Learning Support Infrastructure Work Group

FINAL REPORT

to

Desire2Learn/Learn@UW Steering Committee

May 30, 2008

Submitted by:

Task Force Members:

Kathy Pletcher (Sponsor), UW-Green Bay
Alan Foley (Chair), UW-System
Alan Aycock, UW-Milwaukee
Jeff Bohrer, UW-Madison
Aaron Brower, UW-Madison
Patricia Fellows, UW-Colleges
Daniel Frommelt, UW-Platteville
Julie Furst-Bowe, UW-Stout
Dirk Herr-Hoyman, UW-Madison
Valerie Malzacher, UW-River Falls
Peter Mann, UW-Madison
Laura Pedrick, UW-Milwaukee
Andy Speth, UW-Green Bay
Nicholle Stone, UW-Stout
Lorna Wong, UW-Whitewater
Brian Udermann, UW-LaCrosse

Table of Contents

Introduction

> Our approach to learning must be based on an integrative understanding of being human. We educate the whole person, and in doing so we prepare University of Wisconsin graduates to contribute to and live responsibly in a diverse, interconnected, and technologically sophisticated global community. To these ends, we need to design learning environments that fit with how students interact with the world today – using a variety of learning tools, methods, and pedagogies (including technology), and with a focus on student learning and not merely on "delivering" instruction.
>
> *Advantage Wisconsin*
> *Think Tank Report, 2007*

Background

In 2002 a Task Force on e-Learning investigated the learning technologies landscape and issued a report that led to the acquisition and implementation of a centralized learning management system, Learn@UW. Since that time, many new technologies have emerged, while others have become less central to e-Learning, prompting a need for re-evaluation. Toward that end, in July 2007 the Learn@UW Steering Committee created the Learning Support Infrastructure Work Group (hereafter referred to as eLWG) to review e-Learning technologies and make recommendations for a vision and strategic direction for a learning support infrastructure over the next five years. The eLWG was charged with:

- Assessing the UW System's e-Learning architecture;
- Examining the application of new collaborative learning pedagogies, Web 2.0 technologies, and learner-centered interactive technologies; and
- Considering support issues related to the growing use and demand for new learning technologies.

The eLWG gathered information from a variety of sources, including the 2007 Web-based Learning Survey of UW System faculty and instructional staff, the 2006 ECAR Survey of Student Use of Technology, the 2007 Horizon Report, and faculty/instructor focus groups conducted during the year (Appendix D).

Context

In the 2007 State New Economy Index, Wisconsin ranked 31st in the extent of its participation in the knowledge-based economy. The U.S. Census Bureau also ranks Wisconsin 31st in the percentage of people 25 years and over who have completed a bachelor's degree. These rankings are troubling in light of the increasing competition the state faces as it makes the transition to a knowledge-based economy.

Compared to the 20th century industrial economy, the 21st century's knowledge-based economy requires more baccalaureate and advanced degree holders. First world economies can no longer compete on industrial power and low-skilled labor, but must rely on creativity, innovation, and adaptability to thrive in this new era. The new work world rewards flexible, lifelong active

learners who have an entrepreneurial approach to their careers. To meet the economic workforce needs of the state and the imperatives of the knowledge-based economy, the UW System must increase its production of baccalaureate and advanced degree holders.

In its strategic framework, *Advantage Wisconsin*[1], the UW System outlined a set of goals and action steps that will position the state to meet these challenges. As the eLWG undertook its charge, the Advantage Wisconsin themes of openness to innovation, student mastery of integrative learning skills, increasing access to higher education for adult students, increasing capacity to deliver degrees at the undergraduate and graduate levels, operational excellence, and increasing collaborative activity—across courses, disciplines, UW System campuses, and cultures and communities—were discussed in relation to the e-Learning landscape. The nine overarching recommendations presented in this Report are more than a set of good ideas and best practices: they are determining factors in Wisconsin's ability to adapt to the realities of the 21st century globalized knowledge economy.

