for CMS changes in the same way they handle other ERP systems, with version and product updates in mind. It is important to identify who is responsible for migrating course data from one product to another, or from one product version to another. Change management is of increasing concern to administrators and will continue to be until the products have matured and technical standards gain wide use. Given the inevitability of change, institutions need to work continuously on managing change and assuaging faculty fears about it.

Importance of Training

Training of faculty and instructional staff plays a key role in successful CMS adoption and use. Twenty-nine percent of the faculty and instructional staff surveyed cited training in CMS use as an important factor in their initial adoption or expanded use of a CMS. The most successful training offered is that delivered as close to the faculty as possible, on a small scale and including real examples rather than abstract or dummy courses. Bill Cerbin of UW–La Crosse noted, "Faculty do not always see the need for the use of technology until they attend presentations or training and learn how to apply it."

At UW–Colleges, an important element of faculty training on CMS is to have other faculty members demonstrate how they use a CMS in an actual class. According to Dick Cleek of UW–Colleges, "Faculty learn as much from their peers as they do from CMS trainers." Getting faculty to participate in training can be a challenge. Sometimes, encouraging CMS adoption can be perceived as akin to "helping" faculty teach better. This has always been a slippery slope, because faculty learn the craft of teaching largely through the graduate student apprenticeship model and are skeptical of the merits of training. Institutions must overcome this skepticism and encourage faculty to attend training sessions. In the longer term, use of these new systems should be included within the traditional graduate apprenticeship process.

Satisfaction with CMS Features

Faculty use limited CMS functionality and are less than fully satisfied with some features. Although course management systems offer a wide range of tools, faculty primarily use the "static" tools for storing syllabi and class materials, making announcements, and handling administrative tasks. They also use the gradebook, assessment, and discussion group tools, but are less satisfied with the quality of these features.

More than 60 percent of the faculty and academic staff surveyed ranked announcement, syllabus, and course document functionality as very important in a CMS, and approximately 80 percent of respondents use these tools. Faculty and staff use interactive tools such as assessment, gradebook, and discussion groups less frequently, even though 50 percent of the survey respondents

ranked assessment tools as important or very important. Some faculty and instructional staff adopted a CMS because they needed an online quizzing or assessment tool, but only 36 percent of respondents are satisfied with how the tool works. Professor Tim Nissen of UW–River Falls said, "I started using the CMS so I could have online quizzing capability. I have been disappointed with its limited functionality and inflexibility." Out of all the CMS tool usage traffic, measured in number of page requests, the assessment tool scored the highest, with 70 percent use by students and 4 percent by faculty. It is unclear whether this dissatisfaction reflects on the software's features or its ease of use.

Seventy percent of the survey respondents considered gradebooks important or very important, but only 51 percent were satisfied with the CMS gradebook. While more than half of the faculty reported being satisfied with the gradebook, the qualitative interviews indicate that this satisfaction is soft: faculty members are frustrated with the gradebook functionality and features. The presence of an online gradebook for a course does provide a communication mechanism for faculty, however. As Lauren Fingerson of UW–Milwaukee stated, "Having student grades up there has improved my relationship with my students. There is no 'secret gradebook.' It has improved transparency."

Seventy percent of respondents also ranked discussion groups as important or very important, and their use by faculty at UW–Whitewater over the past five semesters has ranged from 20 to 40 percent. Faculty satisfaction has also been high, measuring 63 percent. Traffic, as measured by page requests, has approached 18 percent, second only to the traffic associated with quizzing.

CMS Effects on Pedagogy

The pedagogical impact of using course management systems is perceived but difficult to measure. There is little empirical evidence that course management systems actually improve pedagogy. Study findings suggest, however, that using a CMS does invite faculty to rethink their course instruction and instructional environment, resulting in a sort of "accidental pedagogy." This rethinking has the pedagogical side effect of enabling better course organization, providing greater transparency and accountability in the course, and potentially increasing student engagement with the materials. According to Sharon Giroux of UW–Stout, "The experience of having to organize courses in different ways and divide it up into new kinds of pieces was thought-provoking, and it had the effect of improving the class and my teaching."

In addition, the presence of an online gradebook increases the transparency of the grading process. Students can view their own grades and know where they stand at all times. Also, student work can be made visible to other students, which appears to make students more accountable for their performance. Faculty members also believe a CMS increases interaction between students and faculty. In fact, 60 percent of respondents reported that using a CMS in instruction has increased their interaction with students, and 62 percent reported that CMS use has increased interaction among the students themselves. Through the use of CMS communication tools, students have increased the amount and quality of their discussions, according to faculty and academic staff interviewed. These discussions, they think, lead to better learning. Nancy Chick of UW–Colleges described the discussion tool thus: "It has enormous potential, for example, to encourage participation by shy students, or learning-disabled students. It gives [the latter group] the opportunity to archive and go through things more slowly or repeatedly."

2
Introduction

What are course management systems, and why should higher education leaders be interested in how faculty members use them? Course management systems play an increasingly critical role in higher education's technology infrastructure. The course management system (CMS) is the academic equivalent of an enterprise resource planning (ERP) system, and the primary way that most faculty come to use technology specifically for teaching and learning. The CMS is also the major vehicle for offering online courses to students in universities and colleges throughout North America and increasingly the rest of the world. Yet higher education technology administrators know relatively little about how faculty members actually use course management systems and the impact these systems have on pedagogy.

Making course management systems available for use by faculty and students raises such challenges and questions as which products to adopt, how to provide them to faculty, and how to maximize their effectiveness. This research study seeks to answer some of these questions and address some of those gaps in our knowledge by exploring how University of Wisconsin (UWS) faculty members use course management systems. This chapter defines what a CMS is, describes the challenges in making decisions about course management systems in higher education, and discusses why it is important to understand how and under what conditions they are used. Chapter 3 describes the mix of quantitative and qualitative methodology we used to evaluate CMS use among UWS faculty. Chapter 4 provides background on UWS and describes its applicability for this study. Chapters 5–8 report the study results, including factors that drive faculty to adopt course management systems, what motivates them to increase or decrease their use of these tools, and how faculty members use the technology, both organizationally and pedagogically. Chapter 9 summarizes some of the major pedagogical themes shaping faculty CMS use. Chapter 10 envisions future directions for course management systems in the higher education landscape.

Background and Definition

Most course management systems date from the mid- to late-1990s. They evolved from efforts to meet the increasing need among faculty, especially those with few technology skills, to manage their courses online. Many course management systems had their roots in colleges and universities. For example, Murray Goldberg and colleagues developed WebCT[1] when Goldberg was an instructor at

the University of British Columbia. Blackboard[2] emerged from collaboration among students and faculty at Cornell University. Prometheus[3] was developed at George Washington University, and CourseTools[4] was developed at the University of Michigan. Other products, such as LearningSpace,[5] have come out of major private sector technology companies. Although the CMS marketplace has consolidated somewhat, many competing products remain to choose from.

Course management systems are hard to define, in part because they are evolving so rapidly that it is difficult to pin down what they are. In essence, a CMS is a suite of software tools, usually organized around a class or unit of instruction. The suite includes most of the tools that faculty members need to teach a class, such as software to

- organize and present content,
- communicate (synchronously and asynchronously),
- assess student performance,
- record and report grades, and
- manage class materials and activities.

A major goal of course management software 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.

Increasingly, course management systems are focusing on content management and learner management functionality. In this way they are starting to resemble the learner management systems and learner content management systems used in the corporate and training sectors.[6] Some course management systems are also beginning to look and function more like operating systems[7] by constituting the environment within which other technologies function. As course management systems have grown in size and complexity, the cost of licensing and supporting them has skyrocketed,[8] resulting in major funding challenges for colleges and universities.

Challenges for Higher Education

Colleges and universities face several challenges in providing and supporting course management systems, including

- increasing acquisition and support costs,
- concern for student readiness,
- marketplace volatility, and
- ongoing faculty training.

Increasing Acquisition and Support Costs

CMS licensing and associated costs[9] have jumped significantly at a time when most of higher education is facing shrinking budgets[10] and high demand for technology infrastructure and ERP system improvements. Reactions to the financial challenge usually focus on

- finding a more cost-effective CMS to implement;
- aggregating with other users to get the best deal from vendors, thereby minimizing cost and maximizing service and support; or
- building rather than buying or licensing a system, as several schools (including the University of Michigan,[11] Stanford University,[12] and Foothill College[13]) have done and are doing.

Marketplace Volatility

The CMS marketplace has seen rapid growth and turnover in the number of companies and products, as well as in product range and variation. Higher education must choose among a large number of products with widely ranging feature sets, architectures, and business models. It sometimes appears that a degree of consolidation and standardization is occurring within the marketplace, but then new products and companies appear, and the dizzying array of choices increases again.

Choosing the best and most appropriate CMS is already difficult for technology

administrators, but the volatile marketplace also leads to frequent reevaluation of CMS decisions. New product adoption leads to increased costs for training system administrators and faculty as well as migration of course content from the old system to the new.

As the CMS industry matures, the demand for standardization becomes ever more pressing. A variety of standards organizations[14] are at work, and momentum for vendor compliance with standards is growing. Until CMS software is fully standards based, migration of courses from one system to another will remain difficult and time consuming. Even dealing with product upgrades has involved much time and frustration among faculty.

Difficulty in moving between products raises the stakes for choosing the right product at the outset. Many colleges and universities have found themselves in the difficult position of having chosen a product that has disappeared from the market or that had to be phased out because it had significant drawbacks or did not keep pace with technical and functional improvements. These situations have caused a growing backlash among faculty who have invested a great deal of time in the CMS and see that time as being lost when the product is upgraded or changed. This has the potential of slowing down faculty adoption and use of the technology.

Ongoing Faculty Training

Persuading faculty to adopt course management systems and training them in their use constitutes a third challenge facing technology administrators. Despite some CMS vendors' advertising slogans, these programs do not run themselves. They often require a lot of back-end support and extensive training in the mechanics of their use for pedagogical effectiveness.

Solutions to These Challenges

To find the best answers to the challenges described above, we need more information about how faculty members use course management systems. Studying CMS use among UWS faculty helps us answer the following questions:

- What factors drive faculty to start using course management systems?
- What factors influence increased or decreased use?
- To what functional uses do faculty and staff apply course management systems on campuses of higher education institutions?
- For what pedagogical purposes are faculty members using course management systems?
- What are faculty members' major concerns about CMS use?

By describing these aspects of CMS use, this report provides some of the information required to answer a range of more general questions, including

- What concerns must be addressed to persuade faculty to use course management systems?
- What goals are achievable through CMS use?
- Where is the best place to situate CMS training?
- What do course management systems add to teaching?
- What do faculty members value in a CMS, and what do they find less useful?
- What features should prospective buyers look for in a CMS?

Endnotes

1. See <http://www.webct.com/>.
2. See <http://www.blackboard.com/>.
3. Originally developed at George Washington University, Prometheus is now owned by Blackboard. See <http://company.blackboard.com/prometheus/>.
4. See <http://coursetools.ummu.umich.edu/>.
5. See <http://www.lotus.com/products/learnspace.nsf/wdocs/homepage/>.
6. B. Chapman and B. Hall, "Learning Content Management Systems, " (Sunnyvale, Calif., March 2000), pp. 8–16 <http://www.brandon-hall.com/>.
7. J. Finkelstein and M. Pittinsky, "The Evolving Role of Course Management System Providers in the Transformation of Education: An Interview with Blackboard's Matthew Pittinsky," *The Technology Source*, Jan./Feb. 2003, <http://ts.mivu.org/default.asp?show=article&id=1039>.
8. J. Young, "Pricing Shifts by Blackboard and WebCT Cost Some Colleges Much More," *The Chronicle of Higher Education*, April 19, 2002, p. A35.
9. Licensing fees are, of course, only one cost factor. In addition, there are hardware and database costs, and, in some cases, infrastructure upgrade costs. Associated support personnel and training costs are also part of the overall funding required for a successful CMS implementation.
10. M. Arnone, S. Hebel, and P. Schmidt, "Another Bleak Budget Year: As State Legislators Convene, Concerns Over Money Dominate the Agenda," *The Chronicle of Higher Education*, Jan. 3, 2003, p. A21.
11. See the University of Michigan CourseTools, <http://coursetools.ummu.umich.edu/about/>.
12. See Stanford University's CourseWork project at <http://aboutcoursework.stanford.edu/>.
13. See Florence Olsen, "Foothill College Will Build Its Own Next-Generation Courseware, and Offer It to Others," *The Chronicle of Higher Education*, Dec. 6, 2002, <http://chronicle.com/free/2002/12/2002120601t.htm>.
14. Several organizations are driving the movement toward e-learning standards, including the Open Knowledge Initiative, <http://web.mit.edu/oki/proj/>; the IMS Global Learning Consortium, <http://www.imsglobal.org/>; and the Advanced Distributed Learning Network, working on the SCORM specification, <http://www.adlnet.org/>. These standards and specifications will ultimately make it much easier to move content from one standards-compliant product to another. Because the content is tagged with metadata described within standard specifications, the software can render the content in the appropriate way. Thus, for example, course management systems that use the QTI standard will be able to import quiz items from another CMS or export them to another CMS without loss of context or detail. This is a tremendous advance over the current state, in which quizzes or assessments cannot easily be moved from one CMS to another. Instead, the data must be keyed in after each migration, a time-consuming process that discourages faculty from CMS adoption.

3
Methodology

This study employs qualitative and quantitative research methods to capture how University of Wisconsin faculty use course management systems. Most previous research on course management systems has focused on faculty opinions of the technology or comparative analyses and rankings of competing products. Although both approaches yield useful results, neither tells us much about the contours of the technology use.

Studying technology use is challenging, and studying course management system (CMS) use is even more so, for several reasons. First, research must distinguish between self-description of use and actual use. Second, people with varying skills and needs use course management systems in different ways. In a single study such as this, which focuses on faculty CMS use in general, we could easily miss some of the nuances in use between, for example, those who make heavy use of the technology to teach distance education courses entirely online and those who use it to supplement their regularly scheduled face-to-face classes. Third, we face several obstacles in measuring CMS use:

- Most course management systems have poor reporting tools. Many, for example, lack ways to track courses offered by semester (or term), college, department, or any other criteria. Site administrators frequently have difficulty counting how many unique students are using a CMS. Thus, reporting on use is a tedious and time-consuming process that must often be done manually.[1]
- CMS site administrators keep a wide range of course sites on their servers. These include courses in development for future semesters as well as those rolled over from previous semesters that may still be active in some regard. This creates a disconnect between the courses listed in an institution's course schedule or catalog for a particular semester and those listed as "active" on the CMS server during that semester. Consequently, to accurately determine how many courses are using a CMS in any given semester, site administrators can't simply count the courses on the server (although this measure is frequently used), because this results in a serious overcounting of CMS use in instruction.
- Many instructors use different course sites for different sections of the same course. This makes it difficult to know whether to count these as single or multiple CMS uses for teaching.
- With most course management systems, it is difficult and at times impossible to measure activity without looking at each

course individually. This means we can't always tell whether faculty are using a course site or to what extent they're using CMS features or tools. In addition, some CMS uses are ephemeral (for example, chat, unless the logs are saved), making it difficult to tell after the fact whether or not faculty have used certain tools.

Quantitative and Qualitative Measures

We sought to overcome these obstacles by using both quantitative and qualitative research methods. Through a process of triangulation,[2] this research captures the multiple aspects of faculty CMS use. We used three research strategies:

- We developed and distributed a 31-question online survey to gather more quantitative data about how course management systems were being used, and analyzed all 730 responses to this survey.
- We interviewed 140 UWS faculty and staff about their use and support of course management systems.
- We analyzed usage logs of various CMS instances to get a more descriptive picture of the usage parameters.

Quantitative Survey

We constructed a 31-item survey using a commercial survey software package and asked CMS site administrators at each campus to distribute it to faculty using course management systems. We received 730 responses representing users from all UWS institutions.

Faculty Interviews

We conducted 140 semi-structured interviews that included UWS faculty and staff members and several faculty from other higher education institutions (see qualitative interview participants in Appendix A). In these individual interviews, we explored faculty CMS use by asking the following questions:

- How did you come to use the technology?
- What factors persuaded you to start using a CMS?
- For what purpose did you start using it?
- What features did you start using first? How has your usage changed over time?
- Has your usage increased?
- What factors drove you to increase or decrease your use?
- What tools did you add to your repertoire? What CMS features do you routinely use, for what purposes, and how successfully? What do you perceive to be the major advantages and disadvantages of course management systems? What other kinds of programs do you regularly use in conjunction with course management systems?
- What is your evaluation of student use, student technology skills, and student attitudes toward course management systems?

CMS Usage Analysis

We used two methods to analyze actual CMS usage. On three campuses, we opened and manually checked individual CMS course sites to determine how many sites were actively in use and what tools were being used. This analysis continued for a single semester at UW–Milwaukee, for two semesters at UW–Stout, and for five semesters at UW–Whitewater. These institutions had a sizeable number of courses in their course management systems. Unfortunately, some data had been lost in moving courses from one server to another. Chapter 6 presents the results of this data analysis.

On three other campuses, we used the Analog software tool[3] to analyze usage logs and determine traffic on three CMS instances over two semesters. Chapter 6 also presents the results of this traffic analysis.

Endnotes

1. Some of the major CMS vendors are substantially improving these features in upcoming product releases. However, many of the measurement issues we uncovered in this study will likely remain problematic for some time.
2. For discussion of mixing qualitative and quantitative methods and the process of triangulation, see N. K. Denzin, *The Research Act in Sociology: A Theoretical Introduction to Sociological Methods* (London: Butterworths, 1970); T. D. Jick, "Mixing Qualitative and Quantitative Methods: Triangulation in Action," *Administrative Science Quarterly*, Vol. 24, 1979, pp. 602–611; and A. Tashakkori and C. Teddie, *Mixed Methodology: Combining Qualitative and Quantitative Approaches* (Thousand Oaks, Calif.: Sage, 1998).
3. See <http://www.analog.cx/>.

4

University of Wisconsin System Case Study

The University of Wisconsin System (UWS) represents an interesting case study in faculty use of course management systems. UWS was created in 1971 with the merger of the former University of Wisconsin (Madison, Milwaukee, Green Bay, Parkside, 10 freshman-sophomore centers, and Extension) and the former Wisconsin State Universities (nine universities and four freshman-sophomore branch campuses). A 17-member board of regents governs UWS.

UWS currently consists of 11 universities that award bachelor's and master's degrees, two doctoral/research universities, and 13 freshman-sophomore campuses forming the UW–Colleges (see Figure 4-1). In addition, the UW–Extension serves the entire state. Table 4-1 lists all UWS institutions.

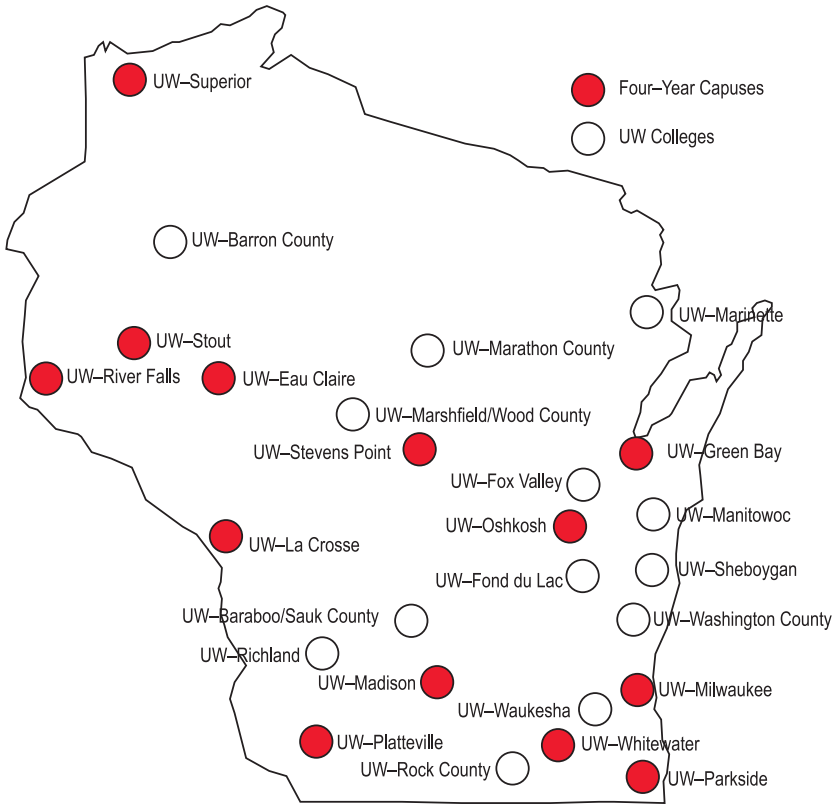


Figure 4-1. UWS Campus Locations

Table 4-1. The Institutions of the University of Wisconsin System

University of Wisconsin Location	Carnegie Classification	Students, Fall 2002
Madison	Doctoral/Research Universities—Extensive	40,858
Milwaukee	Doctoral/Research Universities—Extensive	23,344
Colleges (13 campuses across Wisconsin)	Associate's Colleges	12,453
Eau Claire	Master's Colleges and Universities I	10,862
Green Bay	Master's Colleges and Universities II	5,378
La Crosse	Master's Colleges and Universities I	8,750
Oshkosh	Master's Colleges and Universities I	11,245
Parkside	Master's Colleges and Universities II	4,972
Platteville	Master's Colleges and Universities I	5,939
River Falls	Master's Colleges and Universities I	5,647
Stevens Point	Master's Colleges and Universities I	8,667
Stout	Master's Colleges and Universities I	7,901
Superior	Master's Colleges and Universities I	2,861
Whitewater	Master's Colleges and Universities I	10,758
	TOTAL	**159,675**

UW Course Management System Infrastructure

UWS Administration has substantial experience in providing course management tools as well as support for faculty in using these tools. Since fall 1999, UWS has been supporting the availability of course management tools through a utility known as ITS@Wisconsin[1] that is centrally delivered by the information technology divisions of the two largest campuses. Central funding has been provided for hosting, training, and other technical and instructional support related to several course management tools.

Providing the service as a utility resource available to any UWS faculty or staff member at all 26 campuses is an effective strategy. First, it dissociates course management system (CMS) support from the normal campus learning technology budgets. Early on, these budgets did not include provision for these systems. Central support has enabled widespread use of the tools. Second, it captures efficiencies of scale and expertise by aggregating the services and locating them at institutions with robust technology infrastructures. Third, it lets campuses choose among CMS products. The utility supports several different course management systems, and having this choice has been important to campuses, especially in the technology's uncertain early years.

Through ITS@Wisconsin, UWS has supported LearningSpace, WebCT, Web Course in a Box, Blackboard, and Prometheus. At the time of this study, systems on UW cam-

puses included WebCT, Blackboard, Prometheus, LearningSpace, eCollege, FirstClass, and several other course management systems used by individual programs and schools.

The online survey conducted during this study provides a snapshot of some parameters of CMS use on the campuses, as reflected in Figure 4-2.

