THE BLACKBOARD LEARNING SYSTEM: THE BE ALL AND END ALL IN EDUCATIONAL INSTRUCTION?*

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ABSTRACT

Blackboard Inc. provides powerful and easy-to-use systems for educational instruction, communication, and assessment. In the last three years, Blackboard Inc. has marketed two major product lines: the Blackboard Commerce Suite and the Blackboard Academic Suite. The core of the Academic suite is the Blackboard Learning System, the course management system for classroom and online educational assistance. Other course management systems and learning management systems exist, including Angel/LMS, eCollege, GNU General Public License/Linux, and LearningSpace, as well as open-source learning systems such as The Sakai Project, Open Source Portfolio Initiative, Moodle, and uPortal. Despite the drive toward new portal commodities, the Blackboard Learning System has become the dominant e-learning software company. Is this necessarily good for higher educational learning? Members of the United University Professions Technology Issues Committee debate the issue as well as present specific applications of the Blackboard Learning System in distance learning, hybrid courses, and as didactic supplements to other electronic environment enhancement systems.

*Ideas and opinions expressed in this article are those of the authors and do not represent official positions of the United University Professions or its associates.

A. INTRODUCTION

A Brief History of Blackboard

Blackboard LLC was founded in 1997 by two education advisors, Matthew Pittinsky and Michael Chasen, as a consulting firm to provide technical standards for online learning applications. Blackboard LLC was contracted to the IMS Global Learning Consortium, a worldwide non-profit organization within the National Learning Infrastructure Initiative of Educause. Blackboard's vision was to provide a user-friendly means by which college professors could put course information, including syllabi, reference sites, and study guides, on the Web. In 1998, Blackboard merged with CourseInfo LLC, a course management software provider and startup company at Cornell University, and the merged company soon released their first software product for online learning. Blackboard's continued growth and the expanding public profile was driven by acquisitions. In March 2000, Blackboard Inc. acquired the Richmond-base competitor MadDuck Technologies. In January 2001, Blackboard purchased CampusWide Access Solutions Inc. from AT&T and CEI SpecialTeams from iCollege Inc. In 2002, another online learning competitor, Promethius, was purchased from George Washington University, and then in 2003, the assets of the transaction system company, SA Cash, were acquired. Finally, Blackboard released plans to raise up to $75 million in an initial stock offering and went public in June 2004. Since then, Blackboard Inc. merged with the rival e-learning software company WebCT and together it is estimated they control up to 80% of the academic course management system market in North America.

Blackboard is used by more than 70% of the U.S. colleges and universities named to the Forbes.com Most Connected Campuses' List. As of June 2006, the Blackboard empire includes over 12 million users in over 60 countries. Products are offered in 12 languages to over 2,200 learning institutions and contain more than 2,500 supplements from educational publishers. Blackboard Inc. (BBBB) is traded on the NASDAQ exchange and through the course of 2005, the trading price approximately doubled. With metrics like a renewal rate approaching 90% and a continued trend of moving clients from lower level services to higher level licenses, investors are positive on the prospects of Blackboard Inc. [1].

Blackboard Portfolio of Products

Blackboard Inc. offers two comprehensive product lines which are termed the Networked Transaction Environment (NTE) and the Networked Learning Environment (NLE) [2, 3]. The NTE product is the Blackboard Commerce Suite which contains the Blackboard Transaction System, the Blackboard Community System, and Bb One. The Blackboard Commerce Suite provides software for the establishment and functioning of universal financial and data accounts for students, faculty, and other members of the campus community, enabling clients to

track commerce and access transactions on campus, off campus, and online within a one-card program. The NLE product is the Blackboard Academic Suite which contains the Blackboard Learning System, the Blackboard Community System, and the Blackboard Content System. This single platform integrates data and applications for e-learning. The Blackboard Learning System is the heart of the NLE and it enables instructors to create and manage course matter, employ publisher content, communicate with students, and evaluate performance.