Current Learning Support Infrastructure

The University of Wisconsin (UW) System[2] uses a "Utility" model for provision of a common learning management system (LMS) to all system campuses; the Utility is called Learn@UW and currently employs Desire2Learn (D2L) as its LMS technology. The D2L / Learn@UW project became operational in June 2003, and by July 2004 all campuses had successfully migrated from other e-Learning platforms[3] to the D2L platform. A faculty survey in Spring 2007 showed a very high satisfaction rate with both the D2L product and Learn@UW services. Currently, most of the 160,000+ UW students have one or more Learn@UW courses and more than half of UW courses are using Learn@UW to deliver instruction online or enhance the learning experience in the traditional classroom. While there are numerous online programs using D2L, about 80 percent of current use enhances face-to-face instruction.

In its assessment of the elearning landscape, the eLWG was charged to consider:

- The Future of the Utility Model - Originally conceived, the Utility (Learn@UW) was an operations-only entity, but as use has expanded, campuses need new and emerging kinds of support.

- The Blackboard Patent Issue - In early 2006, Blackboard was awarded a patent on CMS technology and filed suit against Desire2Learn in late July 2006[4]. Aside from the overall shock to the educational technology establishment this case has caused, the University of Wisconsin System is a major Desire2Learn client and this development has introduced another variable into our long and short-term plans with this technology. We need to develop a plan for dealing with the various outcomes of this lawsuit (e.g. increase in licensing costs, loss of product support and development, change in core functionality).

[1] http://advantage.wisconsin.edu/

[2] The University of Wisconsin System is one of the largest systems of public higher education in the country, serving more than 160,000 students each year and employing more than 32,000 faculty and staff statewide. The UW System is made up of 13 four-year universities, 13 freshman-sophomore UW Colleges, and statewide UW-Extension.

[3] Primarily WebCT Campus Edition and Blackboard.

[4] http://chronicle.com/temp/reprint.php?id=5g41b7txfvjcn74cbzk1128x9g4trw1x

- Additional Tools and Needs - University of Wisconsin instructors using web-based e-Learning tools increasingly need access to whiteboard, application sharing, presentation tools, and other synchronous tools as part of their e-learning offerings. Since the implementation of Desire2Learn (D2L), there has not been an integrated suite of tools available to provide these functions. The changing nature of instruction and the evolving LMS environment necessitate a thorough assessment of needs, tools and vendors. With this assessment, we can identify a stable, sustainable, scalable, and financially viable set of tools for the University of Wisconsin.

Vision

Our vision is one of highly engaged students and instructors, working collaboratively among distributed groups without concern for geographical restrictions in an extended campus that embraces the entire state, learning in an environment enhanced by the innovative and effective use of technology. We seek a robust teaching and learning environment characterized by operational and functional excellence, with rapid innovation and deployment of promising technologies, in which opportunities meet innovators, and barriers to early adoption are disentangled. We want and expect an accurate assessment of student learning and the efficacy of the technological element. This vision recognizes the contributions technology-enhanced learning makes in broader System initiatives such as in helping students recognize the LEAP[5] Essential Learning Outcomes.

Key Recommendations Summary

The following recommendations all exist in the context of the Vision laid out by the eLWG in which the next 5 years of elearning infrastructure development will facilitate engaged learning that occurs in an environment enhanced by the innovative and effective use of technology. These three Key Recommendations are ones that we feel are either of the most pressing need or would have the most immediate impact across the UW; however, they should not be considered in absence of our other recommendations.

1. **Provide support for a diversified approach to access to high quality content**
   We support a diversified approach to the learning object repository concept that includes the efforts already in place within UW (e.g. UW Digital Collections, MINDS@UW, and Wisconsin Federated Registry[6]) and that allows content to be shared outside of the learning management system (LMS).

[5] http://www.aacu.org/advocacy/leap/index.cfm
[6] http://wfr.wlearn.com/

2. **Implement Federated Identity Management**[7]
   Teaching and learning in a virtual environment requires that faculty and students can easily collaborate with partners, access restricted digital resources, take courses, and access administrative services. We expect the on-going development of a well managed, common approach to authentication and authorization that enables the portability of identity information across multiple resources and systems.