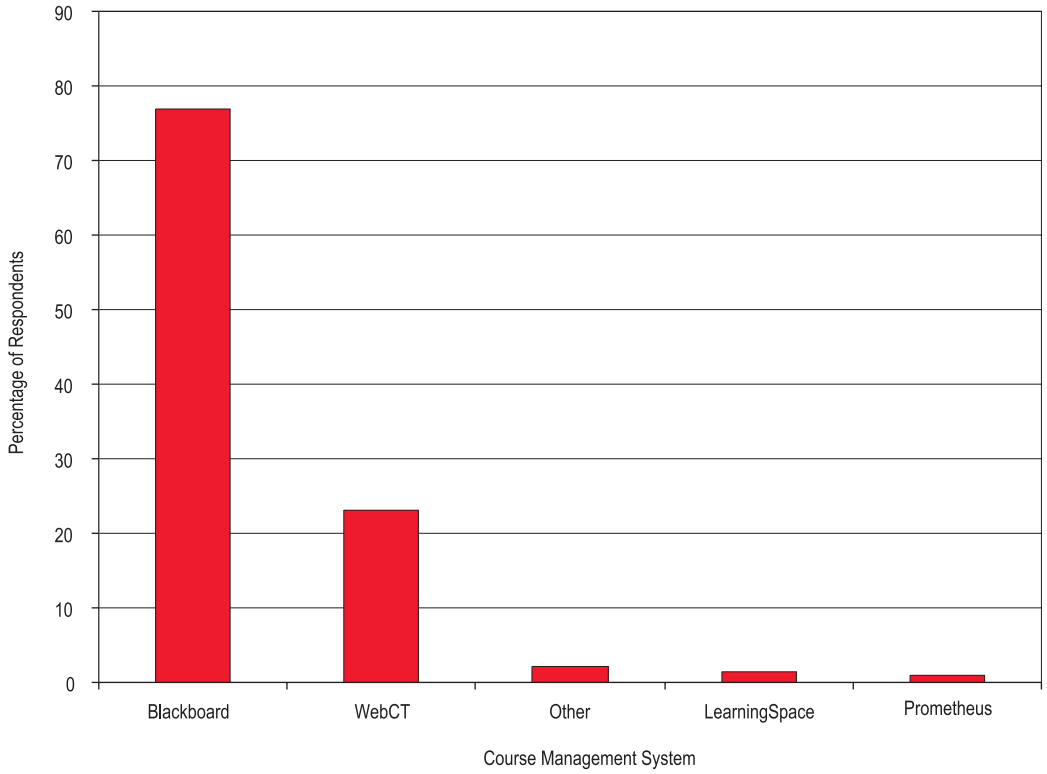


Figure 4-2. Course Management Systems Used by UWS Faculty, Fall 2002 (*N* = 573)

Prior to using their current CMS, roughly half of the survey sample (316 users) had used another CMS. Figure 4-3 shows the breakdown by product.

Of the UWS faculty members using course management systems, roughly a third have been using a CMS for a year or less. Figure 4-4 shows faculty CMS experience.

Figure 4-5 shows the breakdown of reported skill in using a CMS.

UWS faculty use course management systems mainly to enhance regularly scheduled face-to-face classes or to teach hybrid classes in which online work replaces part of the class time. Many also use course management systems to teach distance education classes. Further discussion of this issue continues in Chapter 7.

Endnote

1. See <http://its.wisconsin.edu/>.

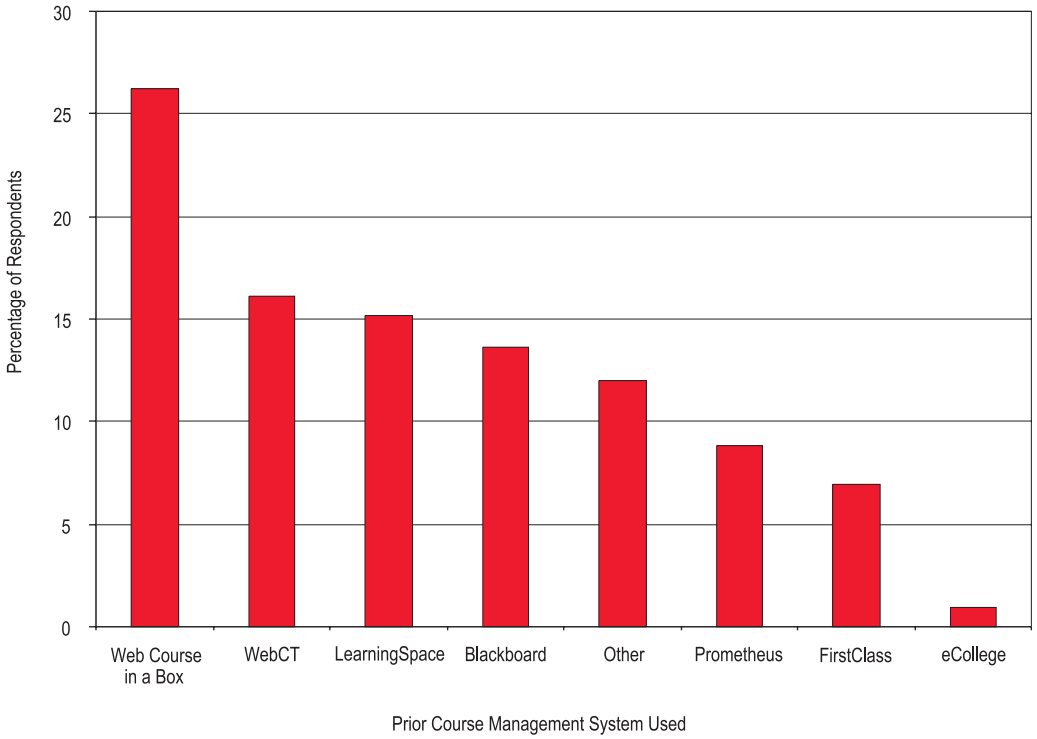


Figure 4-3. Prior CMS Products Used by UWS Faculty (*N* = 316)

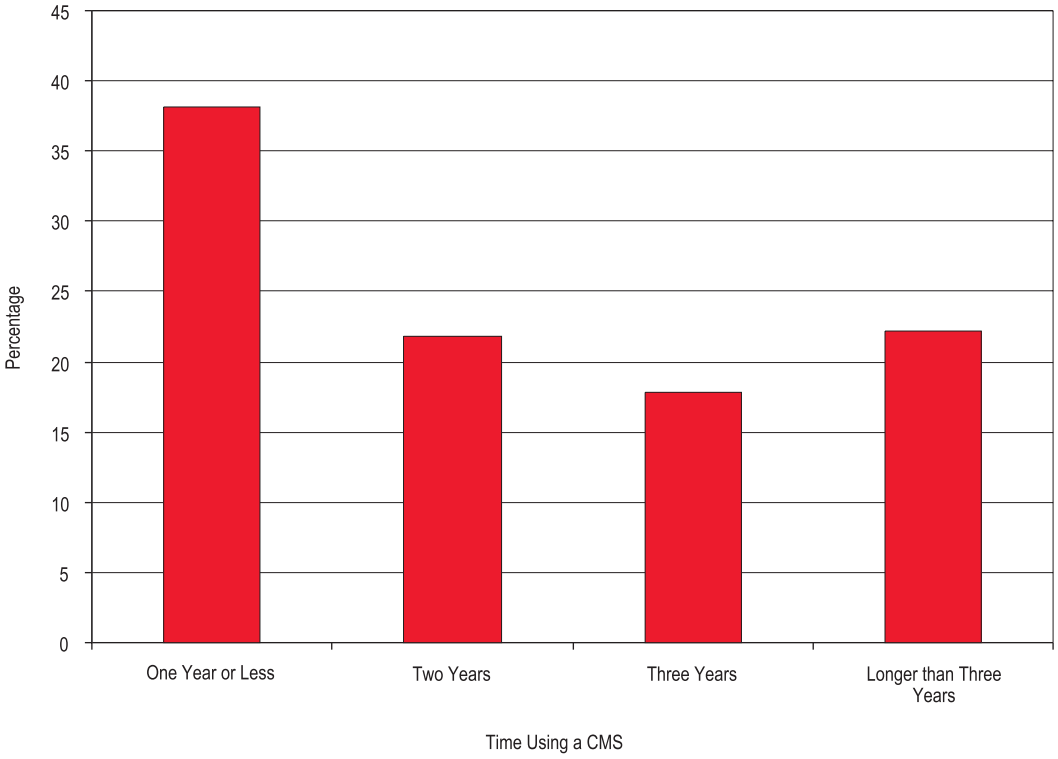


Figure 4-4. CMS Experience Among UWS Faculty (*N* = 575)

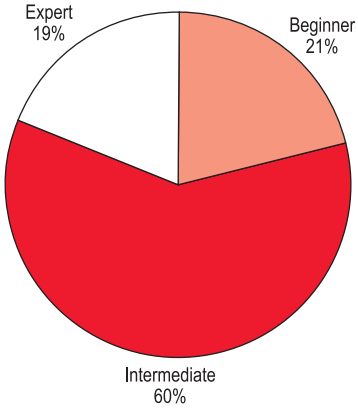


Figure 4-5. CMS Users' Self-Reported Skill Levels (*N* = 573)

5

Encouraging Faculty CMS Adoption

Identifying the factors that encourage faculty to start using technology in their teaching is a constant challenge facing university administrators. The challenge applies both to the use of technology in general and course management systems in particular. Administrators need to identify the factors that cause or contribute to faculty course management system (CMS) use so that they can better support the technology and educate faculty in its use.

This chapter discusses why faculty members choose to use course management systems. Some faculty members begin using a CMS when they teach an online class, or as part of their involvement in a CMS-based distance education program. Interviews with faculty and technology administrators around the University of Wisconsin System (UWS), however, reveal that most faculty members start using a CMS as a response to one or more of the following factors:

- they need to solve a pedagogical problem or challenge;
- CMS training becomes available;
- peers recommend it;
- departmental or administrative pressure/persuasion comes to bear;
- students request that such tools be used; or
- other factors arise, such as the need for cost savings or the desire to organize and manage course delivery.

Figure 5-1 shows faculty assessment of these factors' relative importance.

Addressing a Pedagogical Challenge

This factor's importance in faculty CMS adoption didn't surprise us. Researchers have hypothesized that faculty use CMS technology to address specific issues that arise in their teaching. However, the emphasis on this factor in the survey results is somewhat at odds with the qualitative information gleaned during interviews with faculty and support staff. In interviews, faculty stressed efficiency and time-management challenges as the major reasons for starting to use a CMS. The high score of pedagogical reasons in the online survey probably results from a conflation of pedagogical with more practical issues, such as hosting student discussions, posting grades and quizzes, and providing additional course materials. Faculty mentioned that they used a CMS to

- enable online discussion or increase communication with students,
- post grades online or do online quizzing or testing,

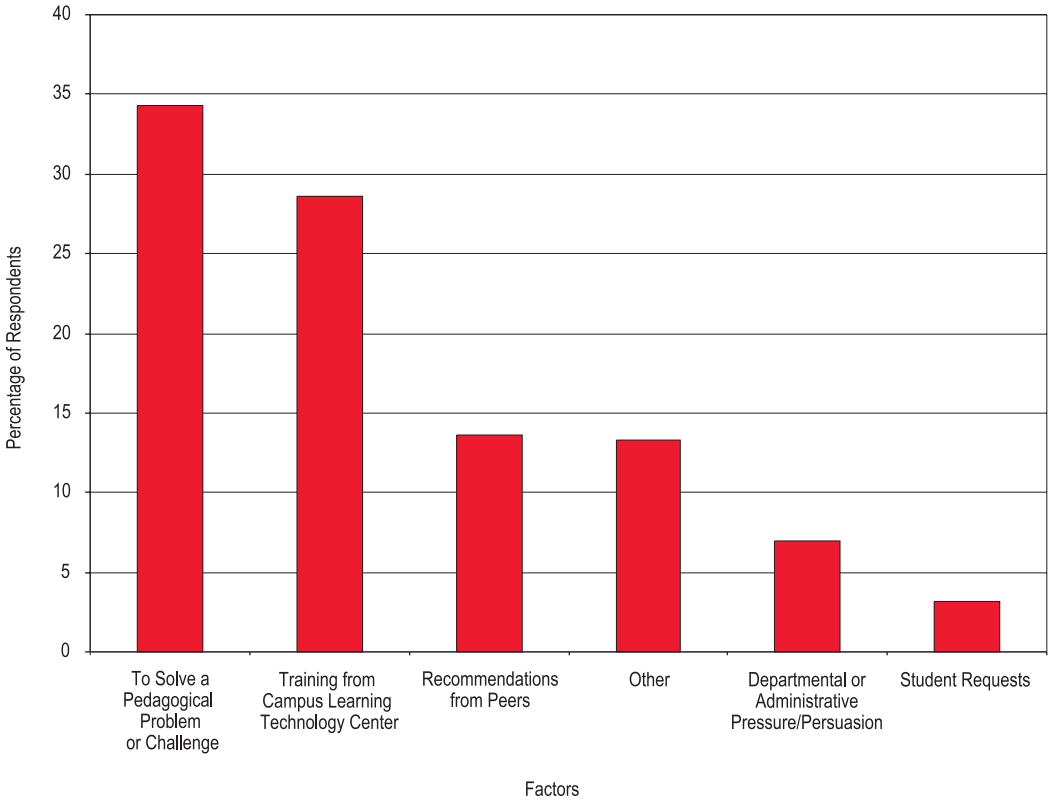


Figure 5-1. UWS Faculty's Stated Reasons for CMS Adoption (*N* = 574)

- provide students with additional course materials, and
- address more complex pedagogical issues such as different learning styles among students.

Facilitating Communication with and Among Students

Faculty often stated that they started using a CMS to increase communication with and among students in their courses. Faculty members were especially interested in how they could use the CMS discussion tool to incorporate online discussions into their classes. Such a tool was not easily available to them outside of a CMS, so the desire for access to a discussion board became a factor in driving faculty to use a CMS. Similarly, although many campuses provide listservs or e-mail distribution lists of students by class, the CMS provided faculty with an especially convenient way to reach an entire class via e-mail.[1] The CMS e-mail function is frequently more convenient than a distribution list because it operates from within the CMS application.

Gradebooks and Assessment Tools

The need for an online and secure gradebook has been a significant driving factor in CMS adoption throughout UWS. As awareness about federal student privacy regulations increases, there is a strong push for faculty to deliver grades to students in a secure and confidential environment. Faculty increasingly see course management systems and their gradebook tools as an easy way to achieve this,[2] so they're taking it upon themselves to use this tool or are being encouraged by administrators to do so.

Faculty are also attracted to the CMS's online gradebook because using it saves time for both students and faculty. Faculty

members recognize that such tools help them manage some of the administrative tasks associated with running a class. This is particularly valuable in large classes, where course management systems are used heavily.

The gradebook is not only a management tool; it also serves a pedagogical purpose. Many faculty described the gradebook as increasing the level of transparency in their class. Having their grades always available lets students monitor their progress and thus become, in a sense, more active in the class. As Laura Fingerson in the UW–Milwaukee Department of Sociology put it, "Having student grades up there has improved my relationships with students. There is no 'secret gradebook'; [it] has improved transparency."

As Figure 5-2 shows, most faculty believe the gradebook is an important CMS tool. However, faculty satisfaction with current gradebook tools is much weaker. While 68 percent of faculty regard the gradebook as important, only 13 percent were "very satisfied" and found the gradebook to be excellent.

Overall, a slim majority (51 percent) of online survey respondents expressed satisfaction with the gradebook. In interviews, however, faculty complained extensively about CMS gradebook tools. They frequently had to spend more time than they would have liked using the gradebook, and they found its functions limited. Figure 5-3 illustrates faculty satisfaction with the gradebook tool.

Faculty expressed particular frustration with the gradebook's inability to calculate

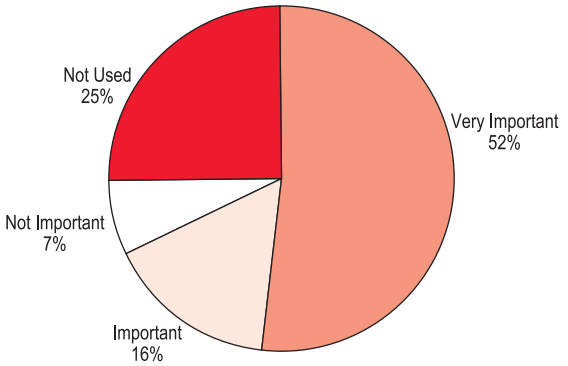


Figure 5-2. Faculty Rating of the CMS Gradebook's Importance (*N* = 548)

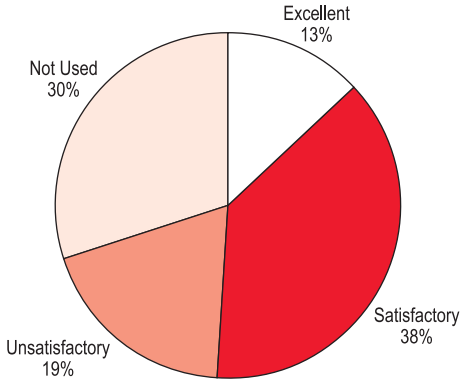


Figure 5-3. Faculty Satisfaction with the CMS Gradebook Feature (*N* = 533)

grades (especially grade weighting) and handle class enrollment. Enrollment-related problems seemed exacerbated when faculty used a CMS integrated with a student information system.

The need for an online quizzing or assessment tool has also driven some faculty to adopt a CMS, according to Kayt Sunwood of the UW–Superior Faculty Development Center. As with the gradebook, the assessment tools' lack of functionality, difficulty of use, and inflexibility caused the faculty enormous frustration. Figure 5-4 illustrates the importance faculty attach to assessment tools, and Figure 5-5 indicates their satisfaction with them.

Faculty members were frustrated because the assessment tools were time consuming and did not allow for data portability across course management systems or between course management systems and other applications, such as word processing programs. CMS upgrades seemed to cause particular problems in use of the assessment tools. Numerous faculty described how they lost many of their quizzes and test banks in the upgrade process and had to manually reenter them. This resulted in significant time expenditures and growing levels of frustration with the CMS.

Despite these problems, however, some faculty members continue to look favorably on CMS adoption because of the assessment capabilities it offers. A need to contain the costs of photocopying exams is also a frequent motivating factor.

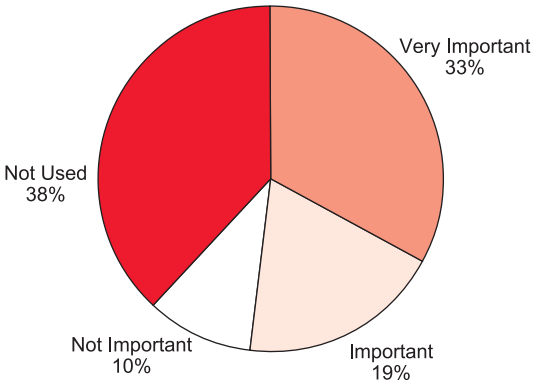


Figure 5-4. Faculty Rating of CMS Assessment Tools' Importance (*N* = 534)

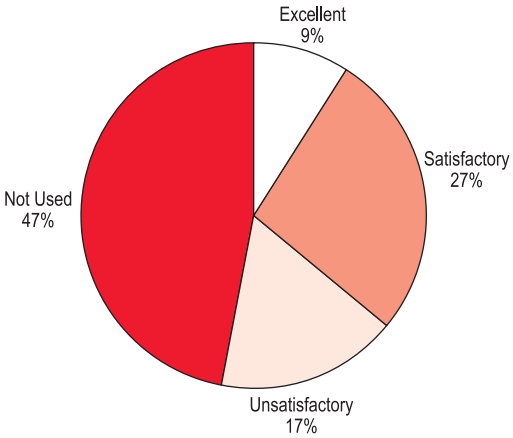


Figure 5-5. Faculty Satisfaction with CMS Assessment Tools (*N* = 534)

Providing Additional Course Materials

Content management and presentation is by far the most compelling reason for faculty CMS use. Faculty frequently cited the desire to easily provide materials to students over and above those provided in class. Others said they wanted to provide students with actual lecture materials so that they might more easily follow along in class or review what was discussed in the face-to-face setting.

Addressing Other Pedagogical Issues

Apart from the reasons described above, few faculty chose to use a CMS to resolve other pedagogical or teaching problems.[3] Numerous support personnel pointed out that some faculty who ask them to help resolve a technical problem are, in fact, asking for assistance with a pedagogical problem for which a CMS might provide a solution. Where faculty did start using a CMS because of a specific pedagogical problem, their reasons were quite varied. For example, LeeAnn Garrison, chair of the Department of Visual Art at UW–Milwaukee, started requiring her faculty to use a CMS to connect the more theoretical "foundations of art" courses with the more practical, hands-on studio courses. Using a CMS during studio courses let faculty incorporate content from the foundational courses, so that they could refer students back to the images and art they learned about earlier.

However, faculty generally did not speak much about the pedagogical challenges driving them to adopt and use a CMS. Most faculty members seemed to use a CMS because it offered practical time- and content-management solutions.

Training Availability

Good, accessible training was a significant factor driving faculty to start using a CMS, according to 29 percent of the faculty surveyed. Although some self-taught faculty members reported starting to use a CMS on their own initiative, most began using it as a result of the efforts of the UWS Learning Technology Centers (or their equivalent within their college). Chapter 6 discusses in more detail the role training plays in CMS adoption.

Peer Recommendations

Peer recommendations are a powerful factor in persuading faculty to start using a CMS. More than 15 percent of the online survey sample cited this as the primary reason they began to use the technology. In qualitative interviews, however, faculty cited this factor even more frequently to explain why they started to use a CMS. Faculty learned about potential CMS uses and advantages from a wide range of colleagues, not just those in their immediate department. Although they might not always be the primary reason faculty start using a CMS, peer recommendations do significantly influence faculty adoption and use of the technology.

Departmental or Administrative Pressure

In the online survey, relatively few faculty members (40) listed departmental or administrative pressure as an important factor driving their CMS use. But again, in interviews, faculty and administrators frequently referred to this factor as playing a large role in faculty adoption.[4] CMS adoption rates tend to be far higher where this is an administrative priority. Administrators at the level of dean and department chair also play a strong role in shaping faculty CMS adoption. In interviews, many faculty ascribed their initial CMS adoption to a department chair's or dean's influence.

Examples from around UWS help shed some light on how administrators can shape CMS adoption and use. Encouraging fac-

ulty to use technology in their teaching has long been a high priority for UW–Colleges. Early on, senior administrators decided to promote and facilitate faculty CMS use whenever appropriate. Administrators used various strategies to encourage faculty CMS adoption. In some cases, they offered stipends to faculty as incentives. The administration also offered a wide range of training, often at a distance, using programs such as Placeware. Among its emphases, this training showed faculty various CMS pedagogical uses by having those already using a CMS showcase what they had done.

Also, in fall 2002, UW–Colleges created a course shell for every course offered and informed faculty members of their availability and that they were free to use them or not. This strategy has the potential to backfire, but it appears to have worked for UW–Colleges. In a recent audit, technology administrators found that fully one-third of courses were making significant use of the CMS course shell. UW–Colleges faculty viewed the strategy positively. They regarded the automatic creation of a course on the CMS as a convenience and as an incentive for them to use a CMS where they might not have otherwise.

Department administrators can also have a strong positive effect on faculty CMS use. The UW–Milwaukee School of Nursing provides an example of a successful departmental initiative to promote CMS use. Senior department administrators encouraged (although never required) faculty to adopt a CMS in their teaching and even took courses from the campus Learning Technology Center themselves. The dean of the School of Nursing was among the first to use a CMS in her teaching, and she constantly stressed to her faculty how easy it was to learn and use. This sent a strong message to the faculty and resulted in the widespread and quite effective adoption of the technology, according to Mary Wierenga in the UW–Milwaukee School of Nursing.

Administrative initiatives to encourage faculty CMS use can backfire if poorly handled. In some UWS departments, administrators decreed that their faculty had to use a CMS in each of their courses. In nearly all cases, this resulted in widespread faculty resentment, and faculty soon stopped using the technology.[5] Enforced (and consequently halfhearted) CMS use also resulted in serious student dissatisfaction. In one department, students complained in departmental meetings about the faculty's sporadic CMS use. Students said they never knew when they should be checking the CMS for updates and felt that much of the activity structured within the CMS was busy work.

Student Requests

Faculty consistently rated student requests as a minor factor driving their CMS adoption. There is a widespread misconception that students are enthusiastic about course management systems and are a large factor driving their use. In interviews, faculty and administrators consistently argued that this was not the case, and this is reflected in the survey results shown in Figure 5-1 above.