B. BENEFITS OF THE BLACKBOARD LEARNING SYSTEM

Students and faculty may benefit from course management systems such as the Blackboard Learning System. Potential benefits include: 1) increased availability; 2) quick feedback; 3) improved communication; 4) tracking; and 5) skill building.

Increased Availability

Blackboard can be accessed from the Internet at anytime and anywhere. Students can retrieve all of their course materials including assignments, lecture notes, slides, Internet hyperlinks, and audio/visual aides. They can submit their assignments as soon as they are complete. It is this accessibility that most appeals to students. In a 2004 survey conducted by Duke University, students were presented with a list of 10 Blackboard functions. The students were asked to select those functions that were most useful to them. The number one choice for 85% of students was "easy access to course materials and readings" [4]. In 2005, Bowdoin College in Maine conducted a Blackboard Pilot Study of students in Web-enhanced courses using Blackboard. Of the students who responded, 61% indicated that Blackboard was most helpful "in terms of increasing my access to course materials'' [5]. Availability is paramount for students.

Quick Feedback

There are two principal types of feedback provided to students via Blackboard: faculty-initiated feedback and automated feedback. Instant grading, and therefore instant feedback, can be provided when Using Blackboard's Test Manager function for quizzes and exams. If the instructor selects the appropriate feedback options, students can take their tests and have all objective-based questions graded and scores available immediately after they submit their responses. Even if there are essay questions on tests, which must be graded individually, students can see sample answers and thus have a good idea of their outcome on the test. Students can submit their homework assignments from anywhere and see if the assignments they have submitted have been graded. Using the Blackboard Gradebook, assignments can be returned to the students and grades can be viewed confidentially. Faculty using Blackboard can also get instant feedback through the Blackboard's

Survey option which allows students to respond immediately and anonymously to multiple choice or true-false questions about the class.

Improved Communication

There are several features of Blackboard that allow for communications with students. Four of the more distinctive options are announcements, discussions, virtual classroom, and e-mail. The announcement function is available to students immediately after log on in the Blackboard system. This assures that all students are current and this minimizes administrative work for faculty. As for the discussion function, the literature indicates that asynchronous discussion within course management systems develops collegiality among students and provides a means of support for students [6]. The Blackboard option, termed Post a Question, encourages students to respond to fellow students' questions and allows instructor surveillance. The virtual classroom is a synchronous environment which supports text-based chat and allows live interaction among participants. The e-mail option within Blackboard is very flexible. Each student's e-mail address can be stored within the student's profile area. Blackboard provides the ability to send e-mail to individual students, to groups of students, or to all students.

Tracking

Blackboard tracks student usage of courses and posts these results in the course statistics area. Instructors can obtain statistics on all students or individual students within the course. Individual assignments can also be tracked. Date and time stamps are included in the Last Submitted/Modified section of the submitted assignment, allowing for easy identification of late assignments. Students can also track their own progress by viewing the Gradebook.

Skill Building

There are several additional skills that are promoted with the use of Blackboard. These skills include organization and time management, which go hand-in-hand in helping students carry out their assignments efficiently. Blackboard provides the ability to include a calendar for each course in which a student is enrolled, thus optimizing students' efforts to match course expectations. Current entries for each course are displayed in the Welcome area that the student sees after login. All documents posted by the instructor can provide start and end dates and times. The use of these dates and times for all documents, including tests and assignments, encourages students to use their time wisely. Likewise, checking the Course Calendar or the Gradebook, where all assignments are listed, allows the student to allocate time efficiently.

In summary, course management systems like the Blackboard Learning System are beneficial to student learning. Donna Patterson, Associate Administrator of

Technology at Valparaiso University School of Law, summarized a survey in her paper encouraging faculty to use technology in teaching and stated the point well: "The students felt that technology helps them feel more organized, absorb more material, and decipher the information with greater ease. The number one response from the student surveys was that they find learning with technology more interesting than sitting in a classroom with a dry erase board" [7].

C. DRAWBACKS OF THE BLACKBOARD LEARNING SYSTEM

Some of the drawbacks or limitations associated with the Blackboard Learning System include: 1) the software is harder to learn than expected; 2) certain options may be restricted to specific operating systems; 3) there are inefficiencies in bandwidth use when materials have to be downloaded every time access is sought; and 4) cost [8].