3. **Have an exit strategy**
   Ideally any newly implemented technology solution will be a long lasting partnership; however, there are unforeseen circumstances (i.e. lawsuits, vendor bankruptcy, and change in technology or security) that can force a conversion to a different technology solution. Faculty and students should be forewarned of such possibilities and be prepared for an exit strategy to any technology services. All new UWS technology systems should have an exit strategy as part of the Request for Proposal (RFP) process and as part of any implementation. In particular, this suggests the means to "export" content should be demonstrated and well understood before any broad use of these content technologies.

Advantage Wisconsin Impact Summary

An important aspect of the eLWG's approach was considering the Advantage Wisconsin themes and the following table summarizes the key impacts of the eLWG's recommendations on Advantage Wisconsin. A more detailed version of this table appears in the Conclusion of this report.

eLWG Recommendation	Advantage Wisconsin Impact
Provide support for a diversified approach to access to high quality content	**Prepare Students** Ensure that students are prepared with the integrative learning skills, multicultural competencies, and practical knowledge needed to succeed in and contribute to a rapidly changing, increasingly global society. **Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient. **More Graduates** Increase the number of Wisconsin graduates and expand educational opportunities through improving access and increasing retention and graduation rates.

[7] Identity management allows us to tell if individuals are who they say they are, whether they are affiliated with the University and what entitlements that affiliation allows. It permits data custodians and service providers to control access to information and/or services, according to an individual's identity, roles and responsibilities (http://www.vc.wisc.edu/Docs/IMLG_Progress_Report_November05.pdf)

Implement Federated Identity Management	**Collaborations** Further leverage UW System's strengths and impact through collaborations among the campuses and with other Wisconsin partners. **More Graduates** Increase the number of Wisconsin graduates and expand educational opportunities through improving access and increasing retention and graduation rates. **Stronger Communities** In partnership with communities, address Wisconsin's greatest challenges and priorities through intensified engagement, research, and learning.
Have an exit strategy in mind when adopting technology solutions	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient. **Resources** Balance, diversify, and grow the university's financial resources and facilities while developing its human talent.
Create and maintain a centrally managed instructional technology sandbox environment	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.
Charter a task force to formally review the Utility model	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.
Develop a structure or process by which individuals can identify, locate, and connect with peers and colleagues	**Collaborations** Further leverage UW System's strengths and impact through collaborations among the campuses and with other Wisconsin partners.
Invest in the expansion and utilization of student technology employees	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.

Review campus learning technology support resources regularly to ensure adequate support as the technology demands increase	**Resources** Balance, diversify, and grow the university's financial resources and facilities while developing its human talent.

Ensuring Access to High Quality Content

Introduction

A robust teaching and learning environment is dependant on and supported by the use of technology infrastructure to support engagement/active learning, pedagogical strategies and environments that engage student in active learning, sharing and access to high quality content. This section will focus on ensuring access to high quality content.

High quality, authoritative information serves as a cornerstone of teaching, learning, and research. Effective educators must present content in their curriculum that fosters student learning, and students and faculty need ready access to a wide range of critical information sources that support educational and research endeavors. Collaboration of great ideas in higher education must be fostered. When faculty excel at specific topics in a subject and are willing to share the materials that they have developed to effectively teach a subject, those learning object resources become extremely valuable to all faculty in that related field as well as to all students and faculty throughout the UW System.

Vision for High Quality Content

In the eLearning environment, students and faculty must have instant access to digital information content to support their teaching, learning and research. High quality information resources, including those that libraries purchase, lease, or create locally, must be expanded so that faculty and students can access information in all areas of knowledge, especially in new fields that are growing rapidly. Premium research content, while costly, must be increased so that students and faculty throughout the UW System, no matter where they are located, can equitably access needed information resources. Concurrently, the tools needed to discover these resources must evolve to meet user needs and expectations.

> *My professors expect that I will use high-quality, peer reviewed resources to complete assignments. I can link directly from my courses in D2L to the online articles, books, book chapters and other digital resources that they require for outside reading. This is very convenient for me, since I can access these materials from my home, my place of work, and even from Europe while I was traveling on Semester Abroad. When I conduct my own research for papers and presentations, my professors often link to the catalogs, databases, and reference resources that they recommend I search for their class. I appreciate this guidance, as there are so many library resources available to me that I am sometimes baffled by all the choices*[8].