Other Reasons

In both the survey and the interviews, faculty members gave several other reasons for starting to use a CMS (Figure 5-6). These include

- the need to provide distance education (although most UWS use is for courses that also include face-to-face sessions);
- faculty initiative (one faculty member said, "No one cares what I do") and faculty desire to teach with technology as well as to advance their careers; and
- grants from the Learning Technology Center or other sources (some faculty

started using a CMS because doing so was specified in a grant they had been awarded).

Relatively few faculty members used a CMS for the security it offered. The capacity to post materials and conduct activities in a password-protected environment was not a significant factor driving faculty to use course management systems. This was clear from both the qualitative interviews and the online survey.

This chapter demonstrates that faculty members adopt course management systems for many different reasons, but especially for the pedagogical and time-saving functions they offer. Peer pressure and departmental or administrative persuasion are also important incentives. Chapter 6 will discuss how these factors are creating a powerful momentum, with faculty members starting to use the technology at ever-increasing rates.

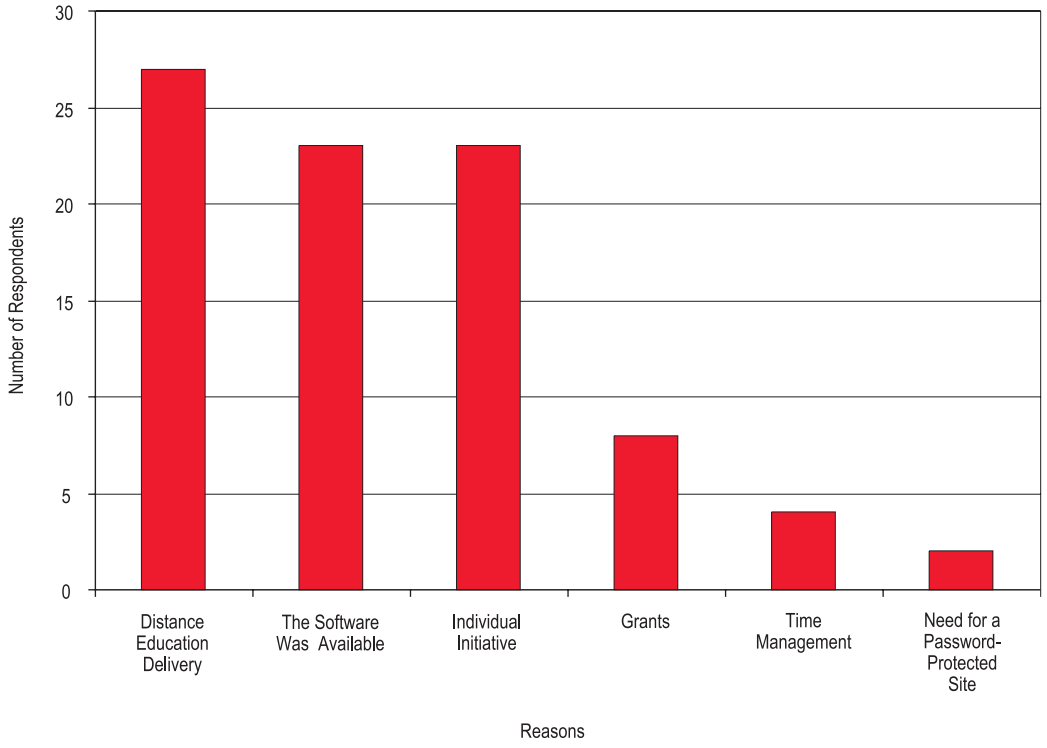


Figure 5-6. Other Stated Reasons for Faculty CMS Adoption (*N* = 87)

Endnotes

1. The fact that most students don't use their university-assigned e-mail addresses is a recurring problem and affects even CMS use.
2. The Federal Education Rights and Privacy Act (FERPA) regulations require that faculty protect the confidentiality of grades as part of each student's record. Some faculty find that they must follow elaborate processes if they are posting student grades outside of a CMS. Procedures vary but are often cumbersome. Scott Cooper of the UW–La Crosse biology department referred to these procedures as "a real hassle."
3. Many faculty members, through their CMS use, find themselves exercising a form of "accidental pedagogy."
4. In interviews, Taggert Brooks of the UW–La Crosse economics department and other faculty mentioned that administrators and department chairs encouraged technology use in general and CMS use in particular in response to pressure or encouragement from accreditation bodies.
5. Where faculty members don't see the role technology plays in their course, their CMS use will likely be limited. Several faculty members interviewed had started and then stopped using a CMS. In many of these cases, the faculty member had been told or encouraged by the dean or department chair to use a CMS but hadn't restructured the course to effectively use the technology. Students frequently complained to the faculty member about such CMS uses, further reducing the likelihood they would continue using the software.

6
Extent of CMS Use

This chapter discusses the extent of course management system (CMS) use within the University of Wisconsin System (UWS), how faculty CMS adoption has changed over time, and what factors contribute to changes in faculty adoption and use rates. It also describes which CMS features and tools faculty use most heavily and what factors shape those choices.

Overall CMS Use at the University of Wisconsin

CMS use among UWS faculty and staff is extensive, although it varies considerably by campus. Table 6-1 shows how many courses[1] used a CMS in fall 2002.

Tools and Features Used Most Often

Although overall CMS use is extensive and growing rapidly, most CMS use concentrates on a few specific tools. Faculty members typically start using the CMS to post syllabi and static content. Use of communication tools such as discussion boards, the gradebook, and quiz tools is much less prevalent. This becomes apparent in the breakdown of tool use[2] within the CMS at UW–Milwaukee in spring 2002 (Figure 6-1).

We see a similar distribution at UW–Stout over a two-semester period (Figure 6-2).

At UW–Whitewater, we measured use over five semesters (Figure 6-3).

When we group CMS tools into four functional categories[3]—content tools, communication tools, gradebook, and quiz tools—the emphasis on content becomes clearer, as Figure 6-4 shows.

The emphasis on content presentation and organization also shows in data collected in the online UWS faculty survey. Figure 6-5 shows how faculty ranked the different tools' importance within a CMS.

Analyzing CMS Tool Traffic Patterns

Faculty members use CMS tools primarily to organize and deliver static content. An analysis of CMS traffic (that is, how often faculty and students access certain CMS tools) sheds light on which tools they rely upon most heavily. Using Analog[4] analysis software, we were able to produce reports based on data contained in the Web server logs. The reports reflect two different kinds of traffic: use based on initial entry point (access reports) and overall use (usage reports).

To get an overall picture of CMS traffic, researchers analyzed the usage reports for the three campuses[5] constituting the most extensive users of one particular CMS over two semesters, fall 2001 and spring 2002.

Table 6-1. Number of UWS Courses Using a CMS, Fall 2002

UW Campus	Number of Courses
Madison	1,667
Milwaukee	553
Colleges	310
Eau Claire	234
Green Bay	70
La Crosse	363
Oshkosh	221
Parkside	64
Platteville	179
River Falls	278
Stevens Point	96
Stout	481
Superior	46
Whitewater	558
Extension	40
Total	**5,160**

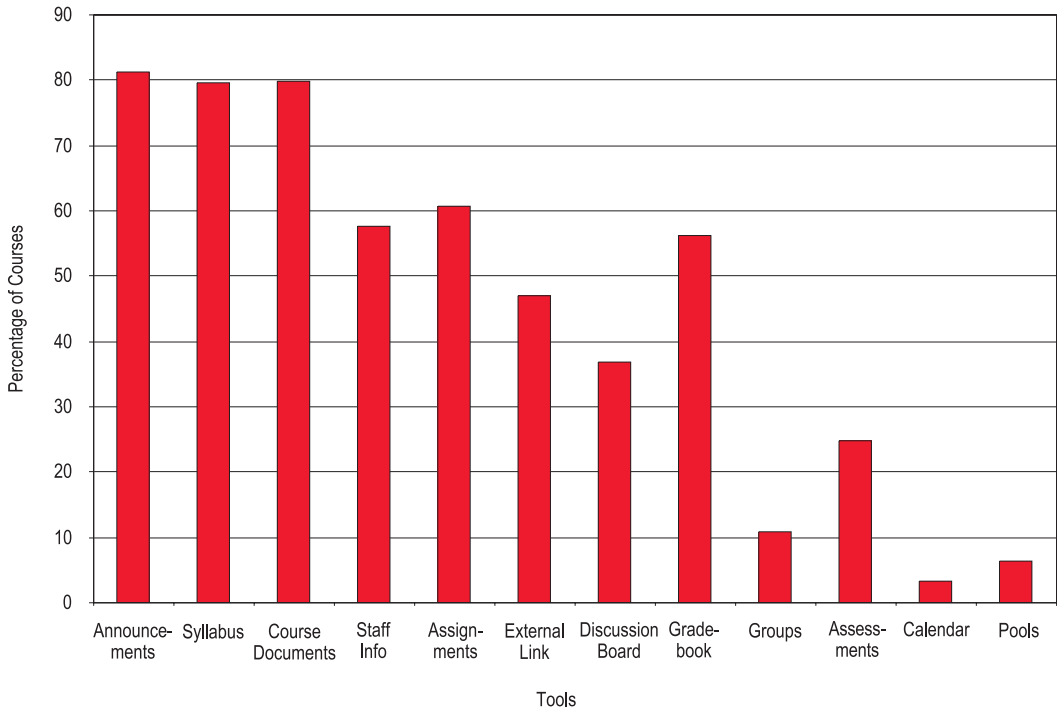


Figure 6-1. CMS Tool Use, UW–Milwaukee, Spring 2002 (*N* = 342)

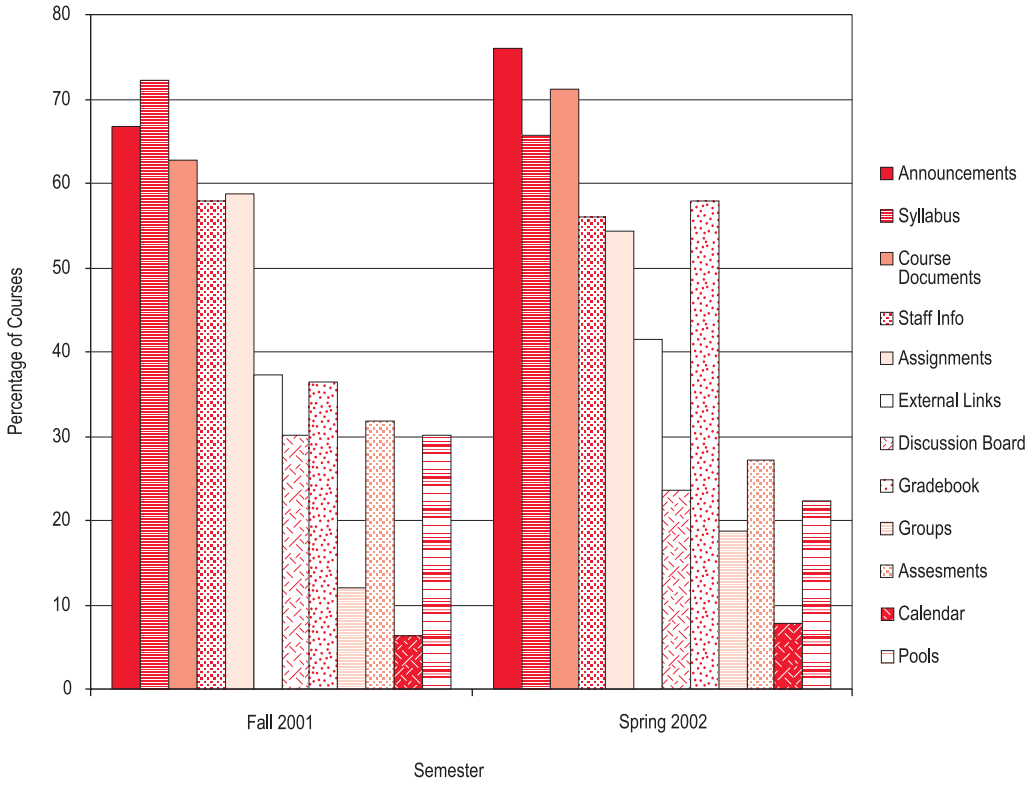


Figure 6-2. CMS Tool Use, UW–Stout, Fall 2001 (*N* = 126) and Spring 2002 (*N* = 166)

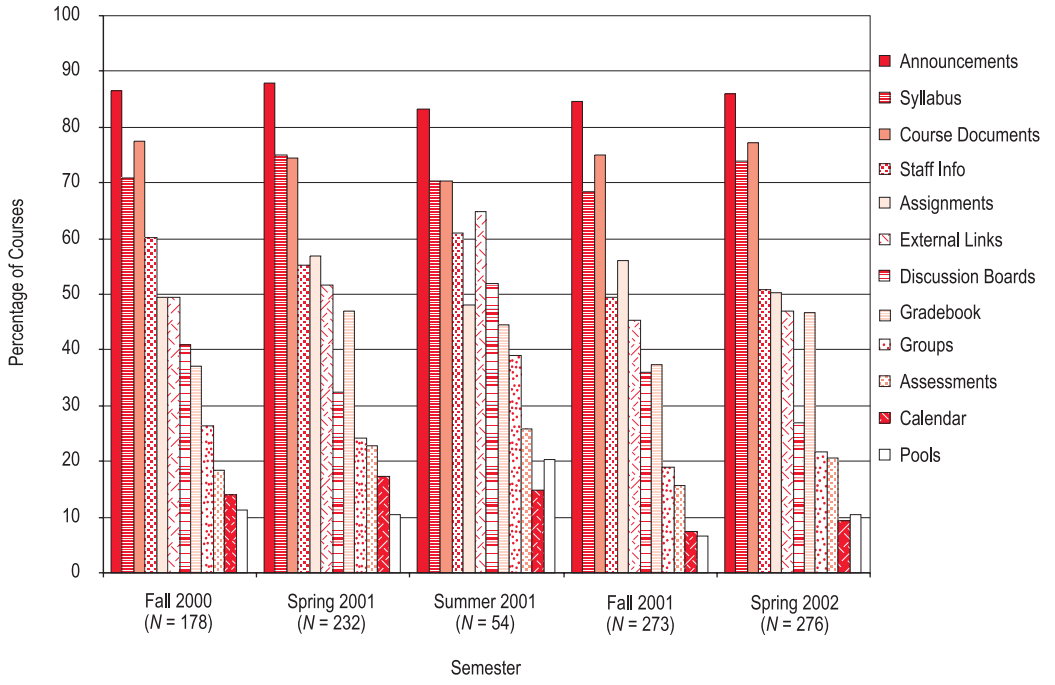


Figure 6-3. CMS Tool Use, UW–Whitewater, Fall 2000–Spring 2002

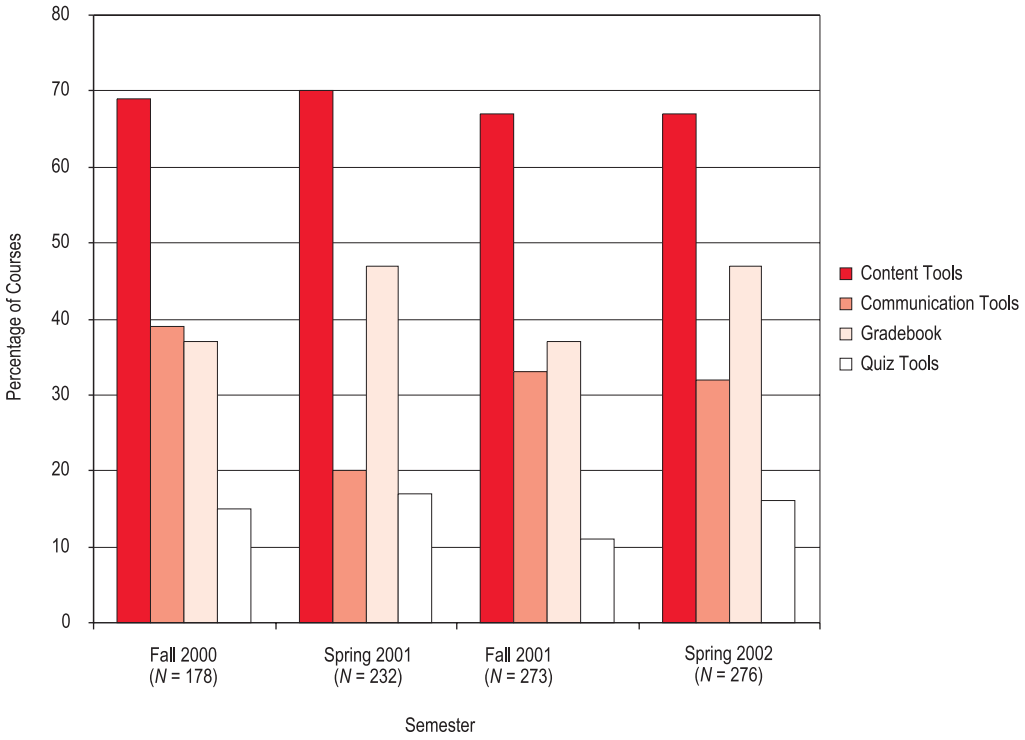


Figure 6-4. CMS Tool Use by Functional Category, UW–Whitewater, Fall 2000–Spring 2002

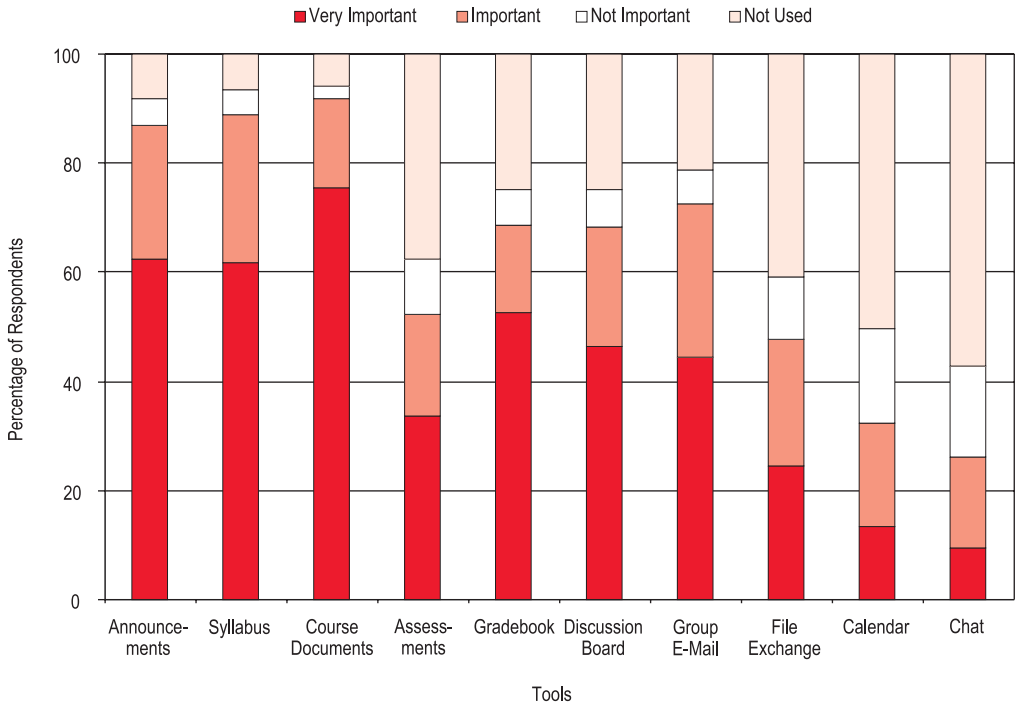


Figure 6-5. UWS Faculty Ranking of CMS Tools' Importance (*N* = 540)

The usage logs show which CMS tools faculty and students used, and to what extent. Table 6-2 reflects the total number of page requests, or "hits," within each tool across all three campuses over both semesters, expressed as actual numbers and as a percentage of overall use.

Table 6-3 itemizes how students use the CMS.

Table 6-4 describes the traffic generated by faculty's CMS tool use.

We can draw several conclusions from this data. First, although content tools receive heavier use than other types, analysis

Table 6-2. Traffic Analysis of CMS Tool Use in Three Campus Instances

Tool	Number of Page Requests	Percentage of Total Use
Student Quiz	6,903,284	69.65
Student Discussions	1,739,599	17.55
Faculty Quiz	382,997	3.86
Student Content	245,836	2.48
Student Calendar	195,756	1.98
Student E-Mail	157,406	1.59
Student Assignment	75,522	0.76
Course Listing	53,909	0.54
Forgot Password	46,408	0.47
Student Syllabus	24,588	0.25
Faculty Help	12,430	0.13
Log-In Hint	12,139	0.12
Student Help	11,409	0.12
Student Chat	11,135	0.11
Administer Course	10,816	0.11
Faculty Assignments	10,192	0.10
Change Password	9,650	0.10
Faculty Syllabus	6,184	0.06
Faculty Discussion	2,286	0.02
Total	**9,911,546**	**100.00**

Table 6-3. Traffic Analysis of Students' CMS Tool Use

Tools Used Only By Students	Number of Page Requests	Percentage of Total Use
Student Quiz	6,903,284	73.72
Student Discussion	1,739,599	18.58
Student Content	245,836	2.63
Student Calendar	195,756	2.09
Student E-Mail	157,406	1.68
Student Assignment	75,522	0.81
Student Syllabus	24,588	0.26
Student Help	11,409	0.12
Student Chat	11,135	0.12
Total	**9,364,535**	**100.00**

Table 6-4. Traffic Analysis of Faculty's CMS Tool Use

Tools Used Only By Faculty	Number of Page Requests	Percentage of Total Use
Faculty Quiz	382,997	92.49
Faculty Help	12,430	3.00
Faculty Assignments	10,192	2.46
Faculty Syllabus	6,184	1.49
Faculty Discussion	2,286	0.55
Total	**414,089**	**100.00**

of the traffic generated by each kind of tool reflects the roles that quizzing (for students and faculty) and discussions (for students) play in CMS use. To some extent, these numbers reflect the fact that using a discussion board or a quizzing tool generates far more page requests than simply posting or using a syllabus or lecture notes. Nonetheless, usage log analysis demonstrates that faculty and students both use the quiz tool heavily. The discrepancy between faculty and student use of discussion boards was somewhat surprising.

As the survey data demonstrated, overall CMS use is growing rapidly. Use is skewed toward content provision in the form of syllabi, course documents, staff information, and announcements. Although fewer faculty use discussion and quizzing tools, these tools account for the bulk of actual traffic within a CMS.

What Encourages Increased Use of CMS?

Most faculty said their CMS use has increased over time (Figure 6-6).

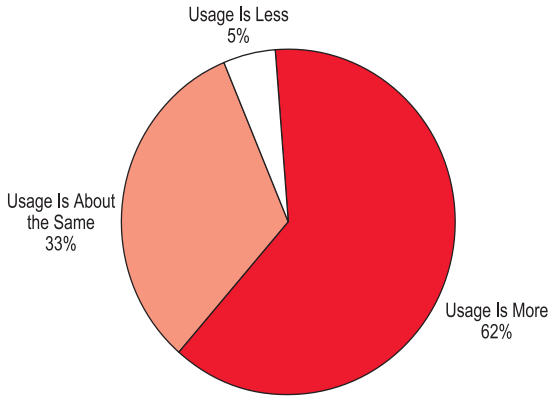


Figure 6-6. Changes in Faculty CMS Use (*N* = 570)

Several factors emerged as drivers for encouraging faculty to use a CMS more often or more extensively:

- Faculty members became more aware of how the CMS might be useful in teaching or in their departments or organizations.
- Familiarity and comfort with the software increased as they began to use the CMS and became accustomed to it.
- Faculty who were already using a CMS received more training, often in the use of specific tools such as discussion boards or quiz tools.
- More features became available within the CMS as the products improved and were upgraded.
- Students began to request that faculty use the tools more often or more extensively.
- Department chairs or other administrators requested that faculty make greater use of a CMS.
- Distance education offerings that relied on CMS use increased.
- Faculty and staff wanted to save money and paper by cutting down on the number of photocopies distributed to students.