Blackboard is Hard to Learn

A survey of 730 faculty, staff, and students in the University of Wisconsin System, the majority of whom use Blackboard, found that course management systems are harder to learn to use than expected [9]. The survey represented 10% of the total faculty and half of those using course management systems. Faculty members found course management systems "time-consuming and inflexible." The study also found that despite expectations, many students were not proficient with the technology. A separate study, an evaluation of Blackboard as a platform for distance education delivery at Hampton University School of Nursing, found that the Internet is often a new learning environment for those returning to University for graduate degrees [10]. These non-traditional students are often older and less experienced with campus computational instruction tools than are resident students and find working with the online Blackboard Learning System difficult. Furthermore, an independent survey of U.S. university Websites shows that most have Web pages dedicated to address common Blackboard problems and to provide means of troubleshooting. Although promoted as an easy-to-use system, there is a learning curve for Blackboard that precludes full and timely utility.

Blackboard Options May Be Restricted to Particular Operating Systems

As reported on dailyprincetonian.com, initial announcements by Blackboard Inc. in 2001 were that new versions of its software would provide additional features only to those running Blackboard on Microsoft NT servers [11]. This bundling of individual programs and applications within specific operating systems has been maligned over and over by innumerable critics. Still others find

that Blackboard limits creativity, technologically speaking, by confining instruction to a restricted format. Stephen Arnold, a college instructor and Gentoo Linux developer, promotes open-source tools rather than fixed platforms for supporting classroom instruction, saying "It (open-source tools) gives me the freedom to try almost anything that comes to mind" [12].

Blackboard System Inefficiencies

Chris Thomas, chief strategist for Intel, is an advocate of mobilized technology and a critic of portal-based systems like Blackboard. Richard Culatta's blog summarized Thomas' reasons to mobilize to open-source technologies in which it is noted that there are significant costs and technological impacts of wasting bandwidth with portal-based systems like Blackboard, particularly when materials must be downloaded in order to view them [13]. Dependence on server portal solutions is always subject to network problems. When information is sent directly to mobile devices, there is no system to crash. According to Thomas, the adherence to portal-based systems like Blackboard is, in essence, teaching students with archaic technology.

Cost

Spending on information technology by colleges and universities is expected to set a record in the 2005-2006 academic year. According to the American Council on Education, costs associated with higher educational telecommunications this past year are estimated to be $7 billion dollars, a 35% increase from the prior year. These costs primarily reflect prices charged by outside Internet service providers and course management system providers like Blackboard. According to Blackboard executives, costs for their network environment products, including Blackboard Learning System, may start low but as subscribers integrate more functions into Blackboard, subscription licenses may be $200,000 to $400,000-a-year [14].

For these and other reasons, the Blackboard Learning System presents drawbacks for many faculty, students, and CFOs of higher education institutions. As the world of learning becomes flatter, more and perhaps better options, such as open-source learning management systems, are becoming available and these are empowering students and teachers in today's pedagogical arena.

D. APPLICATIONS OF THE BLACKBOARD LEARNING SYSTEM IN HIGHER EDUCATION

(1) Distance Learning: Blackboard and the Online Learner

According to Dr. Curtis J. Bonk, professor of Instructional Systems Technology at Indiana University and recipient of the Most Outstanding Achievement Award from the U.S. Distance Learning Association, there are four different types of learners which he defines as R2D2, for "read, reflect, display, and do" [15].

The first type of learner is the reader. This student is the auditory and verbal learner who prefers words, written language, and spoken explanations. The Blackboard Learning System allows the instructor to easily meet the needs of the reader students. Lecture notes, audio recordings, animations, learning activities, case studies, and video clips are easily added to the Blackboard system. These resources may be developed by the instructor or very commonly through the editor's supplemental online material. Most editors provide the course cartridge download key and either the instructor or the Blackboard administrator enters the key under "control panel: import course cartridge." The editor's resources include the plug-in computer requirements. After the course cartridge has been downloaded, instructors can customize and individualize the course with their own specific content and requirements. The student is directed to the resources in the course documents or in the index easily located on the announcement page.