An environment in the form of a learning object repository that provides knowledge-based organization facilitates searching, peer review, and sharing of online content is a natural extension of the common learning management system. Such a repository empowers faculty to

[8] Throughout the report there are italicized scenarios designed to provide perspective and illustrate the concepts being discussed. These scenarios are composite sketches drawn from the experiences and perspectives of the eLWG members, faculty interviews, and conversational data.

develop digital content and unlocks knowledge outside the framework of single courses. Such a repository also sets UW in the direction of e-Learning globalization, a concept that is already realized by other Higher Education institutions such as OpenCourseware at MIT[9], and the Utah OpenCourseWare Alliance[10].

> *I teach a chemistry course and many of the concepts that I try to introduce are very well illustrated with animations or simulations. I have created a variety of these small learning objects using videos, screen capture tools on my tablet PC with narration. I am able to do a few Flash animations but I am not skilled enough with action script, thus my own production is somewhat limited. I am fortunate that I am able to land some remarkable learning objects that my colleagues have created and willing to share on the Internet. As I assemble my course, I would very much like to be able to reuse these modules without having to copy or upload them from one place to another. A single reference to the same object would be helpful. As I sometimes use the same object in quizzes or another related module, changing one means I have to keep track of them multiple times. When I teach from one semester to the next, I have multiple copies of the same module in different courses. Some colleagues would like to use my modules, but it is rather cumbersome to share within the same department even though we are using the same course management system. I sometimes use simple interactions in my modules in my online assignments, but I cannot assess the student's success. There has to be an easier way. I would also like to ask students to create small learning objects to demonstrate their understanding on the concepts. However, I have a tough time finding authoring tools that students can pick up without a steep learning curve. The simplification of the whole authoring, storage and archival environment will be very helpful in my discipline.*

The new wave of Web 2.0 technologies provide new resources as well as possibilities for repositories not available before. While the future of these fast growing media rich web services is yet to be determined, these services can facilitate faculty in sharing their learning objects easily as well as provide quality resources for their courses. Faculty are encouraged to explore these new services - from YouTube to Flickr and from iTunes-U to Google Docs. Each of these services promotes open sharing, provides easy access and is free. Participation will ensure Higher Education to have a place in shaping the future landscape of the Internet.

[9] http://ocw.mit.edu/OcwWeb/web/home/home/index.htm
[10] http://pilot.educommons.usu.edu/uocwa/

The recent media extension of the general access lab on campus is really a godsend to my language class. Students can go the media lab to check out digital cameras, audio recorders, reserve a studio time to do short taping sessions, and edit their recorded video and audio with the easy-to-use software, then upload them as podcasts on the iTunesU server and easily access them from D2L. The support and instructions at the media lab are incredible. The student assistants are well trained and well informed. My students feel very comfortable going there. I regularly make assignments such as role playing exercises, or recitation of poems and passages in the language. It is so easy for me to assist students on their enunciation and proper use of the spoken dialect. I regularly make audio and video comments using my webcam in my office and send them back to students through iTunesU. Students can review each other's work and make their critique aurally too. Some group projects are linked directly to student portfolios, and some students decide to share their work with the world on YouTube! Media technology really brings my language class to a different level of engagement! I heard that many faculty in various disciplines are now expanding assignments and class projects to media to encourage creativity beyond the written format as well. The media lab for students is much more popular than the general access labs for email and word processing five years ago!