Figure 6-7, which summarizes results of survey questions asking faculty what caused them to increase their CMS use, shows faculty's assessment of these factors' relative importance. Figure 6-8 shows a breakout of the "Other" category in Figure 6-7.

Awareness of Potential CMS Uses

As faculty members use a CMS, they begin to see further uses for the software. This might stem from additional training, but discussions with faculty also indicated that even absent any training from the campus Learning Technology Center, they would frequently see new uses for the CMS and try them out. Numerous respondents reported that they had started using a CMS quite cautiously, perhaps by putting up a syllabus, some announcements, and maybe some content. As they continued to use the software, they began to try new things, such as the assessment tool, gradebook, or discussion boards. In fact, conversations with faculty and CMS support staff suggest that many faculty follow a fairly typical path in their CMS use as their experience and comfort with the CMS begins to increase.

They start using the CMS content tools by posting a syllabus, course documents, assignments, staff information, and announcements. This provides a structure for the course and lets faculty become familiar with the process of populating course materials. Then they use the quiz tools (including question pools) and the gradebook,

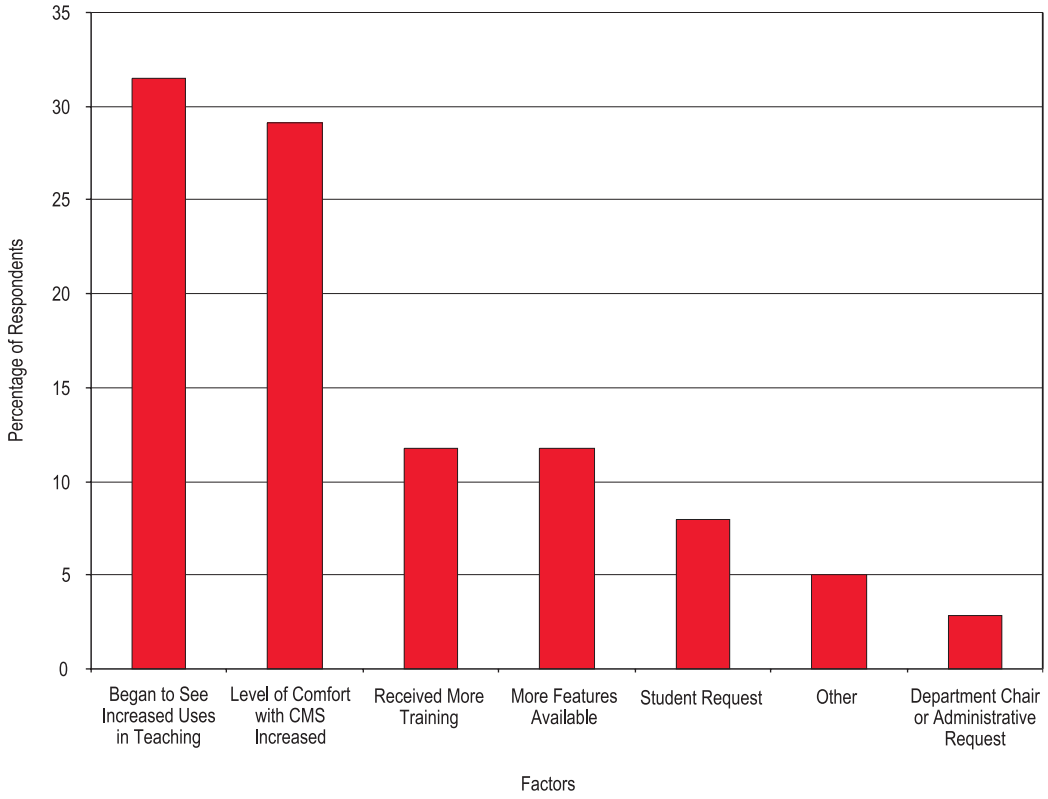


Figure 6-7. Factors Contributing to Increased CMS Use among Faculty (*N* = 362)

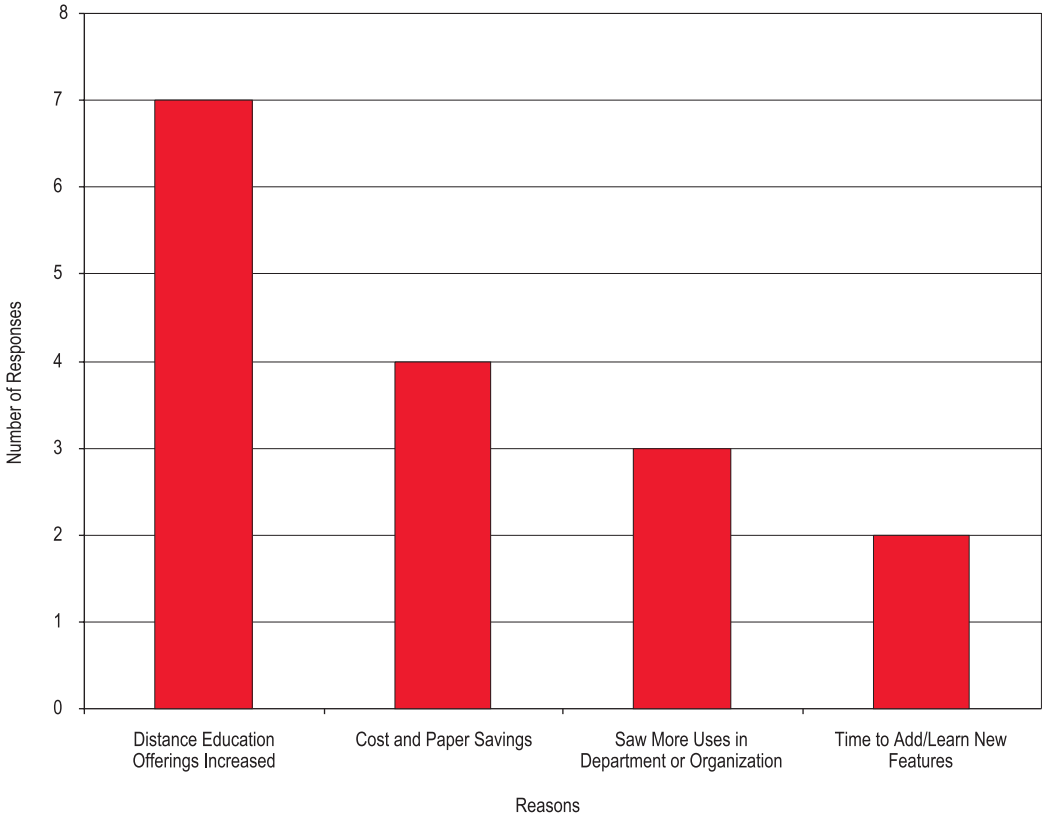


Figure 6-8. Other Reasons for Increased CMS Use among Faculty (*N* = 16)

discussion boards, groups and grouping tools, file-sharing tools (such as the digital drop box), and other tools such as the calendar, whiteboards, chat, and task lists.

Occasionally, faculty will reduce their CMS use. Sometimes this occurs in response to the frustrations of using the software, sometimes because they no longer like working in the CMS's course-centric environment, and sometimes because they want to share aspects of their course with an audience beyond the students registered in the course. (Course management systems are designed to grant access only to those registered.)

Familiarity with the CMS

As faculty become more comfortable and agile with the CMS, they tend to use it more extensively. The more they use it, the more they rely upon it. This finding, which emerged from both the survey and the interviews, partially explains faculty reluctance to change from one CMS to another.

Training

In their responses to the online survey, 12 percent of faculty said their CMS use increased once they received training. This percentage is lower than might be expected when compared with the qualitative data. In interviews, many faculty spoke of how they had been encouraged and inspired to use new tools within the CMS or to use it in different kinds of classes (for example, in smaller, advanced classes as well as in the large freshman classes in which they were already using it). Bill Cerbin, assistant to the provost at UW–La Crosse, suggested that faculty don't always see the need for technology until they attend presentations or training and learn how to apply it. During our study the need became clear for training to focus more on the pedagogical applications of the course management systems and less on the nuts and bolts of setting up courses. However, CMS administrators and staff at campus learning technology centers report mixed results on their efforts to attract large numbers of faculty to training advertised in terms of pedagogical CMS applications.

Interestingly, faculty appear to learn as much from their peers in this training as they do from the trainers. Researchers interviewed UW–Milwaukee faculty who had participated in training as part of their preparation for teaching small freshman seminars. Several faculty members remarked that the training helped them increase the number of tools they used within a CMS. They said that because they were in the natural sciences, for example, it had never occurred to them to use online discussions in their classes. Thanks to the training they received and to conversations they had with humanities faculty at the training sessions, they began to see the pedagogical value of using online discussions in their discipline. Similarly, UW–Colleges staff found that one of the most effective training strategies is to ask faculty members to demonstrate how they have used a CMS in an actual class. This encourages other faculty to try new tools and techniques, according to Dick Cleek, chief information officer for UW–Colleges, and Pat Fellows of the UW–Colleges Learning Technology Center.

One striking factor is the extent to which faculty CMS use reflects the priorities and strengths of the campus Learning Technology Center. Jay Caulfield of the UW–Milwaukee Learning Technology Center explained that "faculty use of the course management system reflects the preferences of the staff … for example, I like groups, so we end up seeing a lot of group work by faculty in [the CMS].… Alan Aycock from UW–Milwaukee Learning Technology Center likes bulletin boards, so we see a lot of

that too. It's partly a matter of us steering faculty to those sorts of things, but also our workshops on these issues tend to be a whole lot better…. If the Learning Technology Center trainers like it [the CMS tool], they will make it look cool."

Faculty CMS use reflects not only Learning Technology Center staff preferences but also the path that individual faculty members take in learning about the technology and setting up a course site. Whether and how the faculty use a CMS is strongly shaped by what they felt needed addressing, whom they spoke to, and where they obtained help in getting access to a CMS, said Alan Wolf of the UW–Madison Division of Information Technology and Center for Biology Education. Thus, use can reflect the priorities of campuses, learning technology centers, departments, and colleges, or some combination of these.

Feature Additions and Upgrades

Faculty have responded well to CMS upgrades and improvements, particularly those made to improve ease of use and enhance the functionality of tools such as the gradebook. It will be interesting to see how faculty respond to the new generation of course management systems currently being released and how this affects use. However, while faculty are responsive to improvements, they are also leery of changes to course management systems, because migration from one product version to another has frequently meant more work for them.

Student Requests

Surprisingly, student requests do not play a major role in increasing faculty CMS use. There is a widespread perception that students appreciate faculty CMS use (as one form of technology use in higher education) and encourage and even demand that faculty use these systems. While students certainly appreciate the increased access to course materials, most faculty report that students are far from enthusiastic about CMS use. As the survey data shows, few faculty (8 percent) increase their CMS use in response to student requests. Barry Cameron of the UW–Milwaukee geosciences department said students had asked him about the CMS site for their class because every other class had one.

More often, though, faculty spoke of increasing their use of a CMS as an indirect response to student needs. As course management systems gain wider use within the university, students become increasingly familiar with the software. It thus becomes convenient for faculty to provide content and activities through the CMS without issuing special passwords or providing new training. In general, students are not driving the process and, in fact, discourage faculty from using course management systems, according to Claudia Barretto of the UW–Milwaukee biological sciences department and Cheryl Frye and Catherine Roraff of the UW–La Crosse Department of Computer Science.

Administrative Requests

In addition to compelling faculty to start using course management systems, departmental or administrative pressure or persuasion induces faculty to use the CMS more extensively or more often. Administrative efforts to increase CMS use vary in their effectiveness. Faculty respond better to leadership by example and efforts to facilitate their use of the software.

Increased Distance Education Offerings

Many distance education courses rely on CMS use. Even those that are not offered primarily online—for example, those that

use compressed video or interactive television—sometimes use a CMS to offer students access to content, discussions, grades, and online assessment. The UWS, like many higher education institutions, has been steadily increasing its distance education offerings to maximize access to higher education within the state and beyond. As distance education offerings have increased, so has faculty CMS use.

CMS Use for Cost Reduction

This factor is far more important than the quantitative survey results suggest. From faculty interviews, we learned that a desire to reduce costs drives some faculty to start using a CMS and drives others to increase their use. Faculty provide content such as documents and quizzes to students online to save on departmental photocopying costs. Essentially, this means that printing and reproduction costs are passed on either to the students themselves or to the campus computer facilities where students can print without charge.[6] But Cheryl Frye and Catherine Roraff of the UW–La Crosse computer science department note that in some courses the situation appears to have gotten out of control, with students being expected to print out (or read online) many hundreds of pages per course. There are reports of growing resistance to this on several UW campuses, and in some instances administrators have directed faculty not to require students to do extensive amounts of printing.

Why Does Faculty CMS Use Decline?

Most faculty indicated that their CMS use had increased. However, a few faculty reported that their use had stayed the same or decreased. Some faculty stop using a CMS altogether after trying it for a while. Why does this happen? Several factors account for this:

- Course management systems prove to be too time consuming for many faculty members to use.
- Many faculty members find course management systems inflexible.
- Students find course management systems difficult to use. In response, faculty use them less in their teaching.
- Faculty members are concerned about product reliability, whether or not the products will continue to be supported, and what CMS product changes will mean for them.
- Some faculty find course management systems difficult to use.
- Many faculty members have problems using a CMS because the technology is unsuited to their discipline or cannot accommodate the tools they need for teaching in their discipline. This was particularly the case with mathematics and science subjects.
- Numerous faculty found course management systems to be unsuited to their teaching goals.

Figure 6-9 illustrates the reasons faculty offer for using a CMS less often or less extensively.

Time Requirements

The survey reflects many faculty members' belief that using a CMS is too time consuming, which is a key reason why more faculty do not use a CMS extensively.[7] In interviews, faculty members were quite eloquent on this issue. Those for whom this was a concern felt that all the various CMS parts required too much time, but the gradebook and quiz tool received the largest number of complaints.

Many respondents also spoke about the time spent using a CMS, focusing on two different aspects. 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

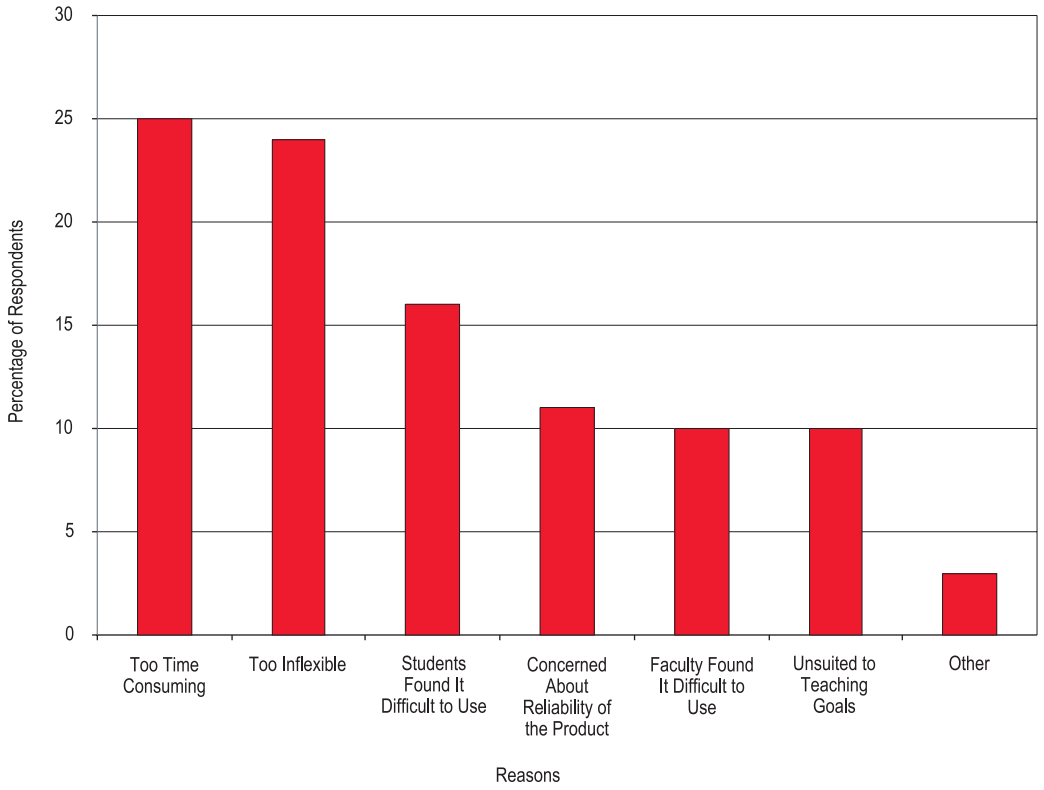


Figure 6-9. Factors in Decreased Faculty CMS Use (*N* = 135)

the necessary resources. Next, they must load the materials into the CMS itself. Many individuals spoke in positive terms about this process, stating that it made them better organized and actually helped them become better teachers. Importantly, though, faculty found the time required to load materials into the CMS to be onerous, and this was the time expenditure they strongly resented. Tom Smith of the UW–Madison Department of Engineering Professional Development and Engineering Outreach described the distinction between the two types of time expenditure as being "like night and day."

CMS Inflexibility

Many faculty became frustrated using a CMS because of its inflexibility. Their complaints fall into three areas. First, the software's highly structured nature limits faculty creativity. This structure is, in many respects, a double-edged sword: it helps faculty manage courses and instruction, but it also becomes highly constraining and even discourages some faculty from using the software. Regan Gurung of the Department of Human Development/Psychology at UW–Green Bay said the inflexibility of the structure gets in the way of good pedagogy. Other faculty simply get frustrated at the lack of customization capabilities in many course management systems. As Ann Zarinia, Department of Educational Foundations at UW–Whitewater, put it, "They constrain you through idiocy."

Second, the CMS or its tools may lack many features faculty want or need. Faculty interpret a feature's absence to mean that they cannot do what they want to do. The problems many faculty face in using CMS gradebook and assessment tools fall into this category. Finally, faculty noted problems or deficiencies in the CMS with regard to file management, and especially the ability to easily move content around within the CMS or into and out of it.

Student Use Problems

Not only are students not driving faculty to use course management systems, but in addition many faculty are dissuaded from using the technology, or they use it less than they otherwise might, because of problems students have in using and accessing the software. Faculty and staff noted that student CMS problems fell into four areas:

- access,
- technology skills and proficiency,
- expectations, and
- opinions and preferences regarding CMS use.

Access

This appeared to be a significant factor in dissuading faculty from using a CMS, in limiting their use, or in making their use more difficult. In interviews and in the online survey, numerous faculty spoke about the problems that students have in accessing the CMS once they are off campus. This complaint came from faculty at larger commuter campuses (such as UW–Milwaukee and UW–Madison) as well as at smaller four-year campuses (such as UW–La Crosse). The major issue seems to be that many students do not have reliable access to computers or Internet service at home. Thus, faculty are unwilling to build CMS use into a course as a requirement. Many faculty also mentioned that where students do have access to a computer, it may not be sufficiently powerful to access a CMS or its content.[8] Some faculty also mentioned that Internet service reliability sometimes made it difficult for students to complete tasks, such as taking a quiz or exam,[9] using a CMS.

Technology Skills

In interviews, numerous faculty and staff raised the issue that students had poor technology skills and that this slowed down or discouraged faculty CMS use in teaching. Claudia Barretto of the UW–Milwaukee biological sciences department and Peter Burkholder of the UW–Stout social science department noted that students were not tremendously technologically literate, though some faculty, including Scott Cooper of UW–La Crosse's biology department, did say that student technology skills were improving. Faculty complaints about student technology skills came from a wide range of campuses, including the two doctoral/research institutions and even from UW–Stout, which has a long history of technology-related programs and is now a laptop-required campus. Some faculty argued that primarily older, nontraditional students lacked the technology skills to comfortably use a CMS, though numerous other respondents said that all students, regardless of age or standing, ran into similar problems.

Student difficulties with CMS use seem to focus on file management skills and general problem-solving skills. Although today's undergraduates have much experience using digital technology to download music and games from the Internet and to chat with their friends using instant messaging software, these skills do not necessarily translate into those needed to use a CMS comfortably and effectively.

Some UWS campuses now offer student training in CMS use along with the programs they offer to faculty. Staff members associated with these programs or involved in CMS support suggest that these training programs reduce the number of calls to the help desk and dramatically improve CMS use, according to Karin Bast of UW–La Crosse Information Systems and Saundy Selness of UW–La Crosse Information Technology Services. Where no user support or training for students exists, complaints arise, said Alan Aycock, a member of the UW–Milwaukee Department of Anthropology and Center for Instructional and Professional Development.

Interestingly, some programs take steps to address students' technology skills even where students might not appear to need training. UW–Madison has a successful online Master of Engineering Professional Practice degree program for engineers already working in the field. Despite the fact that they enroll qualified engineers in the program, all students must complete a one-credit, 50-hour class on the technology skills necessary to study online effectively, according to Tom Smith of UW–Madison's Engineering Professional Development and Engineering Outreach program.

Student Expectations and Responses

Faculty and staff spoke of two quite different problems relating to student expectations. Some noted that many students are apparently unmotivated to use the CMS, or they use it unreliably. One online survey respondent commented that "students who are unmotivated will not seek help with difficulties logging on to [the CMS] … not a faculty problem clearly, a student motivation problem."

Others spoke of students' relying too much on the CMS, resulting in reduced class attendance,[10] passivity, or decreased attention. In the online survey, one respondent noted, "Students began to have unrealistic expectations, expecting all of the course content to be posted on the Web at their convenience. I also found that when students had access to the in-class materials ahead of time, they were less active in class." Faculty reiterated these problems in interviews. Taggert Brooks, UW–La Crosse economics department, contended that when students had access to the course materials in the CMS, they tended not to pay as much attention in class.

Student Preferences

Faculty members commented in both interviews and the online survey that students sometimes complained about having to use the CMS in their classes. It appears that while students may appreciate the access to course materials that a CMS offers (and especially that it reduces the number of necessary trips to the library), many simply do not like having to use it and do not always appreciate the pedagogical role it may play. Some student complaints reflect their discomfort with having to access content online when they would rather have printed handouts and a course reader, said Meredith Weiss of the Department of International Studies at DePaul University. Other students did not seem to make the connection between the parts of the course in the CMS and the face-to-face component. Ann Riall of the UW–Whitewater Department of Special Education said she received a comment in her student evaluations that read, "She didn't really instruct in the class, it was all on the Internet."

Reliability Concerns

In interviews, many faculty expressed concerns about the reliability of course management systems and spoke of how these concerns dissuaded them from using the software. These concerns have several different facets. First, faculty have a straightforward concern about whether the CMS will work when it needs to. Periodic downtime and outages make some faculty loathe to rely on the CMS. These periodic failures also seem to dissuade their faculty colleagues from starting to use a CMS at all. Second, faculty wonder about the speed and strength of the system in use. Numerous respondents complained in interviews and the survey about how slow course manage-

ment systems tended to be, especially tools like the gradebook.

Finally, faculty concerns about reliability flowed into concerns about what changes in the technology or in institutional support for the technology might mean. Faculty expressed concerns that institutional support for course management systems would be withdrawn and that the software would no longer be available to them. To some extent this is a function of the context in which UWS found itself at the time this study was undertaken. UWS Administration was doing a request for proposals to identify and purchase a new CMS upon which the UWS could standardize. News of this process and rumors about UWS withdrawing support for one or another CMS product filtered down to the faculty around the state and no doubt sparked some of the fears about the CMS's no longer being available.

But faculty fears about this also reflect issues in the higher education technology environment. One feature of that environment is frequent marketplace changes. This has certainly been true in the area of course management systems. Several products used within UWS since 1997 have disappeared from the marketplace because the companies that made them went out of business or were purchased. This happened with the product Web Course in a Box, which was widely used at UWS until the company was purchased by Blackboard. The product is no longer available.