The second type of learner is the reflective learner. This student is the observational learner who prefers to reflect, observe, view, or watch learning. They want to see the answers. The Blackboard systems can be used to meet this students needs through the explanation of specific requirements and use of sample responses. The reflective learner likes to make careful judgments and view things from different perspectives. Blackboard's discussion board allows the reflective learner to research an unlimited expanse of topics, make judgments, and elaborate on the answers to specific questions posted either by the instructor or by other students.

The third type of learner learns from display and is the visual learner. The visual learner prefers diagrams, flowcharts, timelines, pictures, films, and demonstrations. The animations, video clips, audio recordings, Web links, and pictures embedded within specific course cartridges or accessed online meet this learner's needs. In the Blackboard Learning System, materials in the educational publishers' course supplements contain additional resources to reinforce lecture notes and postings to the discussion board.

The fourth type of learner is one that learns best from doing. This student is the tactile or kinesthetic learner. According to Dr. Bonk this type of learner enjoys simulations, role play, creative movements, dramatization, and hands on projects [15]. The needs of this student are also met within the Blackboard Learning System as for example by using the course editor's learning activities and case studies. Learning activities are varied, ranging from simple games like crossword puzzles, hang man, sequencing and matching exercises to online and offline reference links to advanced topics.

Seven Principles of Effective Teaching:
A Practical Lens for Evaluating Online Courses [16]

The Blackboard Learning System allows the instructor to accomplish effective online teaching principles. These principles are outlined here and common examples are cited.

Principle 1: Good practice encourages student-faculty contact—Instructors should provide clear guidelines for interaction with students [16].The syllabus in the Blackboard Learning System allows the instructor to document policies on communication, including netiquette, delivery of course assignments, and instructor feedback. As a starting exercise, students are referred to a tutorial on how to be a good online learner. The digital drop box for sending homework assignments and the file attachment in the Blackboard e-mail communication frees up the instructor's private e-mail system. In addition, a Q&A forum may be established in the discussion board where students can anonymously post questions they may have about the course content. This behavior is modeled in the faculty page in Blackboard, with sample discussion postings and responses to students' questions. In many online courses, offline class contact can be offered during the first few weeks of class. Students may be initially anxious about participation in an online course. The initial offline contact supports and builds social and group spirit and establishes trust according to the studies of Pickett and Shea [17].

Principle 2: Good practice encourages cooperation among students—Well-designed discussion assignments facilitate meaningful cooperation among students [16]. The assignment schedule should be posted in the syllabus with a request made that the students print and check the assignments when completed. Expected requirements from the students, the role of the instructor, the grading rubric, and sample discussion postings in the Blackboard course content area are examples of well designed discussion assignments which facilitate student understanding of instructor expectations. In order to promote participation, a percentage of the student's grade may be based on the discussion forum. The discussion forum promotes social interaction and the application of critical thinking concepts. The Blackboard Learning System allows the instructor to control the discussion. The control panel enables the instructor to allow students to modify or remove threads, to post items anonymously, and to add files. At the end of each assignment, the instructor can lock the students out of the discussion board so students can no longer post comments. Feedback on the student's discussion posting is accomplished through the Blackboard communication system. Instructors may use the Blackboard communication e-mail system to send individualized, group, and class e-mails to communicate with the students. The file attachment may be used to provide the student with their grade according to the discussion forum rubric. Pickett and Shea indicate that the sharing of educational expectations via rubrics, expectations, instructions, and examples builds a sense of class community [17].

Principle 3: Good practice encourages active learning—Students should present course projects [16]. Instructors may easily incorporate course projects into the Blackboard Learning System via the assignment manager, the digital drop box, or the discussion forum. Active learning stems from the posting of the

instructor's expectations within the syllabus as well as in the discussion board. The Blackboard communication system and discussion board may be used for students to post questions and answers with supporting documentation as follow-up to other students' questions. The requirement is that students are expected to critique one another. Students are responsible for the research and learning. Only at the end of the discussion forum are the instructor's insights provided and the grading of the forum contributions made. Students have reported they learn a great deal from the postings and enjoy the interaction with their peers. Pickett and Shea indicate that students who rely on each other build a sense of partnership and class community [17].