Recommendations

1. **Support a diversified approach.**
   Various endeavors have been pursued by different groups in the past few years. With the rapid development and availability of digital asset repository that fits different technology formats, recommending a single learning object repository (LOR) solution may not be prudent, from a cost effective as well as a technology perspective. We support a diversified approach to the learning object repository concept:

   a. While most digital assets associated with a course are likely to be deposited inside the learning management system (LMS), we suggest that these content should be easily shareable outside of the LMS for flexibility and avoid the possibility of being locked into a specific system.

   b. We encourage faculty to take advantage of free digital content repositories that are quickly evolving and growing into robust services used by many. Such services can result in substantial cost saving for those willing to expose their work in the spirit of open sharing to all.

   c. We should leverage the efforts already in place within UW – such as the UW Digital Collections, MINDS@UW, and WFR/LCS project and investigate the possibility of building learning object repositories customized to UW e-learning needs.

   d. Regardless of how content is stored in the long or short term, a common registry for digital content with a comprehensive index and easy searching is crucial to the LOR

concept. The WFR (Wisconsin Federated Registry) project currently managed at UW-Extension can be our solution and should be investigated.

2. **Implement Federated Identity Management.**
   Teaching and learning in a virtual environment requires that faculty and students can easily collaborate with partners, access restricted digital resources, take courses, and access administrative services. We expect the on-going development of a well managed, common approach to authentication and authorization that enables the portability of identity information across multiple resources and systems. A Federated Identity Management approach would serve UW well for access to high quality content. The In-Commons Federation, which the Madison campus has already joined, can be a likely model for UW to consider. Licensed content providers for UW should also be encouraged to join In-Commons.

3. **Have an exit strategy.**
   Ideally any newly implemented technology solution will be a long lasting partnership. However, there are unforeseen circumstances (e.g., lawsuits, vendor bankruptcy, and change in technology or security) that can force a conversion to a different technology solution. This can be especially unpredictable in free repositories in the social computing world. Faculty and students should be forewarned of such possibilities and be prepared for an exit strategy from any technology service. All new UWS technology systems should have an exit strategy as part of the RFP and as part of any implementation. In particular, the means to export the content should be demonstrated and well understood before any broad use of these content technologies.

Rapid Development / Deployment

Introduction

Our vision is to foster an atmosphere of collaborative innovation with the use of academic technologies. We believe there is inherent value in exploring emerging technologies for their application to the teaching and learning process and that it can be done in a cost-effective and efficient manner. We desire to lower the cost, reduce the risk, and increase access to the process of investigating new pedagogical technologies.

> *A few professors, on different UW campuses, hear about a new technology and think that it might fill an instructional need in their classes. Working with others in position to support instructional technology on their campuses (e.g., LTDC representatives), they decide to collaborate, to try out this new technology, to evaluate its usefulness relevant to their needs, and explore possibilities for future adoption. They are willing to put in the time and effort to try it, but they need access to the technology.*
>
> *There are options: contract with someone outside the UW willing to host for a fee, set it up and host from a single UW campus, or work with the "instructional technology sandbox" - a utility installation managed by UW. After discussion they decide to pursue the UW sandbox available to all campuses involved.*
>
> *They write a brief proposal that includes: the people involved, pedagogical objectives of the proposal, the applications and technologies required, the scope of involvement requested of the host, a timeline, a commitment to disseminate findings in a timely manner, and appropriate means to evaluate the success of the project. This proposal can be submitted at any time of the year, as need and opportunity meet, and is evaluated very soon after it is submitted.*
>
> *Their brief proposal is evaluated by a governing group (review team) consisting of people actively involved in teaching and learning and instructional technology, and members of the utility or campus service provider. Their evaluation is based on an established rubric that promotes innovation, sound pedagogy, and student engagement.*
>
> *The host manages web servers with configurations necessary for these innovative technologies and has staff in position to install and configure them. The requested and approved technologies are installed and made available to the people involved. Federated identity management makes it relatively easy to control access. The initial pilot runs its course and the professors involved present their findings.*

(Another relevant scenario can be found in "How to Find What Clicks in the Classroom"[11].