A second feature of the higher education technology environment is that funding for technology is scarce and at times unreliable. Universities thus sometimes have to withdraw support for a technology because of funding shortages or because use may no longer justify the expenditure. This has happened several times on various UWS campuses, and some faculty are concerned that the same fate might befall course management systems. Rebecca Stephens of the UW–Stevens Point English department noted that "if people could be assured that technology would be kept around, then they would be far more enthusiastic about using it [and we] would get new adoption."

Difficulty of Use

Some faculty members report finding course management systems simply too complex to use consistently or effectively. Faculty complaints tend to focus on a few specific areas and tools within a CMS, particularly the gradebook and quiz tools. Some faculty also find discussion boards difficult to use. Figure 6-10 illustrates faculty members' levels of satisfaction with the different course management tools.

The weakness of several CMS tools and faculty's dissatisfaction with them act as disincentives for many faculty members to use or increase their use.

Unsuitability for Particular Disciplines

Numerous faculty mentioned in interviews or the online survey that their CMS use was limited by the fact that course management systems were ill-suited to dealing with the languages and programs required in their disciplines. This was particularly pronounced among mathematics and chemistry faculty. The problems[11] that most course management systems currently have in dealing easily with mathematical notation limit their use in mathematics, physics, and other equation-dependent disciplines. Several respondents in other disciplines also complained about the inability of course management systems to cope with the programs, plug-ins, and notation they required.[12]

Incongruity with Teaching Goals

Faculty sometimes limited CMS use because they felt the technology interfered with good pedagogy or got in the way of

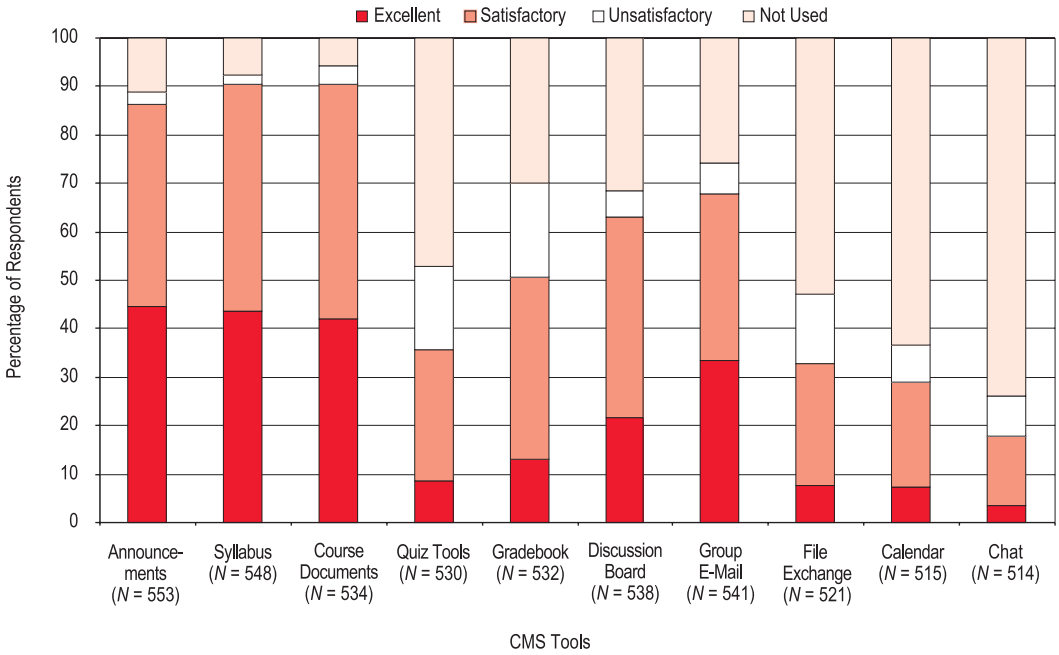


Figure 6-10. Faculty Satisfaction with CMS Tools

their teaching goals. Many of these complaints appear to focus on particular CMS tools, such as the quiz tool or discussion boards. Some faculty were unhappy with the quiz tool in part because it offers inadequate assessment options ("Multiple choice quizzes are bunk!" as one faculty member commented in the online survey) and also because it lacks proctoring and thus permits cheating.

Encouraging CMS Use

Many faculty members have come to use course management systems, and their ranks are growing rapidly. However, much faculty CMS use focuses on content presentation and management (defined narrowly). Faculty use rates for communication, assessment, and grading tools are much lower, though they, too, are increasing. Faculty CMS use rises in response to several factors, including growing familiarity with the program and seeing increased uses for it in teaching. Both of these factors depend on faculty's having access to training. Faculty are dissuaded from making more use of course management systems by product inflexibility and a lack of functionality, and by problems in student use and access.

How can faculty members be persuaded to make greater or more effective use of course management systems? In interviews and in the online survey, respondents identified several factors that would encourage them to use course management systems more than they do currently:

- increased ease of use and functionality—particularly for the gradebook, file management and exchange, and assessment tools;
- more training for both faculty and students;
- greater product reliability, including faster access;
- more certainty that the university will continue to support the products they use; and
- more time to develop courses using the CMS, or recognition from administrators of the time they spend enhancing their teaching using the software.

Figure 6-11 shows which CMS changes will most likely encourage greater CMS use among faculty.

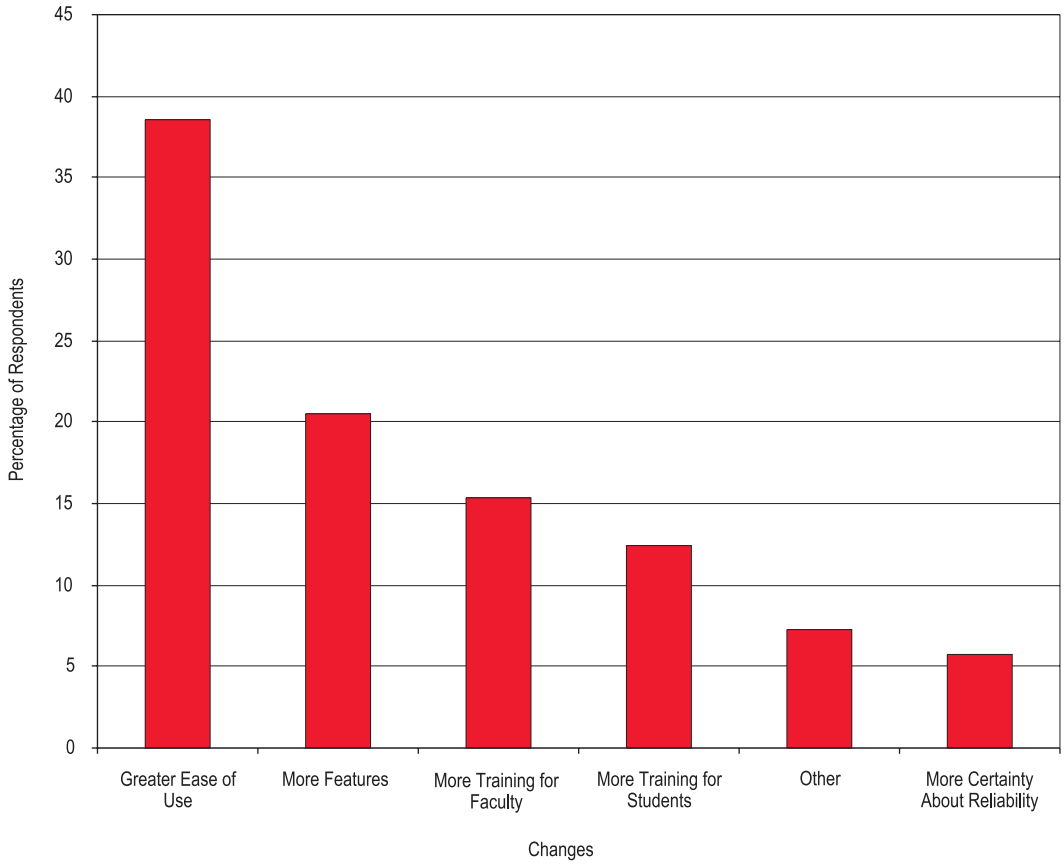


Figure 6-11. Changes That Would Encourage Faculty to Increase CMS Use (*N* = 521)

Endnotes

1. CMS administrators collected this data by counting each active course site in all course management systems used on their campus. An active course was defined as one with at least one student enrolled. Different sections of the same course were counted separately if they had separate course sites.
2. We used two strategies to gather information about which CMS tools (features) were being used on the campuses. At UW–Milwaukee and UW–Stout, we opened each CMS course for the semester in question and checked to see which tools had been used. At UW–Whitewater, we polled faculty members with CMS course sites to assess which tools they had used for each course in each semester. Faculty responded for 62 percent of the course sites, and site administrators measured use in the manner described above for the remaining 38 percent of courses. Unfortunately, the ephemeral nature of some CMS tools' use—e-mail, chat, and the digital drop box (file sharing) do not record use—meant we couldn't get an accurate picture of these features' use. Therefore, we've omitted these tools from the description of tool use in the figures and discussion here.
3. For this analysis, we defined content tools as announcements, syllabus, course documents, staff information, and assignment tools. We defined communication tools as e-mail, discussion board, external links, and groups. We defined quiz tools as the actual assessment tool and the group tool.
4. See <http://www.analog.cx/>.
5. We analyzed data for UW–Madison, UW–Green Bay, and UW–Eau Claire. There were at least 1,000 page hits per day per semester at each of these campuses. The CMS analyzed is not used extensively at the UWS institutions.
6. Free printing is available to students on many UWS campuses.
7. Many faculty see course management systems as being a time saver. Chapter 7 discusses how faculty use a CMS to save time.
8. For example, one respondent to the online survey commented that "course management systems can be difficult for students to access if their own systems are inadequate."
9. For example, another respondent to the online survey commented that "the major disadvantage is problems with Internet service providers' making use difficult for student, i.e., disconnects in the middle of an exam."
10. In the online survey, one respondent stated, "Students rely on announcements to let them know when I do 'something important' such as giving a quiz in class. They are more apt to cut class than they used to be."
11. The ability of numerous major course management systems to easily handle scientific notation appears to have vastly improved in recent releases.
12. For example, one faculty member in the online survey commented that the "CMS cannot incorporate software/files/structures that are essential for my course (chemistry, biochemistry)."

7

Functional Uses of Course Management Systems

This chapter discusses in detail how University of Wisconsin System (UWS) faculty use course management systems and related tools. Most use a CMS for regularly scheduled face-to-face classes, although many use the software for distance education as well. Faculty also use course management systems in many other creative ways.

Course Types

Most UWS faculty members use a CMS to support their regular face-to-face teaching, as Figure 7-1 illustrates.

Twenty-seven percent of the survey sample consisted of faculty who use a CMS to teach fully online classes. Some might be surprised at the fact that most faculty use a CMS for teaching face-to-face or hybrid classes, where online activity replaces some face-to-face meetings. Faculty CMS use in teaching fully online courses is probably even lower than the survey indicates. The higher percentage is likely a result of the heightened interest that faculty teaching fully online classes have in responding to a survey on course management systems.

Figure 7-2 breaks down the "Other" category in Figure 7-1.

Departmental or Organizational Support

Survey responses and interviews with faculty and support staff clearly show that course management systems are being widely used to support the activities of departments, other organizations, and other activities. Many departments use a CMS as an organizational tool, to post documents to share, or to carry out discussions online using the discussion board. For UW–Colleges department members, who reside at 13 different campuses, this is an especially useful tool, said Pat Fellows, an instructional technologist for UW–Colleges. Departments at other UWS institutions also use course management systems, for example,

- as a recruiting tool for potential students, to give them a taste of what their program might look like, according to Frank Hanson, Department of Music, UW–Whitewater;
- to help run and organize national and international scholarly associations and interest groups, according to Kayt Sunwood, Faculty Development Center, UW–Superior;

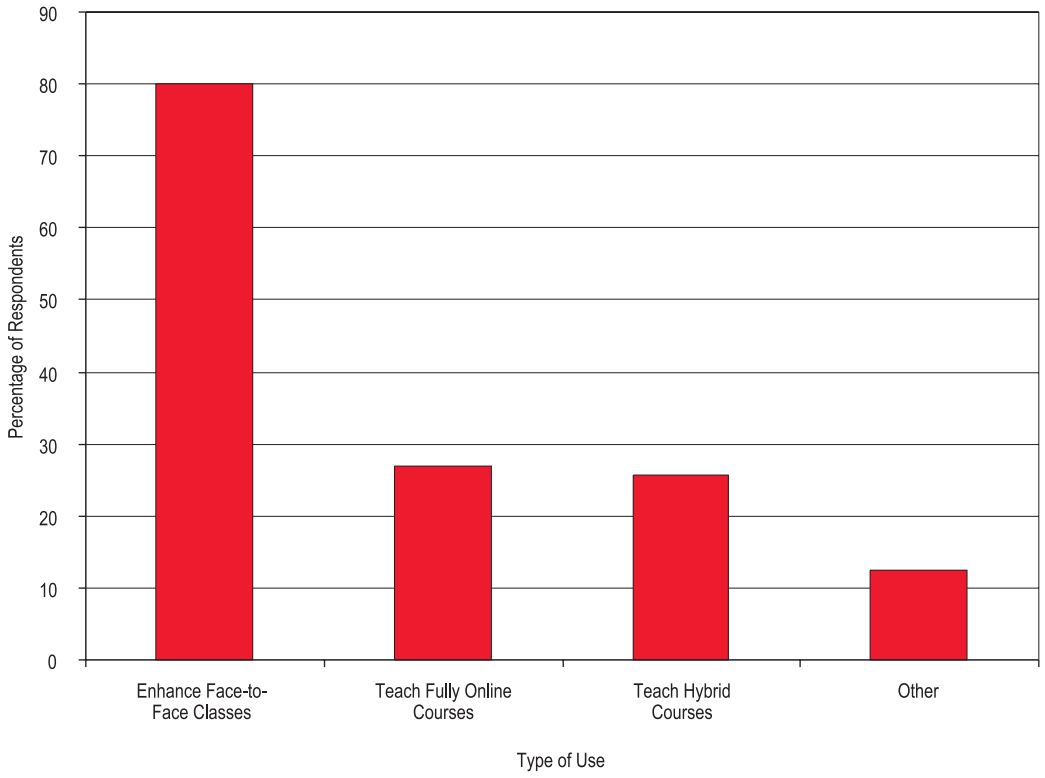


Figure 7-1. How Faculty Members Use Course Management Systems (*N* = 571)

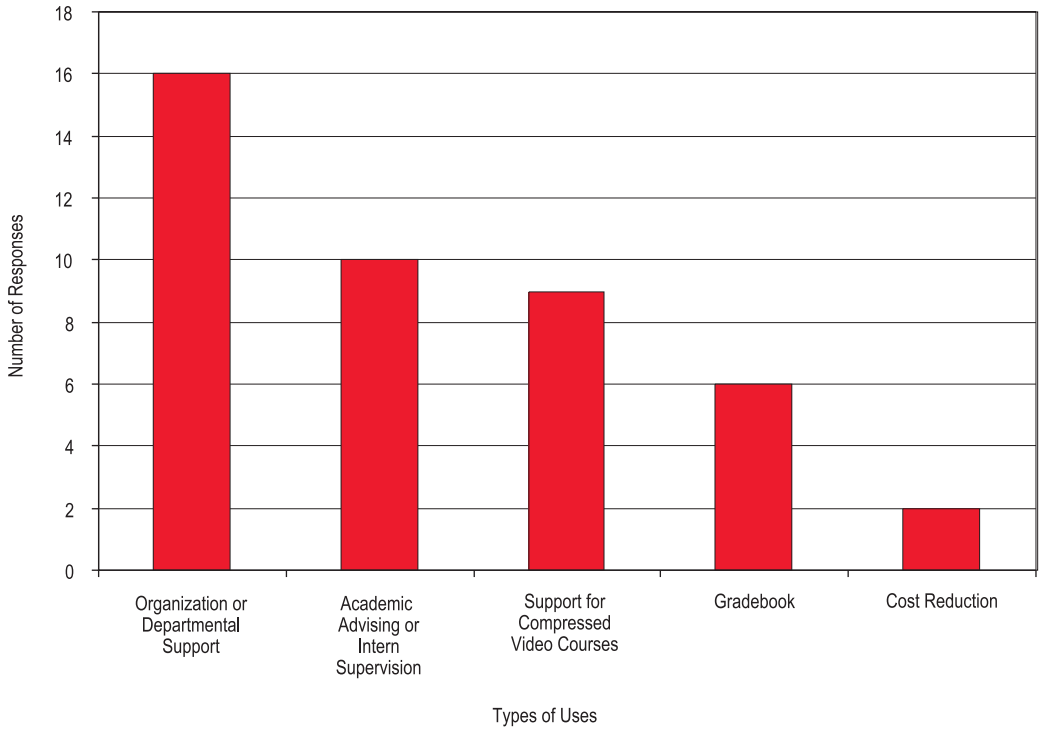


Figure 7-2. Other CMS Uses (*N* = 43)

- to organize and run student organizations, such as a campus chapter of Habitat for Humanity, according to Tim Nissen, Department of Sociology, UW–River Falls;
- to run interinstitutional projects and grant-based projects, according to Scott Cooper, Department of Biology, UW–La Crosse; or
- as a general organizational tool for an online program.

Many faculty and staff experienced problems when trying to use course management systems for organizational and departmental support. The most serious of these was the closed nature of the CMS, which made it difficult for people who were not members of a particular institution to gain access. The situation seemed to become even more difficult as course management systems obtained tighter access controls when tied in to enterprise resource planning systems such as PeopleSoft's Student Administration System. This difficulty related more to policy than to technology integration. In all cases, faculty and staff had some difficulty using the CMS for the purposes they desired because the systems were not sufficiently flexible.

The lack of openness of course management systems and their course-centric nature affects faculty use in several other ways. A tension exists between the technology's structure and closed and proprietary nature, and faculty's desire for greater access and openness. A constant selling point of course management systems is that the security, class-centric structure, and password protection they offer constitute a big advantage for faculty, and core features of the technology, such as discussion boards, the gradebook, and groups, help faculty create a sense of community in the course.

All these things are true (for example, security means that many faculty and staff use a CMS to conform to Family Education Rights Privacy Act privacy regulations), and faculty members certainly appreciate these aspects of the CMS. Many faculty find additional advantages in the course-centric and private nature of CMS sites. Barry Cameron, Department of Geophysics, UW–Milwaukee, and Sharon Giroux, Department of Hospitality and Tourism, UW–Stout, said they like that the course sites are closed to all but the students in that course, because they share some of their in-progress research with their students and would prefer not to post such information to a more public site. Others use the CMS to share readings with distance education classes. They believe they can share these readings in the course of teaching with only those registered for a class and remain in compliance with copyright laws.

However, while faculty members appreciate these benefits, they also find aspects of the CMS overly compartmentalized and restrictive. This affects faculty in a number of ways. First, as described above, it limits the collaboration they would like to have. One of the major benefits of course management systems is that they make distributed learning possible. However, the software's closed and almost silo-like characteristics make it difficult to conduct collaborations or share materials or activities with people outside their institution. For example, Tom Lacksonen of the UW–Stout Department of Industrial Management runs a collaborative project with some students and colleagues in Turkey and would like to use the CMS to facilitate collaboration. He has been unable to do so because the people with whom he wants to collaborate are not members of his institution and therefore cannot get easy access to CMS accounts. Similarly, John Kunz at the UW–Superior Center for Continuing Education, who helps support the International Institute for Reminiscence and Life Review, wanted to use a site on the CMS to facilitate discussions and post member profiles. However, people outside the institution could not gain access to

the CMS site without Kunz's going to enormous lengths to establish exceptions to the normal university policies of allowing only faculty, staff, and student access to the software.

The closed and compartmentalized nature of course management systems limits faculty's ability to share their course materials and means that no part of their course can be publicly available. Many respondents want to share course content with colleagues in their departments or colleges, or beyond. Others want at least part of their course to be public, either because they want colleagues at other institutions to be able to see how and what they are teaching or because they believe that part of the university's role is to create this kind of public knowledge. Taggert Brooks of the UW–La Crosse economics department said he "wants the externalities of putting material online." He makes his materials available online and can surf the Internet to see what others have made available. Looking at how others are teaching econometrics helps him improve his own course. Brookes argues that this is "fantastic for society as a whole" and that creating these sorts of externalities is "part of why we get paid" in the university. The closed and silo-like nature of course management systems reduces that access and those externalities.

Academic Advising and Supervision

In interviews and the online survey, many faculty and staff described the ways they used a CMS to supervise or advise students, especially teachers or nurses in the field. Some faculty mentioned that they had initially started using a CMS because of its potential for this kind of task. Those who supervise in-service teachers, school counselors, or nurses at a distance require a way to hold secure online discussions with them, and the CMS enables this, noted Doug Mickelson, Department of Educational Psychology, UW–Milwaukee, and Carol Porth, Department of Health Restoration, UW–Milwaukee.

Enhancing Distance Education Courses

Faculty members use course management systems in distance education not only to provide wholly online courses but also to supplement distance education courses offered through other media such as compressed video or interactive television. Faculty provide course documents, host online discussions, and use the CMS assessment tools while conducting class sessions over video or television networks. The use of course management systems to supplement distance education courses offered through other media is an application that has been largely ignored. It is an important and creative use, and one that highlights the common misunderstanding that distance education is offered either wholly online or through some other medium. Increasingly, those media are mixed.

Limited CMS Uses

Some faculty and staff use a CMS only for one narrow purpose, usually to provide a secure online gradebook for a face-to-face class or for one that uses another form of support, such as an extensive Web site.

Cost Reduction, Organization, and Time Savings

Many faculty use a CMS specifically as a cost-savings tool, for example, to reduce costs of paper duplication. In some cases, those costs merely shift from one part of the institution to another, while in other cases, costs are actually reduced.

Faculty also use course management systems as a way to organize themselves as

teachers and to save time. Some emphasized CMS management assets, which require a certain discipline to use effectively. Many use the technology as a sort of class repository. Tim Nissen of the UW–River Falls sociology department said the CMS "organizes me ... let's me stash things" and provides a framework for both him and his students. In response to the online survey, a tenure-track engineering faculty member from UW–Platteville said that course management systems "are a convenience. It takes time initially to put course materials on the Web, but once there, I know where they are. I tend to lose papers, and too many papers fill up my office. It takes time to place something online, but once online, I need only make slight modifications between semesters."

Although many faculty members find course management systems time consuming, others say they can save time by using a CMS. One way they do this is by using a CMS in very large classes to cut down on housekeeping tasks and student requests. If all course documents are available in the CMS and students can get their grades through it, faculty members have fewer students coming to their office and staying after class. In classes of hundreds of students, this time savings can be considerable. Scott Cooper of the UW–La Crosse biology department commented that he wanted his interaction with students to be "quality time," and the CMS dramatically reduced the mundane tasks and requests from students.

This use of a CMS as a management and organizational aid hasn't received much emphasis from CMS vendors or administrators and trainers supporting faculty use of the technology. By emphasizing the pedagogical benefits of course management systems, these parties tend to sideline other CMS aspects. This is unfortunate, because the organizational and management features and advantages of course management systems hold enormous promise for faculty. These benefits are relatively quickly and easily realized, while the pedagogical payoffs take longer and are frequently questionable.

Third-Party Tools

A number of faculty and staff use other tools in conjunction with a CMS. In part, this use seems to stem from their frustration with the CMS tools. Figure 7-3 shows the percentage of survey respondents who use other products in conjunction with a CMS.

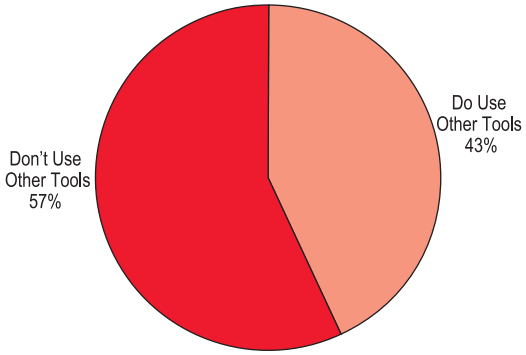


Figure 7-3. Faculty Use of Outside Tools to Supplement a CMS (*N* = 563)

Figure 7-4 illustrates which outside tools faculty use most commonly to supplement the CMS.