Principle 4: Good practice gives prompt feedback—Instructors need to provide two types of feedback: information feedback and acknowledgment feedback [16]. Information feedback is easily provided through the Blackboard communication system, discussion board, and grade book. Acknowledgment feedback is required and demanded by students. Students rely on the instructor to communicate as stated in the syllabus, even if it is simply a statement or acknowledgment that a question or response has been received and will be answered as soon as possible. As stated by Picket and Shea, in order to build the online class community, "the instructor needs to establish trust by responding promptly to student concerns and provide opportunities and recognition for students who support one another [17]. Blackboard also has a whiteboard option that may be used for synchrony in student/instructor interaction. The grade book in the Blackboard system allows the student continuous feedback as to their performance and standing in the class. The instructor maintains the grade book by keeping the grades current and the weighted average correct.

Principle 5: Good practice emphasizes time on task—Online courses need deadlines [16]. The Blackboard syllabus contains the course policies on attendance, participation, and late assignments. Students may be reminded about assignments by postings on the announcement page. In addition, folders may be used in the Blackboard system to open and close according to deadline dates, Assignments, surveys, and quizzes may be set to start and stop at prescribed intervals so that they are no longer available to the students after the deadline. Pickett and Shea indicate that establishing time parameters is a good online instructional design and organization [17].

Principle 6: Good practice communicates high expectations—Challenging tasks, sample cases, and praise for quality work communicate high expectations [16]. Blackboard allows the instructor the tools to assign challenging work, present sample cases, and provide feedback individually and publicly. An example of high quality work may be provided in the discussion board or in a folder by itself. Students are referred to the sample work in the orientation document or on the announcement page. Exemplary work may be praised via the Blackboard

communication system or within the discussion forum. Pickett and Shea indicate that engaging in supportive contact and interaction builds a feeling of student ownership in assignments as well as a sense of class community. Posting of sample expectations is good instructional design [17].

Principle 7: Good practice respects diverse talents and ways of learning— Allowing students to choose project topics incorporates diverse views into online courses [16]. The Blackboard system provides structure for instructor and student projects. Students may be required to think about the topics being discussed, ask a question, or answer a specified number of questions from peers each week. This requirement means that the student must research an area of interest and share their unique perspective. Each student may be required to provide an individual experience with the content being addressed. Engaging in supportive contact and interaction fosters class community [17].

(2) Incorporation of Blackboard in the Teaching of Hybrid Courses

Blackboard is as easily incorporated into hybrid courses as it is in all Web-based distance learning. The benefits of increased availability, access to the Internet anytime and anywhere, quick feedback, improved communication, tracking, and skill building are applicable as a supplement to classroom instruction in hybrid courses as they are to solely Web-based instruction. These teaching strategies may be implemented in ways that take into account the array of learning styles present in any student cohort to meet individualized student needs. Blackboard enables immediate access to students and student-generated data. Access to this data enhances instructional capability beyond what is realized in the traditional classroom and facilitates the formative evaluation of courses and students to enhance instruction and learning. At any time during a course, progress of a student or student cohort may be assessed. This is accomplished by reviewing student usage of course material, grades on assignments, testing, and one-to-one communication between faculty and students. As an instructional supplement, Blackboard has been embraced positively by students.

The creative use of Web-based platforms such as Blackboard by faculty to develop hybrid courses should strive toward incorporating Blackboard in a seamless way into the classroom. This creativity is boundless and is limited only by the ability of the user. As stated earlier in this article, one drawback or limitation of the Blackboard Learning System is the belief that "the software is harder to learn than expected." This sentiment is expressed by faculty and students. It is worth noting that Blackboard provides Web-based instruction in explicit detail in *Behind the Blackboard* which is accessible to faculty and students in instructional and student versions. *Behind the Blackboard is* accessed through the Blackboard Website.

(3) Blackboard as a Supplement to Other Digital Environment Learning Systems

The Blackboard Learning System can also be used as a supplement to classroom learning even when other digital environment learning systems are the primary instructional tools. A case in point is upper level, higher educational settings in which instructors and students meet face-to-face in traditional classrooms and in which curricular content and additional core instructional material are delivered directly to students' laptops via digital environmental systems, for example via the VitalSource Technologies learning system. Even in this environment, Blackboard may be used as a supplemental technology.

VitalSource Technologies provides content for managing, integrating, and accessing information in the digital classroom, particularly using software to create and access digital books. The mission of VitalSource Technologies focuses on ways by which the electronic environment can enhance learning, particularly in the delivery and use of respected resources into the classroom. This means that storage resources delivered to laptops may contain all curricular materials, instructional supplements, as well as an extended portfolio of reference textbooks which stock the VitalSource digital bookshelf. Students attend classes where the instructor's digital notes are viewable on laptop. These notes may be annotated by the students own inputs as inspired by additional comments and discussions raised in the classroom. Materials from hundreds of textbooks, video libraries, animated tutorials, and Internet interactions available through VitalSource storage resources are interwoven during the didactic session.

Blackboard Learning System may supplement this didactic format. In this venue, Blackboard can be used independently of its course cartridges as an interactive, out-of-class access site to present learning units, post assignments, provide pre-lecture assessments in the form of quizzes and question pools, exchange files within the digital drop box, create and archive discussion boards for specific lecture blocks or topics, post grades confidentially, and provide evaluation tools. System administration access is provided with different privileges and at a variety of security levels for instructors, course administrators, system support personnel, and guests. In this setting, Blackboard provides an interactive instructional medium which complements the resources and tools available through the VitalSource library.

The Blackboard format works well as an integrated tool even when primary instruction is given in the classroom and when other digital learning systems provide the majority of the instructional source materials.

E. FUTURE PROSPECTS

Just as human lives are thought to go through successive seven year developmental cycles, so too may the levels of contentment with and demand for

commercial course management systems and e-learning advancements. It has been just over seven years since Blackboard Inc. was founded. Many current analyses indicate a maturation phase for commercial portal system-based products and a clear growing market for open-source learning management systems [18]. Maturation of portal-based systems, however, doesn't mean that the companies are static. The principal educational technology companies are spending millions of dollars every year in research and development to bring new applications online. Even so, there is a momentum growing for open-source learning management systems. The movement of open-source systems to acceptability was predicted to arrive when the existing commercial portal platforms lack significant differentiation (or competition) and when open-source systems become more innovative than their rivals [18]. Both conditions may be here or on the near horizon. Open-source platforms, such as Sakai and Moodle, are becoming more technologically innovative and attractive for users. Mara Hancock, Associate Director of Educational Technology Services of the University of California at Berkeley, sees innovative learning technologies coming directly out of higher education and this means advances in open-source systems. According to Tim O'Reilly, president of O'Reilly Media, open-source business models are moving beyond professional services and are now including services delivered to end users [19]. Open-source models in business and in education promote user-centered design, guidelines, and technologies. Innovations in open-source technology are here; and whether companies like Blackboard Inc. and Microsoft reach out to the open-source community may dictate their future economic success.

F. CONCLUSIONS

Most university and college classrooms now provide rich computer, network and multimedia capabilities for instruction. The benefits of these systems include not only access to a diverse means of didactic presentation but also the means for creation of motivational environments for learning. Course management systems or learning management systems provide software for the management and delivery of learning content and resources to students. These systems have become an essential component of computer-based instructional capability. The Blackboard Learning System has emerged as the dominant course management system, largely by its Wall Street-style acquisition of complementary component companies and through buy-out mergers with their nearest market competitors. Blackboard has now expanded into more academic domains as part of a total networked learning environment and as an accompaniment to campus and community-wide networked transaction environments.