As Figure 7-4 shows, where faculty supplement their use of the CMS, it is with an outside gradebook product. Faculty members frequently use Excel or other spreadsheets to keep or calculate grades, but they also use other gradebooks. Use of third-party gradebooks is not surprising, given respondents' mixed feelings about these tools in the CMS.

Ten percent of survey respondents also reported that they use a different discussion tool from that included in the CMS. The comparatively high level of satisfaction with the CMS discussion tools largely explains the lower rates of third-party discussion tool use. Figure 7-5 illustrates the level of faculty satisfaction with the CMS discussion tools.

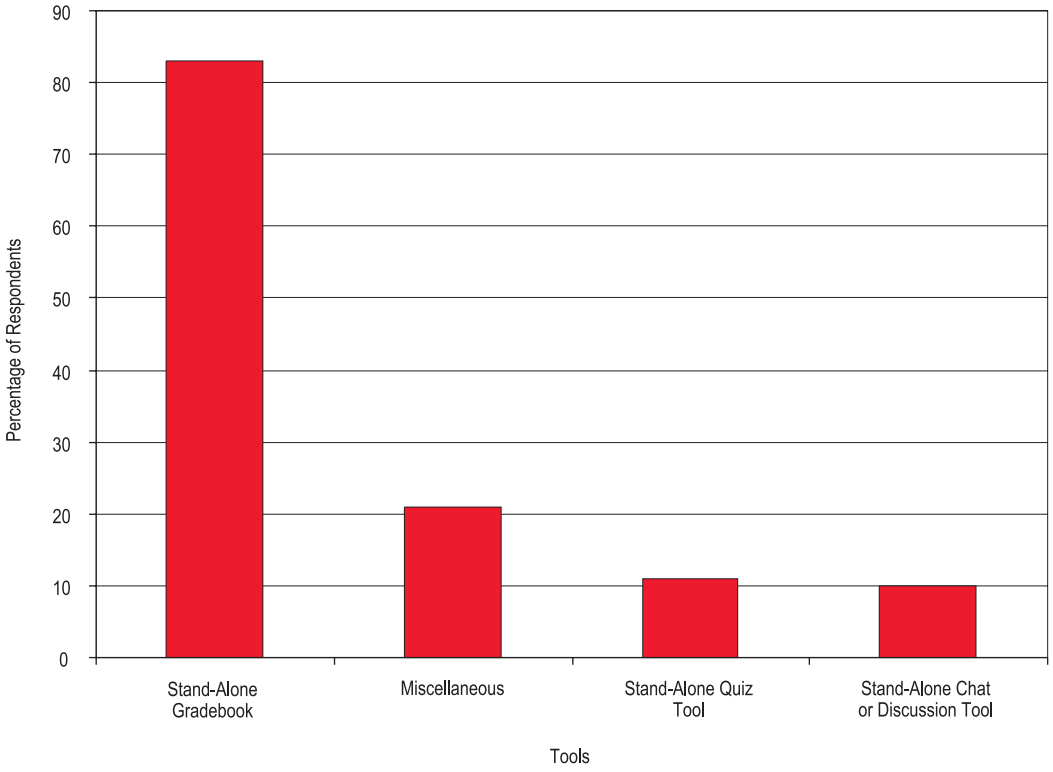


Figure 7-4. Outside Tools Used in Conjunction with a CMS (*N* = 266)

Apart from third-party gradebooks, quiz tools, and discussion tools, the most frequently used third-party software is mathematical and scientific software, such as Scientific Notebook. Science and mathematics faculty need easy ways to include scientific notation in various parts of the CMS. CMS vendors have made progress in providing these tools, but even the most recent versions of some major CMS products do not meet faculty needs. This will continue to be a disincentive for faculty to use the technology.

Separate Web Sites

A minority of faculty also use instructional Web pages to supplement course management systems. These sites vary in nature. Most are created for one or more of the following reasons:

- In response to requests or training from administrators or CMS support personnel who want faculty to keep content separate from the CMS to ensure content stability or to simplify the task of upgrading software or moving to a different CMS.
- To keep content stable when two or more faculty are teaching the same course, such that core course content resides on a Web page outside the CMS while faculty modify their own information within the CMS itself.
- To provide the bulk of course content, reserving the CMS for interactive and perhaps more technologically complex tasks such as assessments, discussions, or the use of a gradebook.
- To enable a particular part of a course to be public.

Figure 7-6 shows the percentage of faculty that use Web pages in conjunction with a CMS.

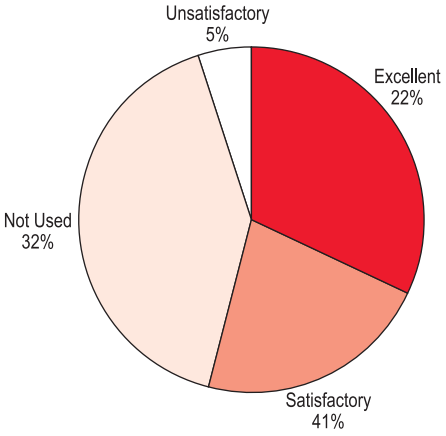


Figure 7-5. Faculty Satisfaction with CMS Discussion Tools (*N* = 539)

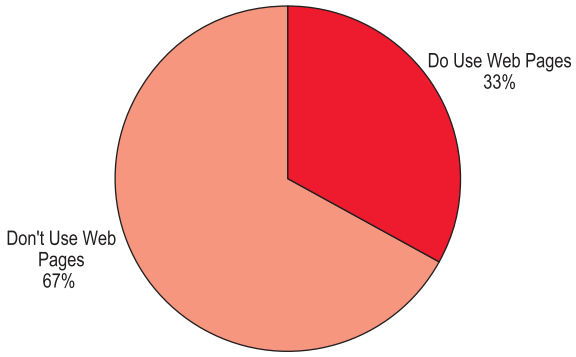


Figure 7-6. Faculty Web Page Use in Conjunction with a CMS (*N* = 566)

Tools for Pedagogy

Clearly, faculty members use course management systems for many purposes and in a variety of venues. They prefer some CMS tools over others and make heavier use of some CMS features than others. The results presented here demonstrate that because faculty are not completely satisfied with CMS gradebooks and quizzing tools, they often supplement the CMS with other tools that support the needed functionality. These tools often include third-party gradebooks and Excel spreadsheets, and some faculty also provide Web pages to supplement their CMS-based courses. How faculty and staff use course management systems for pedagogical purposes is an interesting question that we will explore in Chapter 8.

8

Pedagogical Uses of Course Management Systems

Earlier chapters of this study describe how faculty members come to use a course management system (CMS), the extent to which they use it, and how their CMS use changes over time. This chapter, which draws on certain kinds of data and faculty opinion, explores how faculty members actually use the technology in their teaching. What kinds of pedagogical goals are they trying to achieve when they use a CMS? The evidence shows that the emphasis is on supplementing course materials, enhancing communication, supporting transparency, giving and receiving feedback, and addressing student technology skills. But we also found that in their use of course management systems, faculty members ultimately practice a sort of "accidental pedagogy," whereby technology use improves learning outcomes.

Pedagogical Reasons for Using a CMS

Figure 8-1 presents the pedagogical reasons faculty members give for using course management systems in their teaching. We group these into three categories:

- supplementing course materials to increase student understanding, appeal to different learning styles, and increase the time students spend on course materials and exercises;
- increasing faculty-student and student-student communication;
- providing greater feedback to students to enhance their learning; and
- increasing the course's transparency.

Supplementing Course Materials

The online survey results shown in Figure 8-1 demonstrate that faculty consider it important to supplement course materials or provide more access to interactive materials. In supplementing course materials using the CMS, faculty are usually trying to

- increase student learning by providing additional access to course materials,
- appeal to diverse learning styles,
- provide more access to interactive materials and activities, and/or
- increasing student time on task.

Also, as described in Chapter 7, many faculty offer hybrid courses in which part of a class is moved online to replace actual class meetings. Some faculty and staff provide supplemental materials through the system as a way to increase access and encourage students to use the CMS. Claudia Barretto of the UW–Milwaukee biological sciences department said, "About 95 percent of my students print out my class notes and use them. Students can access the material when they need to, [and this is important

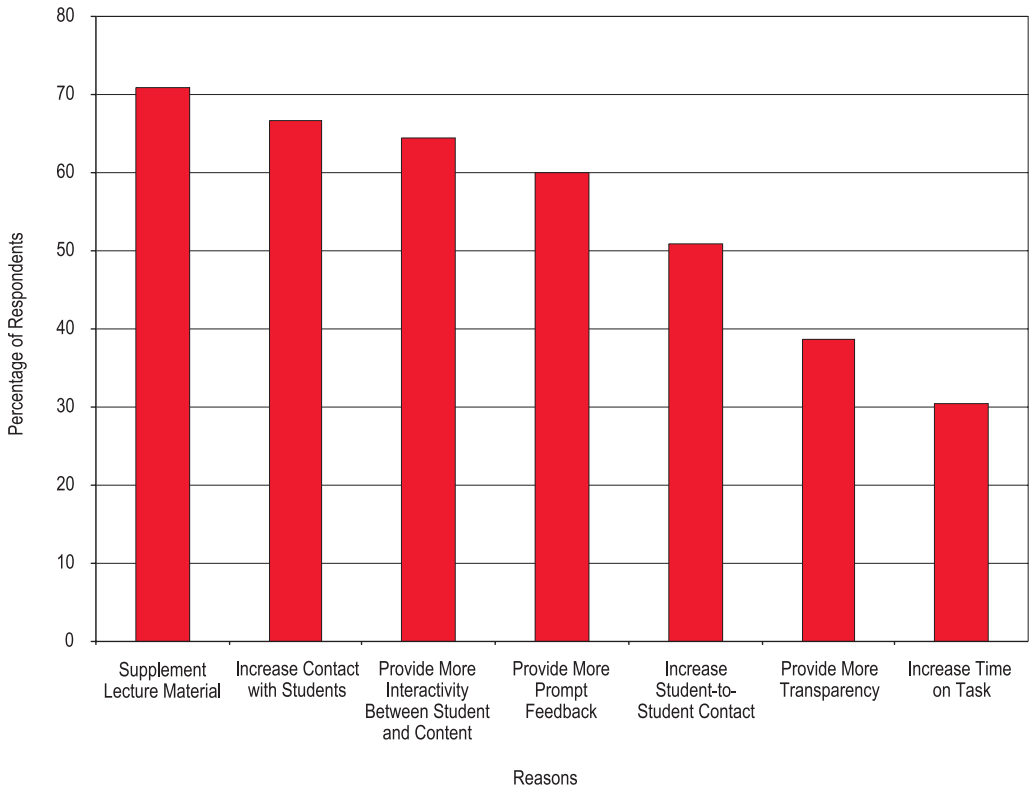


Figure 8-1. Faculty's Stated Pedagogical Reasons for Using a CMS (*N* = 551)

because] most work and commute. The key to successful use of [the CMS] is giving students a reward, something they can really use."

Increasing Student Learning

Much faculty CMS use is an effort to enhance student learning by improving students' interaction with the course materials, including how they listen and learn in class. Many faculty members agree that putting up course materials ahead of time helps students to pay more attention and learn better in class, as Brenda Bredahl of the UW–River Falls journalism department suggested. Some worry about the effect this has on student attendance,[1] particularly because it seems to affect the weaker students more, according to Barry Cameron of the UW–Milwaukee geosciences department. Others worry that rather than helping students listen more carefully and learn more from class time, the availability of course documents in the CMS encourages passivity. Because they have the notes ahead of time, students may become complacent and stop listening properly in class. Taggert Brooks of the UW–La Crosse economics department described how students themselves have become aware of this and have even started to ask him not to post lecture materials or PowerPoint presentations so they are no longer tempted to do this.

Appealing to Different Learning Styles

One of the big promises course management systems hold is to help faculty more easily appeal to students' diverse learning styles. As Figure 8-2 shows, 63 percent of the faculty respondents believe course management systems do this successfully.

It is interesting to consider faculty perceptions of how course management sys-

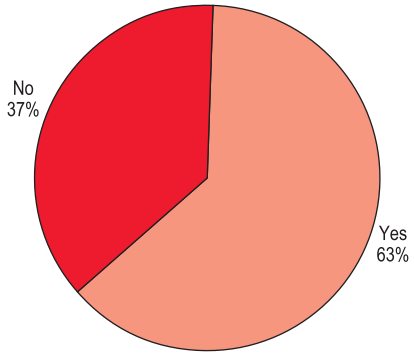


Figure 8-2. Faculty Confidence in CMS Capacity to Accommodate Diverse Learning Styles (*N* = 554)

tems help accommodate diverse learning styles. Figure 8-3 shows the breakdown.

Some respondents, however, believe that the highly structured nature of a CMS actually impedes their ability to appeal to diverse learning styles. Regan Gurung of the Department of Human Development/Psychology at UW–Green Bay said that the structure of the CMS becomes the structure of how you do things. A UW–La Crosse arts and humanities faculty member suggested that "the CM systems may actually inhibit diverse learning styles because CM essentially forces students to conform their learning to a specific set of technologically oriented 'standards.' So I'm not really persuaded that CM is something totally good."

We believe that the promise of course management systems to appeal to diverse learning styles is not even close to being fulfilled. Interviews with faculty confirm that to address the problem, course management systems should not become more complex. Rather, vendors should make them easier to use (for example, make it easier to upload and manage visual materials), improve their ability to handle streaming media, and include help for faculty who must learn to use these features. Many faculty members interviewed had not thought extensively about the CMS's ability to accommodate diverse learning styles. On the survey, a social sci-

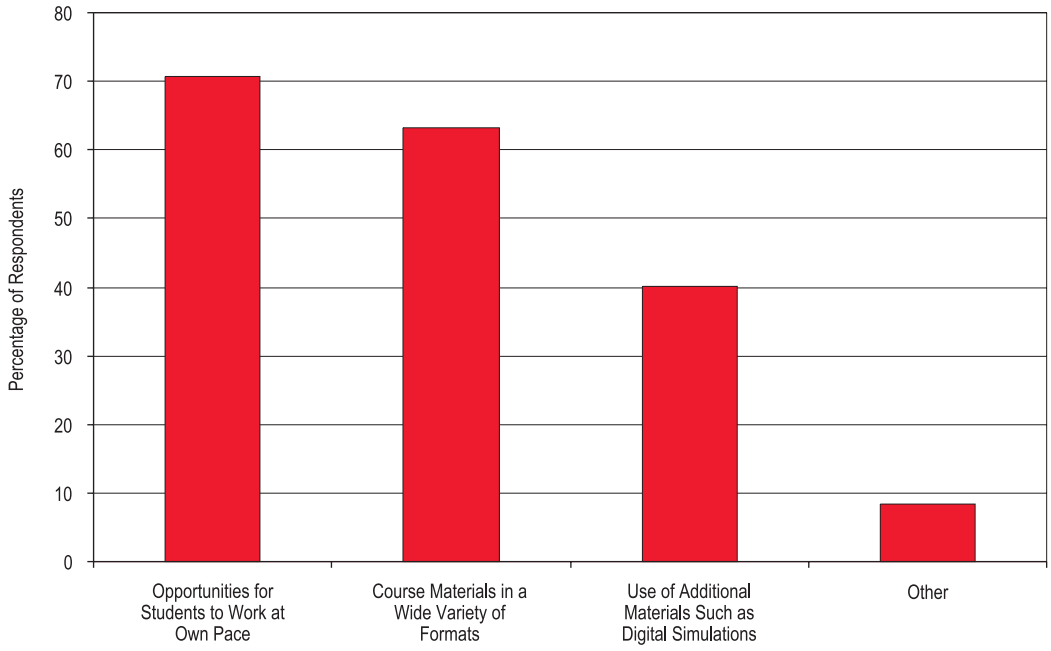


Figure 8-3. Faculty Perception of How Course Management Systems Accommodate Diverse Learning Styles (*N* = 346)

ences faculty member at UW–Milwaukee commented, "I'm not sure how [the CMS] addresses different learning styles—or even what these styles might be. Some discussion of this aspect would be helpful."

Providing More Access to Interactive Materials

Faculty also supplement course materials by using a CMS to provide more access to interactive course materials and activities for their students. One of the great promises of e-learning is this capacity to provide more interactivity, and Figure 8-4 shows that most faculty members believe that using a CMS will help them include more access to interactive activities in their courses.

A detailed examination of how faculty define interactivity revealed that use of interactive materials such as simulations is still quite limited. Figure 8-5 illustrates that most faculty see the CMS as primarily fostering faculty-student and student-student communication.

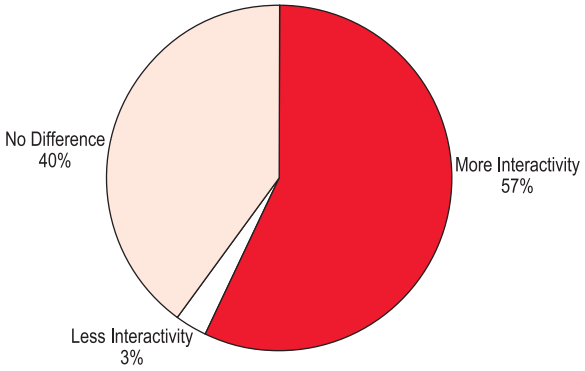
Interestingly, faculty who identify themselves as intermediate users expressed particular interest in using the CMS to improve interactivity (Table 8-1).

From interviews it is clear that many faculty were not familiar with using digital simulations and exercises. Those who were tended not to use them extensively within a CMS, in part because of technical difficulties and in part because they were not always clear on how to incorporate these activities into their teaching.

Increasing Students' Time on Task

Although faculty rated this as a relatively low priority among their reasons for using a CMS, most seem to think that this is indeed what a CMS accomplishes. As Figure 8-6 illustrates, most faculty believe that using a CMS induces students to spend more time with the course materials than they otherwise would. This being the case, some faculty in interviews expressed concern that their strong students tended to use the CMS more often and benefited from it more than their weak students did. The CMS thus had the effect of increasing the gap between these two groups of students.

Figure 8-4. Faculty Perception of CMS Capability to Allow More Interactivity in Classes (*N* = 560)



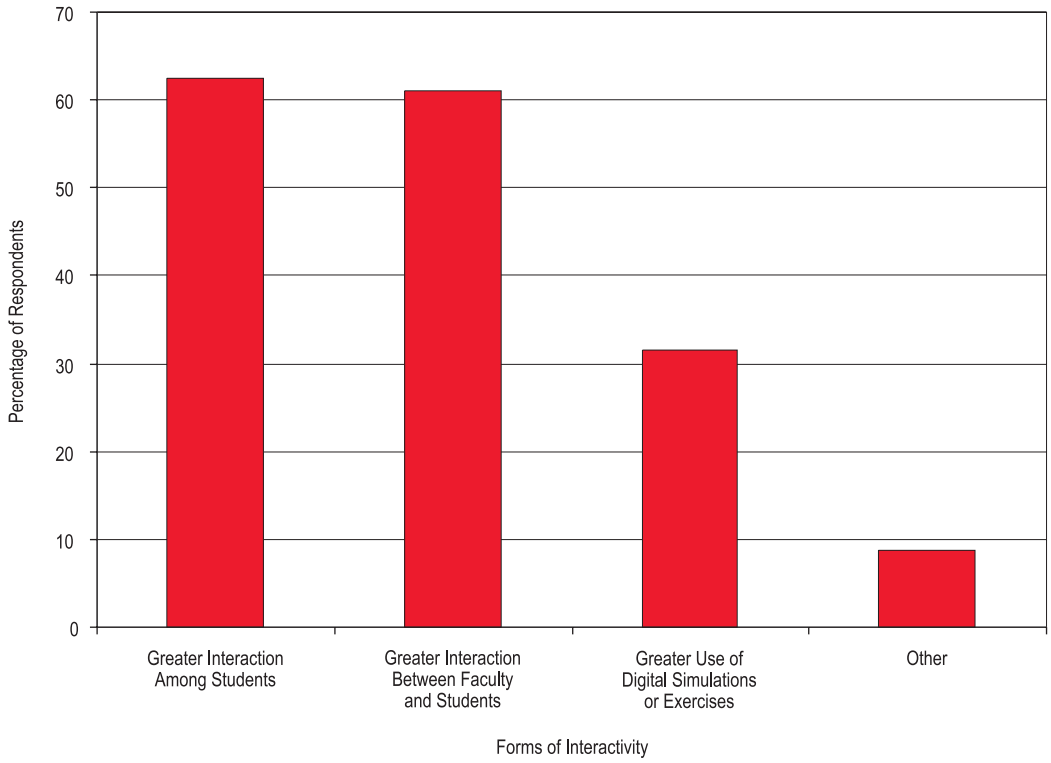


Figure 8-5. Faculty Perception of How Course Management Systems Foster Interactivity (*N* = 333)

Table 8-1. Goals of Interactivity in a CMS, Correlated with Faculty Skill Level

Goal	Response to Each Goal, by Faculty Skill Level in CMS Use (Percentage of Users)		
	Beginners	*Intermediate Users*	*Expert Users*
More interactivity among students	12.98	64.42	22.60
More interactivity between faculty and students	13.30	63.55	23.15
Greater use of digital simulations and exercises	14.29	56.19	29.52

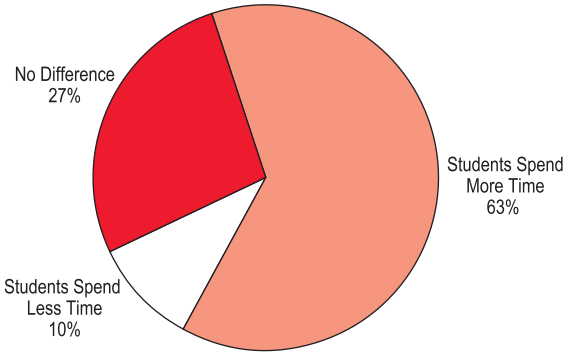


Figure 8-6. Faculty Perception of How CMS Use Affects the Time Students Spend Engaged with Course Materials (*N* = 563)

Increasing Communication

Faculty see the ability to increase communication through CMS use as a major pedagogical goal. This goal also drives faculty CMS adoption and increases CMS use. Faculty reported that the use of CMS communications capabilities such as the announcements, discussion boards, e-mail tools, and grouping tools led to increased communication between faculty and students and increased communication and cooperation among students.

Faculty-Student Communication

Much of this communication appears to be unidirectional, that is, broadcast from faculty to students. Most faculty members believe their CMS use has been successful in this regard, as Figure 8-7 shows.

The amount of contact that faculty feel the CMS provides increases as their skill level in using the CMS increases. Therefore, if we examine the relationship between skill level and whether faculty members think they are able to communicate more, we find the results shown in Table 8-2.

Increasing numbers of faculty seem to be using the CMS's synchronous tools, such as chat and the whiteboard, according to Cheryl Frye and Catherine Roraff of the UW–La Crosse computer science department and Kurt Liechtle of the UW–River Falls history department. Naturally, this means that the communication is much less unidirectional. But faculty still use these tools at relatively low levels.