The Blackboard Learning System provides the opportunity for students to use the familiar environment of the Internet for educational purposes. The argument is made here that the use of Blackboard as a curricular tool is good from the standpoints of both student learning and faculty instruction. It provides a medium

to present curricular materials in a way that promotes the development of students' organizational, communication, and time-management skills. However, critics point to the pedagogically restrictive nature of Blackboard, its Internet inefficiencies, its need for troubleshooting, and most significantly, its increasing cost. Viable alternatives are being found in open-source learning management systems.

The Blackboard Learning System has found a home in distance learning with university and college courses taken totally online, but also as a complement to more traditional instruction in hybrid courses and courses in which other digital environment learning systems may be the primary means of instruction. What lies in the future for Blackboard and other course management systems? It is likely that instruction will become less course-centric and more knowledge-centric. Open-source software for instruction and learning will become increasingly available. The technology will undoubtedly become less of a goal in learning and more of a tool. The systems will evolve to allow students to progress at their own rates with instructors serving as guides for the learning process. Motivation of students in the online learning environment will show benefits in a skilled and knowledgeable society.

REFERENCES

1. S. Jayson, Blackboard Breaks Through, *The Motley Fool,* www.fool.com/News/mft/2006, May, 2006.
2. M. Pittinsky and T. Bell, From the Dining Hall to the Campus Bookstore to a Networked Transaction Environment: Overview White Paper, *Blackboard, Inc.,* 2005.
3. M. Pittinsky, *The Networked Learning Environment: Overview White Paper,* Blackboard, Inc., 2004.
4. Y. Belanger, *Summary of Fall 2003 Blackboard Survey Results,* Blackboard.duke.edu/pdf/Bb_ survey_report_f2003.pdf.2004.
5. Bowdoin College, www.bowdoin.edu/it/erd/blackboard/pedagogy/files/bb-StudentSatisfaction.ppt, 2005.
6. E. E. Bhagyayati, S. Kurovsky, and C. C. Whitehead, Using Asynchronous Discussions to Enhance Student Participation in CS Courses, *ACM SIGCSE Bulletin, 37*:1, pp. 111-115, 2005.
7. D. Patterson, Encouraging and Assisting Faculty Incorporation of Innovative Classroom Technologies, *ACM Press* (459041), pp. 79-81, 2004.
8. P. Bradford, The Blackboard Learning System, *Conference on Instructional Technologies, 15,* pp. 61-62, 2006.
9. D. Carnevale, Study of Wisconsin professors finds drawbacks to course management systems, *Chronicle of Higher Education, 49*:43, p. 26.
10. E. J. Servonsky, W. L. Daniels, and B. L. Davis, Evaluation of Blackboard as a Platform for Distance Education Delivery, *ABNF Journal, 16*:6, pp. 132-135).
11. B. Henn, *Microsoft-Blackboard Partnership Stirs Debate,* Dailyprincetonian.com, December 4, 2001.
12. S. L. Arnold, Blackboard Acquires WebCT: Clash of the Titans? *AFT On Campus,* p. 14, December/January, 2006.

13. R. Culatta, *Top 10 Reasons to Mobilize*—Chris Thomas (Intel), Wideopendoors.net/blog/archives/2004, 2004.

14. F. Olsen, Getting Ready for a New Generation of Course-Management Systems, *Chronicle of Higher Education, 48*:17, pp. 25-28, 2001.

15. C. Bonk, R2D2 on the Matrix: A Galaxy of Online Learning Style, Motivational and Blended Learning Examples, *Conference on Instructional Technologies, 15,* p. 29, 2006.

16. C. Graham, K. Cagitay, B. Lim, J. Craner, and T. Duffy, Seven Principles of Effective Teaching: A Practical Lens for Evaluating Online Courses, www.westvalley.edu/trc/seven.html, 2001.

17. A. Pickett and P. Shea, Improve Your Online Course, *Conference on Instructional Technologies, 14,* p. 107, 2005.

18. S. S. Adkins, *Wake-Up Call: Open Source LMS,* www.learningcircuits.org, 2005.

19. P. Galli, *O'Reilly Gazes Into the Future of Open Source,* www.eweek.com, 2003.

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