Student-to-Student Collaboration and Communication

Many faculty use the CMS to facilitate greater communication and participation among students. This is not something they can easily do outside of the CMS.[2] Faculty can also enhance communication among students by building learning communities within the class, a function the closed and

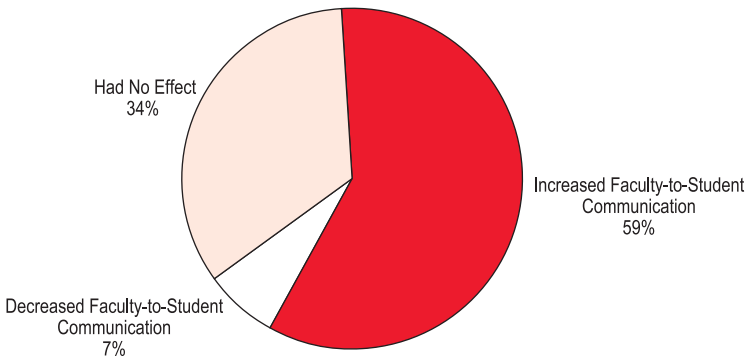


Figure 8-7. Faculty Perception of How CMS Use Affects Faculty-Student Communication (*N* = 560)

Table 8-2. Faculty Perception of Whether a CMS Increases Communication, Correlated with Faculty Skill Level

Assessment of CMS Impact on Communication	Faculty Skill Level in CMS Use (Percentage of Users)		
	Beginners	*Intermediate Users*	*Expert Users*
More communication with a CMS	43.12	60.82	71.70
Less communication with a CMS	8.26	7.02	6.60
No difference in communication	48.62	32.16	21.70

class-centric nature of the CMS makes relatively easy and accessible.

Faculty members most often use the discussion board to facilitate communication. Many said the discussion board encourages far more participation from students—especially shy, reticent, and minority students—than faculty can elicit in the classroom. In addition, by having discussions through the CMS, they are effectively able to slow things down. This allows for more processing time and lets students more effectively engage the text, if there is one. Nancy Chick of the UW–Colleges Department of English made a strong case for the use of the CMS discussion tool: "It has enormous potential, for example, to encourage participation by shy students or for learning-disabled students. It gives them the opportunity to archive and go through things more slowly or repeatedly. I have good discussions in literature classes [and] I have worked to perfect that online. These discussions are superior to those that happen in a face-to-face class. They are slower, students tend to look for textual evidence more, and they are clearer in their explanations …. I have been impressed with online discussions. When I started, I was a skeptic …. The challenge [however] is getting students to achieve a high level of discussion, and it takes a few weeks to get them there."

Other faculty share these views, even those in the natural sciences, business, and other disciplines where we might not expect to see quite as much use of the discussion tool as in the humanities and social sciences. These faculty make extensive use of the discussion tool in small, writing-intensive classes and to conduct group projects, according to Reinhold Hutz, UW–Milwaukee Department of Biological Sciences, and Kelly Ottman, UW–Milwaukee School of Business Administration.

Although many faculty members described how online discussion encouraged participation, some noted that they had received student complaints about this feature's use. Most of these complaints related to the policies faculty created to manage discussion. Numerous faculty members said they learned through trial and failure and by trying again the following semester. They feel that more faculty training on effective use of class discussions is needed.

Peter Burkholder of the UW–Stout Department of Social Science said he and other faculty members especially like the CMS

group feature that lets them divide students into groups for discussion or projects. They desire greater ease of use and flexibility in this tool, however, and they especially appreciate the students' being able to form their own groups. Faculty would also appreciate course management systems in which these collaboration tools included an easy-to-use and powerful file-sharing system, according to Jude Rathburn of the UW–Milwaukee School of Business Administration.

Using a CMS to Provide Feedback

Faculty use the CMS extensively to provide prompt, easy, and comprehensive feedback to students. This takes several forms. First, faculty structure courses within the CMS such that they can easily monitor student work and understanding, and give students feedback on their work. Faculty commonly use the discussion boards for this task. One way to use discussion boards is to have students write about or respond to readings or case studies, said Carol Porth, UW–Milwaukee Department of Health Restoration, and John Koslowicz, UW–Whitewater Department of Political Science. This lets faculty follow student progress and identify any problems. Faculty have always assigned such exercises, but the CMS makes them more manageable and thus more likely to be undertaken. LeeAnn Garrison of the UW–Milwaukee Department of Visual Art noted that after struggling with student journals and all the problems of periodically collecting them and redistributing them, faculty found this much easier to do using a CMS.

Faculty also monitor student learning and help students monitor their own learning by using the CMS assessment tool. Many faculty use the CMS for practice tests, either in coordination with or instead of "real" quizzes. These assessments help both faculty and students gauge their progress and weaknesses. Faculty members also use the quiz tool as a survey and feedback instrument to gauge student learning and experiences. These CMS features are frequently the only tools of this type to which faculty have easy access. Most likely, as these tools become more robust and easier to use, faculty will use them more often and more extensively. Many CMS quiz tools are quite limited in their functionality, and faculty dissatisfaction currently discourages them from using these features.

Transparency

Faculty members make quite creative and extensive use of course management systems to increase the transparency of their courses. In the survey and interviews, numerous faculty members cited transparency as an important factor, as Figure 8-1 illustrates.

The CMS allows for greater transparency in three related ways. First, having the various parts of a course available in a CMS makes the course goals and processes more visible to students. Second, having students' work visible to other students in the class—through student postings to the discussion board or their participation in a group project, for example—appears to make students more accountable for their performance. Course management systems enable this more public kind of learning, which many faculty value as contributing to greater educational gains. Finally (and this appears to be faculty's most common understanding of transparency), the use of the CMS gradebook tool increases the transparency of the grading process. Laura Fingerson of the UW–Milwaukee sociology department said, "Now there is no secret gradebook …. It has also improved my relationships with students."

Student Technology Skills

As discussed in Chapter 7, faculty members who are discouraged by students' poor technology skills are often dissuaded from using or increasing their use of a CMS. However, a few respondents use the CMS in their teaching in an explicit effort to force students to learn important technology skills. This appears to be especially pronounced in disciplines such as business, where faculty members feel that students will need certain skills by the time they leave the institution.

Accidental Pedagogy

Thinking about how faculty use course management systems in their teaching forces us to confront an odd paradox. Course management systems are really organizational tools. Ideally, they enable faculty to do such things as manage groups, post announcements, and distribute presentations more easily and effectively. This is how faculty largely use the software, and they would likely resist and reject programs that try to force a certain teaching style or pedagogy upon them. Faculty want control, and they want to make their own decisions about how to teach.

Using course management systems as an organizational tool, however, seems to trigger a process of rethinking and restructuring for many faculty. Quite possibly, the extended use of any technology would do the same thing. But as it happens, most faculty members come to e-learning by using a CMS. It is their starting point, and it becomes the focus of a lot of their thinking about how to teach well. A sort of accidental pedagogy happens.

Dick Cleek, chief information officer of UW–Colleges and a major champion of CMS use, tells of one faculty member who described the process of using a CMS for the first time as a "mini-sabbatical" in that it was exciting and energizing to have to think about a course in a way he had not done in a while. The CMS forced him to ask questions about what he was trying to achieve and how, something that teaching the class in the regular manner hadn't required. Other interviewees spoke about having to organize courses in different ways and divide them into new kinds of pieces. Sharon Giroux of the UW–Stout Department of Hospitality and Tourism said this was thought-provoking and had the effect of improving the class and her teaching.

Faculty do not do all of this CMS work by themselves. Staff members at the campus Learning Technology Centers describe how faculty members come to them with what they perceive to be technology problems. In the process of addressing them, they uncover pedagogical challenges, and faculty either address that themselves or work with others at the Learning Technology Centers to do so.

Some faculty are skeptical about the extent to which CMS use improves pedagogy, even inadvertently. Bill Cerbin, assistant to the provost, as well as a psychology department faculty member at UW–La Crosse, argues that course management systems have not changed pedagogy, with the possible exception of the brave souls who have really experimented with them and pushed them to the limits. As a thoughtful observer of technology use, Cerbin believes that most faculty simply assimilate the technology into what they already do. He adds that technology use does not force a process of rethinking; rather, faculty use it only where it fits and where it is convenient. While some of this skepticism may be quite appropriate, the evidence presented here makes it hard to deny that CMS use is changing faculty teaching.

Endnotes

1. As one respondent to the online survey commented, "[I]t doesn't make any sense to take extra time to put syllabi and assignments on a Web site when the information can be more easily distributed in class. How is it pedagogically sound to make it easier for a student to pass a course by skipping class and getting the information another way?"
2. Numerous UWS departments and campuses have used, are using, or are experimenting with a range of tools to facilitate class discussions outside of a CMS. These tools include public folders and Outlook in an Exchange server environment, as well as third-party tools such as WebBoard. Some campuses are now taking steps to build discussion tools into the campus portal. It is interesting to consider what impact this will have on CMS use.

9 Conclusion

This study of how faculty members use course management systems in the University of Wisconsin System (UWS) provides numerous insights into technology adoption and use. These derive from the three methodologies employed: the quantitative survey of 730 faculty and instructional staff CMS users, the qualitative interviews with 140 faculty members and instructional staff, and examination of usage logs within UWS course management systems.

Measurement Tools

Today's course management system (CMS) products are weak in the area of measurement tools. In the process of trying to measure actual CMS use for this study, we found the tools and reports available directly from the CMS insufficient. Measuring CMS usage is vital: without measurement, organizations have little sense of how much these technologies are being used and how this use is changing over time. A more accurate understanding of use levels and patterns will contribute to more effective planning and training.

Measurement is frequently difficult because

- most course management systems have poor built-in reporting tools,
- it isn't always clear what counts as an active course,
- a communication gap often exists between those who run CMS servers and databases and other academic administrators, and
- some CMS administrators fear that the counts would be low and that this would result in withdrawal of political and financial support for the CMS.

CMS vendors must develop better tools for measuring the technology's use at both the course and individual-tool levels. In addition, institutions must develop policies to maximize the data collected in course setup and maintenance within their CMS so that they have as much data as possible in an easily accessible format.

CMS Use in Face-to-Face Courses

A significant finding of the study is that 80 percent of CMS use occurs in the course of face-to-face instruction, either to enhance regularly scheduled classes or to create hybrid courses in which online activities and exercises replace part of the meeting time. In the survey sample, less than 27 percent of faculty and instructional staff CMS use was for fully online courses.

These facts come as no surprise to those involved in supporting CMS use on campus. But given the traditional association of

course management systems with distance education, especially among higher-level administrators, this fact should compel a substantial rethinking about how to support and implement course management systems. Given the base of use in mainstream instruction, the growth rate of CMS adoption will likely be higher than anticipated.

Rates of CMS Use

The extent to which faculty use the full range of CMS tools is less than many may have anticipated, but use is growing quickly. Faculty tend to first adopt the static content tools that let them post announcements, syllabi, and text or graphic content. Once they're more familiar with the system, they begin using the assessment, gradebook, and communication tools. A strong majority of faculty report that their CMS use has increased over time. Study findings suggest that most faculty who now use course management systems primarily for delivery of static content will begin to use more CMS tools and capabilities. This will occur in response to

- administrative leadership;
- learning from peers;
- training by campus learning technology centers;
- greater faculty awareness of and comfort with the technology, and their identification of the CMS as a solution to a particular pedagogical challenge;
- student requests;
- desire for cost savings or a way to organize online course delivery; and
- improvements in CMS ease of use and in power and reliability of particular CMS tools.

Faculty members respond much better to efforts to facilitate their CMS use than they do to directives that the technology must be used. They need to be persuaded to use course management systems and to build them into their teaching. If faculty members are not persuaded, CMS use tends to be short-lived and ineffective.

Numerous factors clearly serve to slow faculty adoption rates, whether of the CMS as a whole or of specific tools within the CMS. Factors that faculty consistently identified as inhibiting their CMS adoption include

- lack of time to learn and to use a CMS,
- problems with student CMS use,
- inflexibility of the software, and
- inability of the CMS to map to teaching or organizational goals.

Administrative Leadership

Another finding of this study is that administrative leadership plays a strong role in shaping and encouraging faculty CMS use. Where strong and positive administrative leadership is exercised, it has resulted in extensive and effective faculty CMS use. Where there is little or poor leadership, adoption rates are lower, CMS use is less effective, and use often engenders student resistance and resentment.

Given that this study is about how faculty use course management systems, it is beyond the scope of the report to examine the nature of institutional best practices in promoting CMS use. From the data, however, researchers observed that the practice of relying on faculty to adopt technology at their own speed is not sufficient. Strong leadership from above is required if faculty are to adopt the technology at sufficient rates to justify the institutional expenditure necessary to support a CMS. They also noted that faculty respond better to the facilitation of their CMS use or to the active involvement of senior leadership than they do to decrees or directives from above.

Administrative leadership at various levels is required to encourage faculty to use course management systems and to help

shape that use. Where leadership is exercised, it is most effective when it is facilitative, supportive, engaged, and encouraging.

Faculty Training

Training in CMS use is essential to encourage higher levels of faculty use and more effective uses of the technology. Twenty-nine percent of the faculty and instructional staff surveyed cited training as an important factor in their initial adoption or expanded use of a CMS. Some training models work better than others. We found that training is most effective when it

- occurs as close to the faculty as possible, in the same college or at their campus Learning Technology Center;
- is carried out on as small a scale as practicable (faculty expressed a strong unwillingness to attend large group training sessions);
- utilizes peer training and mentoring; and
- shows faculty real examples of CMS uses.

Interestingly, many faculty members want training focused on the technology rather than pedagogical strategies. Effective trainers understand this and advertise training in the technology while at the same time addressing pedagogical issues or creating an environment in which faculty can explore these issues in the company of their peers.

The Importance of Management

One of this study's findings is that faculty place a high value on CMS management functions. Faculty consistently appreciate how course management systems facilitate communication, grade keeping, assessment and evaluation, and class management. Most faculty use a CMS as an administrative tool. This does not mean they value the software less. On the contrary, this may make the technology more appealing in that it holds the promise of helping them save time and be more efficient in the administrative tasks that pull them away from things they value: the creative and pedagogical aspects of teaching.

One implication of this tendency is that the emphasis on course management systems as pedagogical tools might be a bit misplaced. As this study describes, course management systems can certainly have a positive impact on pedagogy and learning, but this largely stems from how faculty members choose to use the tools. Using a CMS to facilitate quiz administration and other organizational tasks frees faculty to focus on more creative activities. Acknowledging that course management systems can be used effectively in many different ways will likely speed faculty adoption.

CMS Effects on Pedagogy

Using a CMS invites faculty to rethink their course instruction and instructional environment, resulting in a sort of "accidental pedagogy." Although this study was not designed to empirically measure the effect on student learning, it was able to measure faculty perceptions about factors that traditionally improve the learning environment: transparency, accountability, communication, interactivity, and student engagement with the course materials.

Faculty members use the CMS to increase both the transparency of their course and student accountability. When faculty use the online gradebook, they make their assessment of student work more visible. Students can track their progress through the course. They have a greater sense of how they are doing and learn to recognize their strengths and weaknesses. Faculty report that this seems to give students a greater ownership of their success or failure in the class. The class and their progress in it are less opaque, and they can see, understand, and affect the

outcome by making a greater effort. Faculty also report that posting student work in the CMS or in a discussion forum helps improve student performance. Knowing that other students can see their work increases their incentive to perform, and improved performance hopefully leads to better learning gains.

Fifty-nine percent of faculty believe that their CMS use contributes to greater contact between them and their students. This comes at the cost of faculty's spending greater time on CMS use. But the gains from this increased contact cannot be underestimated, particularly in larger classes. Similarly, course management systems play an important role in increasing the time students spend on tasks. Learning continues out of the classroom, and students can engage with the materials at their own pace and in a slower, more deliberate fashion. Many faculty members describe this as an important pedagogical benefit of course management systems.

Finally, using a CMS lets many faculty include more interactive materials and exercises in their courses. A lot of this interactivity consists of group work and increased contact between faculty and students and among students themselves. The rates at which faculty use interactive simulations are quite low, reflecting low levels of awareness on their part about where to find digital learning materials and how to use them in their classes. This suggests the need for more training to help faculty identify and use digital learning materials.

Students' Technological Literacy

Contrary to the popular myth of students as the Internet Generation wünderkinder who drive faculty use of technology and course management systems, this study shows that students not only don't encourage CMS adoption but in fact *dis*courage it. In the survey of UWS faculty, only 3 percent felt pushed by students to use the CMS. Conversely, 16 percent of faculty felt that student difficulties with or dislike of the technology caused them to use a CMS less often or less extensively.

Faculty most often cite students' lack of technology skills as a contributing factor to their decreased use of a CMS. They consistently report that their students seem to have inadequate technology proficiency and that this inhibits their CMS use. Complaints about students' technological literacy focus on their lack of technical-problem-solving skills and basic technology-literacy skills such as file management.

It was beyond the scope of this study to gauge the extent of the problem with student technology skills. It could be merely a matter of student preferences, or faculty could be projecting their own fears of and inadequacies with instructional technology onto their students. Whatever the root cause, administrators should take steps to address the issue on their own campuses, probably by providing more training for students in technology use in general and CMS use in particular. This should include training and education in the practical, social, and ethical aspects of technology use.

Widespread problems with student access to technology certainly contribute to faculty perceptions that students have weak technology skills. Although the UWS annual survey of student technology access shows that students have very high levels of access to computers at home, in university computer labs, and in dormitories, faculty consistently report that they cannot rely on good student access to a CMS and so are reluctant to build CMS use into a course. Internet access seems to be a particular problem. Many faculty report that students do not have access with enough bandwidth to use

the CMS effectively and that access itself isn't always reliable.

Faculty Control

The study also reveals that faculty resistance to CMS use stems in part from their perception that these tools diminish their control over their teaching and environment. There are two aspects to faculty concerns about how course management systems affect their control and autonomy. The first relates to their control over teaching, and the second relates to a reliance on technology in general.

Some faculty resist CMS use because they believe it will interfere with the teaching process. They argue that the CMS's heavily structured nature excessively constrains teaching, getting in the way of how they want to teach and thus inhibiting student learning. Another faculty concern about control arises from the perception that CMS use places a layer of bureaucracy between faculty and their course materials. Many faculty members find this problematic and say it stifles the flow of good teaching. The bureaucracy involves the support structures that faculty have to work with to get their courses up and running in a CMS. These problems seem to be much more pronounced in fully online distance-education courses, especially those for which someone other than the faculty member does much of the course development and where the expectation is that course materials will be used more than once. Having to work with others in constructing and updating a course raises enormous control issues, and battles ensue between faculty and support staff over who determines content and the look and feel of the class.

Administrators must therefore address the issue of faculty control and faculty perceptions that course management systems erode that control. This is especially true if the administration wants to increase CMS effectiveness and use. Many faculty concerns about course management systems and control stem from the fact that, like any other enterprise initiative (such as enterprise resource planning), course management systems require some standardization. In this case it is not about standardizing accounting transactions (and even this is a challenge in research universities) but about standardizing one of the most durable and idiosyncratic activities of the institution. Classroom and research autonomy are two of the most alluring features of the "life of the mind" embodied in the faculty experience. Many perceive the standardizing tendencies inherent in course management systems as wrong and demoralizing. Overcoming these psychological, cultural, and philosophical barriers is a challenge.

Security: Copyright Protection and Privacy

Course management systems are sometimes touted as providing an important part of the solution to the thorny problem of providing content to students without infringing on copyrights. According to this study's findings, this does not seem to be a major concern for faculty and is not a significant factor compelling or shaping their CMS use. To the extent that faculty members are concerned about copyright and link that concern to the CMS, many see the CMS as a way to protect their own intellectual property. While some faculty worry about how to teach online and remain within the bounds of copyright law, most seem largely unaware of or unconcerned by the issue. Awareness is much higher among administrators and those who work with faculty in campus Learning Technology Centers.

Faculty concerns about student privacy, however, are much more pronounced. They clearly understand the need to protect stu-

dent privacy, in particular the confidentiality of student grades, and the potential promise of course management systems to address this. The convenience and security of being able to post student grades online using the CMS gradebook is a strong factor compelling faculty to start and continue using a CMS.

Change Management

Change management is a growing concern among those who administer course management systems and will likely continue to be a major issue, at least in the medium to long term. Universities face two potential sources of CMS change: changing from one version of a product to another, which can often involve substantial reconfiguration and disruption; and changing from one product to another as CMS products disappear or are replaced by superior technology, or as universities standardize on a particular CMS.

We must not understate the impact of CMS upgrades on faculty. Don Sorenson, a faculty member at the UW–Whitewater School of Business, argued that "what's killing people are updates of everything." This frustration intensifies when faculty feel that CMS vendors are addressing bells and whistles in the upgrades rather than improving core features, especially ease of use for the gradebook and the assessment tools.

Faculty particularly fear changing from one CMS product to another. The volatility of the CMS marketplace has forced many UWS faculty members to make such a change. This has frequently been difficult and has caused faculty to spend considerable amounts of extra time learning the new system and reconfiguring their courses. When discussing the possibility of yet another change, many faculty threatened to stop using a CMS altogether.

Given the personal costs to faculty, their aversion to change is understandable. But numerous factors exacerbate the situation. First, faculty demonstrated a lack of understanding about the nature of the learning technology market, especially concerning change and innovation. Second, faculty have become perhaps too aware of branding in the CMS market and may even have become irrationally attached to one or another CMS. Terry Brown of the UW–River Falls English department described the interaction on her campus between users of two major CMS products as a form of the "culture wars." Third, CMS administrators have been relatively slow to develop comprehensive policies and procedures for moving courses from one product or version to another.

Many of these faculty concerns about change will diminish, if not disappear, as the metadata standards movement gains momentum and as it becomes easier for faculty to move content into, out of, and between products. But it would be a grave error to pin all hopes on portability. Also needed are policies and procedures for making changes in course management systems, and reasonable faculty education about the CMS marketplace. University administration must plan for CMS changes in the same way they handle other systems, with version and product updates in mind. They should put considerable effort into developing effective strategies to minimize disruption, and these strategies will likely include content management.

Change management is of increasing concern to administrators and will continue to be until CMS products have matured and technical standards have gained widespread use. Given the inevitability of change, institutions need to work at managing change and assuaging faculty fears about it.

10

Course Management Systems in the History and Future of Higher Education

Columbia Teachers College President Arthur E. Levine describes a higher education future in which providers will become more numerous, "brick and click" and "click" colleges and universities will assume a place alongside traditional "brick and mortar" institutions, and education will become more personalized and focused on learning.[1] New information technologies are identified among the major drivers of these "inevitable" changes. At the same time, University of California at Berkeley Professor Emeritus Martin Trow counsels us that "technology is embedded in and used by institutions that have a history." Trow argues that our institutions' histories will likely constrain the progress that technology can make, leading to the emergence of new institutions "where the weight of history does not condition and constrain technology's use."[2] Similarly, Richard Eckman and Richard Quandt emphasize that the mere existence of hardware and software does not give direction to future technology implementation.[3]

The opposing forces of technology and tradition have long shaped the landscape of postsecondary education. The introduction of course management systems is only perhaps the latest skirmish in this evolutionary saga.

This study on course management systems describes this struggle in considerable detail. To those responsible for integrating new capabilities into tradition-bound activities (activities that in most cases have been operating effectively for decades), the findings of this study may neither surprise nor alarm. Effecting change when something is broken is hard. Introducing change to activities that are often highly effective is very hard, and occasionally wrong-headed. Nevertheless, Levine is likely right: new technologies will inevitably alter—even revolutionize—all aspects of our lives, including how we communicate, conduct commerce, create communities, teach, and learn. The study's findings related to faculty perceptions about student IT literacy, the limited early pedagogical gains associated with CMS adoption, faculty concerns about curricular control, and the seeming focus on course management systems' administrative capabilities reflect both the nascent (and evolving) state of the technology and, more importantly, the dynamics of change in institutions (and people) constrained by proud histories. Understanding the place of these systems in our institutions suggests a need to understand a bit of this history.

As Table 10-1 illustrates, the history of higher education is one of balancing peda-

Table 10-1. Historical Pedagogies, Technologies, and Markets

Historical Epoch	Dominant Technologies	Dominant Pedagogies	Dominant Markets
Agrarian: Storehouse of Knowledge	Oral Limited writings Scriptorium	Scriptural Experiential Apprenticeship Reflection Self-study	Ruling elites Local Mobile faculty
Industrial: City of Intellect	Campuses Classrooms Textbooks Lecture halls Operating theatres Libraries	Lectures Seminars Tutorials Self-study Experiential Apprenticeship in graduate study	Citizenry Meritocracy Community State/provincial National "Foreign"
Knowledge: eUniversity	Campuses Textbooks Libraries Computers Networks Multiple media Course and learning management systems ePortfolios Learning objects Simulators	Lectures Seminars Tutorials Simulations Experiential Problem based Team based Communities of practice Apprenticeship in graduate study Global	Accessible to all Capable Global

gogical tradition with new technologies and mandates for increasing access.

Mobility and Student Centricity in Early Modern European Education

Before the construction of the first modern European universities, secular scholarship was organized under the auspices of students who pooled funds in the earliest unions to attract itinerant instructors to their towns so that the young scholars (referring then to learners) could take instruction. Historical texts describe itinerant instructors traveling in bands through the countryside for their livelihoods in search of students. Such instructors carried with them in carts or sacks the books and other accoutrements of their craft. In some colorful (and perhaps apocryphal) accounts, students dissatisfied with some aspect of their tuition ran their professors out of town without pay. In this early age of ecclesiastical or practical education, access was limited economically to the ruling elite (second and third sons) of a society and geographically to those in towns and cities served by either cathedrals or itinerant instructors. The challenge of distance in an agrarian and largely preliterate Europe was enormous and was mediated by the slow exchange of scholarly correspondence throughout Europe, notwithstanding war, plague, and the early modern systems of transport.

The "technologies" to support instruction in this environment were strictly limited—first to what instructors could carry, more profoundly by what the church allowed, and finally to what scholarly and historical literature could be copied by hand in medieval *scriptoria*.

The social compact between instructors and their students, the limitations of the economic and geographic marketplace for "higher education," the limitations on the permitted scope of scholarship, and the agrarian economy's necessary focus on craft production all conspired to shape medieval pedagogy. Notwithstanding the mercantile relationship between medieval scholars and their roving bands of instructors, the craft of education was conducted in the manner of all early modern crafts. Young students became apprentices to noted authorities, often traveling with them between cities and towns. Instruction, like the times, was slow and measured, revolving largely around scriptural reading, reflection, recitation, and, more infrequently, discourse.

Growth of the Modern University

The twelfth century witnessed the emergence of the University of Paris, the University of Bologna, and the University of Oxford, among other modern and extant universities. These important new social institutions served both secular and ecclesiastical purposes, operating under charters from both kings and popes. The creation of learning venues provided safe haven for instructors and, as with monasteries, abbeys, and *scriptoria*, created environments for the collection, presentation, and protection of the world's recorded scholarship. It also compelled students to show up at these institutions where teaching and learning took place. In a very positive way, the emergent universities created specialized facilities—including lecture theatres for demonstrating surgical and anatomical studies—where teaching and learning could occur without interruption. These institutions also weakened the influence of the student unions and strengthened the role of the instructors, who themselves organized into disciplinary guilds. Indeed, the well-documented fourteenth-century student riots over these painful transitions led to the emergence of residential colleges at the universities of Oxford, Cambridge, and elsewhere. The modern university was on its way to becoming what Clark Kerr described as cities of intellect, removed and protected from the broader societies in which they operated.

The invention of the printing press in 1454, the Protestant Reformation of the sixteenth century, and the Industrial Revolution of the eighteenth century contributed to a proliferation of European universities and to the broadening of the university's purposes. In an Age of Enlightenment, the purposes of the modern European (and colonial American) university came to embrace not only the transmission and amplification of religious scripture but also the pursuit and dissemination of knowledge in the physical sciences, philosophy, and political economy. In the United States, post-revolutionary colleges and universities were established and soon charged (under independent charter) with the Jeffersonian ideal of preparing young men to become enlightened citizens in a democratic society. Higher education in the service of an emerging industrial economy became characterized by the technologies of books, including textbooks that captured and standardized leading professors' lecture notes, classrooms, laboratories, lecture halls, and social spaces.

In England and Scotland in particular, and also in the United States, universities

were regarded as fuel pumps for the Industrial Revolution, and comparative advantage among nations was defined in part by the quality and quantity of university-educated engineers. Furthering this trend in the United States, the Morrill Act of 1862 established one so-called land-grant university in each state for the express purpose of educating the masses and serving as a source of applied knowledge in support of the agrarian and industrial economy of the day. This shift in higher education's major purpose—from the education of social elites in religion, natural philosophy, and liberal philosophy to the instruction of ordinary citizens in "the practical and mechanical arts" to improve agriculture, foster industrialization and urbanization, and develop and transfer practical technologies—was profound.

In pursuing the emerging purposes of the land-grant university and its European equivalents, the challenge of educating an increasingly literate and professional population became an issue for the first time. Access to higher education was certainly not a birthright and remained largely a province of white males, with only 24 coeducational colleges in the United States at the end of the Civil War. By 1880, there were more than 150 such institutions. In this environment, important modern concepts such as course credits and a variety of credentials (most notably graduate degrees) emerged as important markers of educational attainment and mechanisms for regulating and augmenting the flow of graduates through the postsecondary education system. These changes reflect, to a large degree, a shift in higher education's role away from the narrow preparation of young men for the ministry and toward broader roles in American society. The lecture hall became a fixture at land-grant universities, a means of leveraging the time of scarce experts in the professoriate.

In sum, it is reasonable to suggest that the modern university, particularly the land-grant university, is a social institution designed to increase the supply of needed professionals in the service of increasingly urbanized and industrial nations. To meet this mandate, craft-based pedagogies yielded to standardization and more highly leveraged teaching techniques, namely the textbook (the course management software of its day) and the lecture hall. The market for higher education grew by this time, including not just educational elites but also large numbers of citizens across a spectrum of educational goals at the local, state, regional, national, and even international level. By the twentieth century, American universities like Johns Hopkins University and the University of Chicago, and German universities like Humboldt University, had integrated research, technology transfer, and graduate education into their missions in important and enduring ways.

It is important to recognize that while the history of higher education is partly one of linkage with the societies it serves (agrarian, industrial) and also one of increasing educational access, this history is not characterized by the replacement of one pedagogical paradigm (craft apprenticeship) with another or of one institutional purpose (preparation of enlightened citizens) with another. We can more accurately summarize higher education's history in terms of two dominant forces: educational access and institutional tradition. While instructors at land-grant universities have struggled to preserve the craft of instruction and to nurture apprentices, these practices have had to yield, in undergraduate contexts, to the use of teaching assistants and other scaling techniques, to preserve the intimate, face-to-face opportunity for upper-division courses.[4] In particular, however, the cultural precepts of personal mediation of instruction, craft, aca-

demic mentorship, and preparation of civic leaders remain vibrant in graduate instruction and in the mission of liberal arts colleges. Academic tradition has been able to occupy (or perhaps retreat to) ecological niches in the broader context of higher education's increasing "massification."

At the same time, according to the American Association of Community Colleges, "the country's rapidly growing public high schools were seeking new ways to serve their communities. It was common for them to add a teacher institute, manual learning (vocational education) division, or citizenship school to the diploma program. The high-school-based community college, as first developed at Central High School in Joliet, Illinois, was the most successful type of addition. Meanwhile, small, private colleges such as Indiana's Vincennes University had fashioned an effective model of higher education grounded on the principles of small classes, close student–faculty relations, and a program that included both academics and extracurricular activities."[5]

Finally, the emergence of "big science" during World War II, through the establishment of national wartime laboratories at Cambridge (Lincoln), Berkeley (Lawrence Radiation), Los Alamos, and Oak Ridge, emphasized even more the importance of education to the wealth and security of nations, furthering the notion of postsecondary education as a public good, if not a public right. Importantly, the emergent role of science also signaled the broader recognition of research as a function of the university to serve the social/public good.

Higher Education in the Knowledge-Driven Era

The passage of the Servicemen's Readjustment Act on June 22, 1944, marked the beginning of higher education's next wave of "massification." U.S. college and university classrooms swelled by more than two million students in the years immediately following the end of World War II. Absent new technologies, lecture halls got bigger, residence halls became more crowded, "temporary" structures dotted many campuses, and the United States graduated unprecedented numbers of degree holders while Europe rebuilt from the devastation of war. In 1950, the U.S. National Science Foundation was established, and in 1958 the U.S. Defense Education Act pumped nearly $500 million into colleges and universities to promote the study of strategic foreign languages and to stimulate the creation of and market for textbooks. This burgeoning public policy of promoting the growth of higher education in the United States gained momentum from both the Supreme Court's decision in *Brown* v. *Board of Education* (1954) and the rapid growth of community colleges in the 1960s. More than 1,100 community colleges now educate nearly one-half (45 percent) of all freshmen in the United States, reflecting the growing shift in U.S. public policy to one making access to a postsecondary education a public right. This shift has been furthered by waves of financial-aid legislation designed to lower economic barriers to educational participation.

Efforts to balance the public policy of expanding access to education with the traditions of the professoriate have, in the main, been successful. In fact, today 43 percent of all U.S. high school graduates enroll in college. Until recently, this balancing act was achieved through various combinations of economic rationing: private versus public education, programmatic bifurcation (large lower-division courses taught by teaching assistants versus small upper-division seminars taught by ladder-rank faculty), or other largely traditional (undergraduate versus graduate) means.

Breaking Traditions in the 1970s and Beyond

Since 1970, four major developments have further promoted higher education's evolution and challenged our traditions. These events have promoted increased access to higher education while breaking with traditional higher education modes and methods.

British Open University

Established in 1971, the British Open University was built on a small but time-tested correspondence school movement. The Open University was designed to provide access to higher education for Britain's working-class students without requiring the commensurate growth of Britain's residential educational infrastructure. The Open University was, at the time, the first and largest attempt ever to standardize a curriculum and its delivery across multiple professors and tutors. Instead of honoring higher education's longstanding tradition of treating each professor as the inventor, producer, and distributor of a course, the Open University invested massively in the design of a standard course and in the training of those empowered to deliver it. The model has been a historic success, and today more than 150,000 learners make up the Open University's enrollment, including more than 25,000 learners outside the United Kingdom.

University of Phoenix

In 1976, John Sperling founded the University of Phoenix. This university has achieved nearly unprecedented scale, breaking with several traditions by

- capitalizing its education efforts through private market equity offerings;
- standardizing and centralizing curriculum wherever possible;
- focusing on the underserved market of working adults;
- sharply abridging its academic offerings on the basis of economic criteria;
- bringing the faculty to students by seeking accreditation and locating across U.S. political jurisdictions;
- focusing on outcomes assessment, measurement, and formal continuous improvement;
- unbundling core instructional activities such as course design and delivery, and assessment of student performance;
- eschewing a traditional library in favor of an all-digital library, and
- applying information technology strategically to a variety of instructional and support tasks.

The achievements of the University of Phoenix have been extraordinary. Growth exceeded 20 percent per year for more than two decades, and 117 campuses now serve more than 125,000 students, making it among the largest universities in the United States.

Knowledge-Driven Era

The third major development or trend to affect the course of higher education's recent history has been what some call the emergence of the "knowledge-driven era." While the growth of higher education in the past 200 years was largely propelled by the recognition that industrialization requires education, education and so-called "intellectual capital" have clearly replaced land, labor, and financial capital as the dominant source of wealth. In the short run, the emergence of the knowledge economy has placed the United States in a position of comparative advantage because of the size and quality of its postsecondary education system and the high participation rate of U.S. citizens in postsecondary education.

In the longer run, developing nations eager to compete and win in global markets are committed to providing unprec-

edented educational access to their citizens. In this context, and owing to the introduction of robust communications technologies, higher education has become a global market. For example, an official poll indicates that ordinary citizens of China are now spending 44 percent of savings on their children's education, compared with 38.4 percent on pensions and 20.3 percent on housing. In 2000, colleges and universities admitted 1.6 million Chinese high school graduates, increasing admissions over the prior year by 47.4 percent. In the same year, a total of two million students passed China's rigorous standard college admission examinations.[6] Higher education's story of increasing massification continues and, indeed, accelerates.

Course Management Systems

Finally, and importantly, the past 30 years have witnessed the emergence of the course management system (CMS) as an integral part of higher education's instructional infrastructure. Developed simultaneously at a number of institutions, but most notably by Murray Goldberg, then at the University of British Columbia, instructional technologies have evolved from small and often *sub-rosa* tools used by quirky faculty to streamline effort or to illustrate points with students in new and novel ways, to become dominant elements of higher education's system of educational delivery. This transition has occurred in less than a decade and, for most students or providers, less than three years. The introduction of the enterprise-level CMS in higher education begins a new and important "journey of a thousand miles." And like other journeys of this nature, the implementation of these systems in the early part of the twenty-first century represents just a first step.

Because of their importance, the EDUCAUSE Center for Applied Research (ECAR) has invested significant effort in the study of course management systems, looking especially at how colleges and universities institutionalize these new capabilities, how faculty are socializing the new skills, and how campus organizations support students and faculty as they confront these new tools. Several lessons become evident.

A CMS Is an Enterprise System

In late 2002, ECAR conducted research on enterprise systems in higher education, focusing on the three big administrative systems: student, financial, and human resources. Among that study's many findings is that implementers of these systems initially experience a loss of functionality and a degradation of performance as effective employees grapple with new technologies and the new processes these systems require. Trow describes this as technology's propensity to "cut its own channels." The ECAR study of enterprise resource planning (ERP) systems concluded that as users assimilate new systems into everyday practice and master the technology, productivity gains become apparent and the institutional dialogue becomes less about stabilization and more about improvement or even transformation.[7] This process repeats, though with less productivity loss, during upgrades.

In the context of course management systems, ECAR research suggests a similar socialization curve, illustrated in Figure 10-1. It demonstrates that a short-term loss in productivity often accompanies the implementation of new software as users assimilate new tools, methods, and processes.

Teaching and learning are inherently and historically social activities. As such, they are especially subject to dislocations associated with new techniques and technologies. If the incorporation of information technology into the social mix is the "new work" of teaching and learning, Shoshana Zuboff advises us that "the new work depends

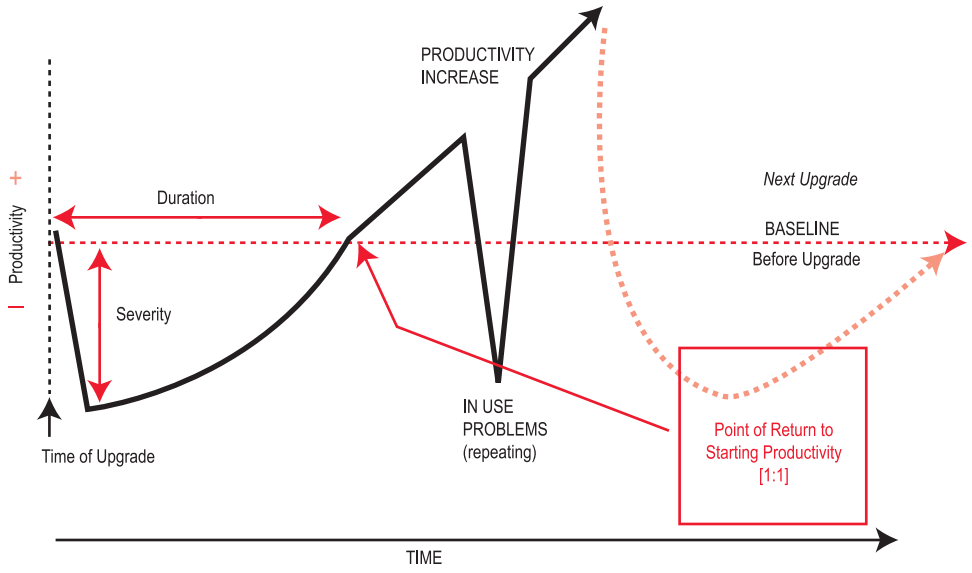


Figure 10-1. Software Productivity and Socialization Trends

Courtesy Wayne Hodgins, Autodesk Inc.

upon a radically different approach to the distribution of knowledge and authority, according to principles of equal access and equal opportunity."[8] In this light, introducing course management systems into a community of scholars with more than a millennium of tradition is a radical and disquieting act.

Who Will Be at the Helm?

Eckman and Quandt are of course correct in observing that the existence of hardware and software does not give direction to its future use.[9] The saga of course management systems has shifted from one based on the bottom-up energy of a small cadre of inventive faculty to the embodiment of a top-down institutional strategy. Very likely, as with traditional ERP, expectations for these investments are unclear because the motivations for their acquisition are often unstated, unclear, or ambiguous. Those who select systems are often not the same people who will use them. Course management systems have significant change management implications. As related in this study, course management systems automate and standardize elements of higher education's mission that have been refined and protected for nearly a millennium. The instructor's dominion over the classroom is a long-established principle of academic governance, and while the CMS does not dictate either a discipline or a pedagogy, it does possess structure that threatens faculty hegemony.

Importantly, CMS structure is simultaneously an area of great strength and one that can incur possible resistance or even rejection. The strength lies in the potential of a CMS to interoperate with its helmsman (the faculty member) in an inquiry into the nature of effective pedagogy. One of the ironies of higher education's evolution and history is that while universities have fostered the production of great insights into learning, members of the academy have been free to largely ignore these insights in favor of what they learned from their apprenticeship or even from trial-and-error experience in the classroom. Course management systems carry with them the potential to guide instructors through course plans anchored in the learning theories of Skinner, Piaget, Gagne, Bloom, Kolb, Maslow, and others. This structure creates the potential to adapt the teaching to each learner's needs and learning style. These systems' developers,

sponsors, and early adopters see for the first time the potential to customize and tailor instruction without sacrificing the scale of delivery. This is critical, as the history of higher education is largely about balancing trade-offs between access and instructional intimacy (and presumably quality).

The University of Wisconsin data and analysis reinforces the ECAR experience with enterprise systems. When the systems are first put into service, users work hard to adapt them to their own structure and predispositions. Colloquially speaking, most of us "pave the cow paths." We not only struggle to force the system to conform to our view of how the planets are arranged, but we also struggle with the new technology. 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. As practitioners gain experience, they will likely (as with ERP) venture to use more CMS features, eventually achieving comfort, if not mastery, with large elements of the system's capabilities. The challenge facing educators and those who manage these enterprise investments is whether and when faculty attention can shift from adaptating existing course structures and mastering difficult and newly evolving technology to thoughtful experimentation with customizable pedagogies. Anecdotal evidence suggests that precocious and adventuresome teachers are actively experimenting with new techniques to use the CMS to restructure instruction for more effective results. Empirically, Carol Twigg has demonstrated that course management systems used within new course structures can materially and positively influence both teacher and learner productivity at no cost to learning outcomes.[10]

A Long Way Yet to the Holodeck

In *Star Trek*, instructional activities on board starships occur in the holodeck, an immersive three-dimensional simulated environment designed to foster what Kolb described as experiential learning.[11] This type of learning focuses on a cycle of immersion, reflection, conceptualization, and planning, as Figure 10-2 depicts.

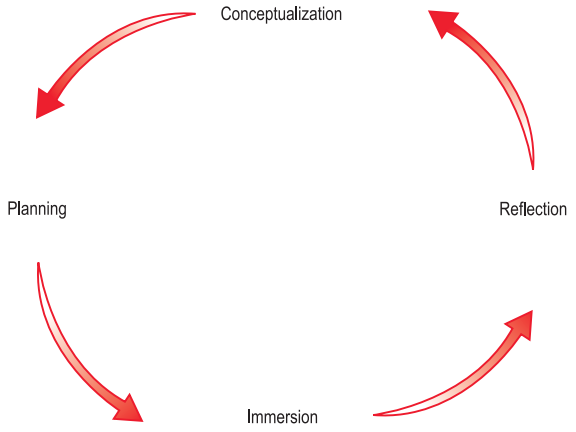


Figure 10-2. The Experiential Learning Cycle

Source: D. A. Kolb

To approach the holodeck, course management systems will need to become more robust and flexible. They will have to enable students and faculty to choose among customizable pedagogies embedded in their structure. Their designers must aspire to make them the fabric of the educational experience, much as chalk, blackboards, paper, textbooks, uncomfortable chairs, touchscreen monitors, erasers, and presentation software have become part of the historical fabric. This will likely happen.

For them to become part of the fabric, students and faculty must make these systems a priority within their teaching and learning objectives. *Faculty Use of Course Management Systems* demonstrates how far we must move in this direction to achieve the ideals described in a growing body of literature about online communities of practice. It can be disheartening to note that students' most common activities in these systems include the retrieval of passwords forgotten, presumably, because of infrequent use. Notwithstanding such laments, we must recognize that we have only begun to socialize these technologies; we have not yet rendered them seamless, relevant, rich, and interesting. The classroom experience has drawn similar complaints despite a millennium of use.

In 2000, Massachusetts Institute of Technology President Charles M. Vest described higher education as being at a "proverbial fork in the road" where "cognitive science, virtual environments, and new modes of interacting will all come into play in powerful ways."[12] The goal of this new synthesis, according to Vest, is quite simply to bring a high-quality learning experience to students wherever and whenever they need it.

The Future Is Bright

The path to the holodeck will be incremental. Colleges and universities are communities of skeptics, and skepticism will constrain progress in CMS adoption. Colleges and universities are also communities of explorers, however, and the curious will further the adoption of course management systems. Vest described the path toward e-learning as "somewhat chaotic, intellectually entrepreneurial evolution, as opposed to overwhelming revolution."[13]

Course management systems will change power relationships. The glib observations about a shift from the "sage on the stage" to the "guide on the side" are correct. Zuboff is right to warn us that these new systems will alter the distribution of knowledge and authority according to principles of equal access and equal opportunity. Some faculty know this or sense it intuitively, and the trend likely underlies their concerns about "loss of control."

Even in Star Trek *there's an academy.* Higher education eras overlap, as do pedagogies and missions. CMS and e-learning zealots proclaim the arrival of higher education's messiah, while detractors decry these systems as the work of devils. The history of higher education is one of endurance through adaptation. In organic fashion, each new stimulus or challenge to the academy led to the production of new shoots and new growth. Only rarely have new technologies fundamentally threatened old root systems. Face-to-face education is very unlikely to be replaced by emerging online forms of education. Rather, educators will experiment with new forms, methods, and techniques, and those that enhance the educational experience will likely prosper and be integrated into both virtual and face-to-face offerings.

Course management systems will cut new channels and create new issues and new opportunities. Clifford Lynch suggested that course management systems will not only create challenges in expected areas re-

lated to the ownership of intellectual property in course materials, but will also raise new issues related to the ownership rights and privacy of students who contribute materials to online courses via these systems.[14] These systems inherently blur the distinctions between teachers and learners as online learning communities begin to form. The traditional hierarchies of the guild and craft may not withstand these democratizing influences.

Over time, learning outcomes will improve. Despite the newness of course management systems and the lack of clear model practice in their deployment, management, support, and assessment, the evidence is clear that these technologies do not erode the educational experience or outcomes.[15] Increasingly, there is credible evidence that course management systems—when implemented within a cohesive programmatic and management framework—can enhance student performance, reduce drop-withdraw-failure rates, and foster active student participation in course activities.[16] Even as faculty at the University of Wisconsin work to assimilate the most basic CMS capabilities, they report rewarding increases in communication with their students.

The future is exciting. The implementation of course management systems in higher education is truly a small first step in what is likely to become a significant reshaping and renewal of one of higher education's most cherished and important activities. As software providers introduce greater sophistication and functionality, and as faculty and students become more proficient in CMS use, a major global upgrade of education may become possible.[17] Commercial software developers, faculty, and students are today working on new tools that promise to lower the economic, pedagogical, linguistic, and technical barriers to full global online participation in a high-quality postsecondary education. These technologies promise to alter forever the trade-offs between quality and access that have dogged higher education since its inception. And even so, these technologies will make it possible to retain places and environments in which our most cherished traditions can prosper.

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Appendix A Participants in Qualitative Interviews

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