Recommendations

4. **Create and maintain a centrally managed instructional technology sandbox environment.**
   This environment, equipped with hardware and software capable of supporting modern applications, would provide a place for new teaching and learning tools to be housed. These tools would be accessible to appropriate UW faculty, students and staff regardless of their campus affiliation.

   a. Invite proposals by UW faculty, students and staff for the purpose of establishing the initial set of instructional tools to be installed in the sandbox. The suite of applications would be determined through a brief proposal process reviewed by the governance group described below.

   b. Create a governance group to oversee a cursory review process. Likely members would include a small combination of faculty and academic technologists. [Note: this proposal process is not intended to supplant or diminish the current LTDC Curriculum Redesign grant.]

   c. Consider both local and outsourced hosts: In addition to a locally hosted (at any particular UW institution) server environment, the instructional technology sandbox would also comprise third-party hosted services when appropriate.

   d. Implement federated ID management across the UW System. Although not technically required for the instructional technology sandbox, federated ID management across the UW System would bring many benefits to such an environment including single sign-on capability for the user of the sandbox.

[11] Tabron, Judith (2008). How to find what clicks in the classroom. *The Chronicle of Higher Education, 54(29), A1.* Available online at http://chronicle.com/free/v54/i29/29a03801.htm

Analyzing the Utility Model

Introduction

The University of Wisconsin (UW) System uses a "Utility" model for provision of a common learning management system (LMS) to all system campuses; the Utility is called Learn@UW and currently employs Desire2Learn (D2L) as its LMS technology. We are limiting our analysis to our current model - a common LMS utility, but recognize this model's applicability across elearning technologies. In this section, we will describe the pros and cons of what we are currently doing and how it works well and areas that need address going forward.

Advantages of the Utility Model

From a financial perspective, this model provides consolidation of costs and expertise to run the service. UW enjoys lower licensing costs as a result of this economy of scale, as well as consolidation of costs resulting from only requiring one set of servers and requisite licenses/services to support the servers (e.g. Operating System and database licensing, maintenance, security, networking). The Learn@UW Utility is able to leverage access and availability of Enterprise level services (e.g. backup, storage, platform redundancy) and has access to a critical mass of expert staff resources. Additionally, the Utility model provides Enterprise level application and services for smaller campuses that might not be able to otherwise provide the necessary resources to support such a (level of) service.

From a pedagogic and user experience perspective, the Utility Model provides uniform software for users across courses and campuses. The consistency across campuses and within institutions provides familiarity – faculty and student, instructional staff, and support staff do not have to "switch gears" across learning systems and provides opportunities for more collegial support. The Utility Model encourages and supports sharing of instructional and faculty development expertise across campuses. We have found this "whole greater than sum of its parts" to be true since the original implementation, drawing on the collective intelligence of the Learning Technology Development Council, and the D2L Site-Administrators. Consistent services raise adoption and dissemination rates. Faculty surveys in Spring 2005 and 2007 showed a very high satisfaction rate with both the D2L product and the Learn@UW service.

Disadvantages of the Utility Model

A primary concern is that of risk aggregation. When there is a failure (as Learn@UW has experienced during periods of peak usage - beginnings and ends of semesters), everyone is affected. The Utility Model will have a bias towards being conservative in change. In the equation of risk and benefit, any change will be seen as having risk by everyone, while the benefits may only be seen by a few. This may be great for stability, it can stifle innovation.

The size of the Learn@UW deployment also raises issues. Because of the size and specialization of our implementation, it is harder to find peers for collegial sharing. We have had success in working with the D2L multistate group, but still have unique problems. With the sheer size and scale of our implementation in which we only have 2 or 3 peers nationally. Because of the statewide nature of the implementation and the nature of courses augmented or delivered online,

it is difficult to find windows for downtime (maintenance, upgrade). More online courses will only limit those windows.

Needs and Lessons Learned

Technology emerges and evolves at an incredible pace, which creates significant challenges to those who use, support, and develop (users, service providers, vendors, etc.). One particular challenge is knowing which technology offers a competitive advantage and how to leverage its functionality.

Extensibility

To a certain extent, extensibility mediates the pros and cons of a LMS by attempting to take advantage of changing technologies and local pedagogical needs without forfeiting the advantages of a utility model. A good Utility should have extensibility as one of its main technological underpinnings and clearly is a necessity in the new world of Web 2.0. This does raise issues of policy, under what circumstances should campuses or, within a campus, departments or programs, be allowed or encouraged to experiment with specific solutions to issues that have been identified? What counts as a "need" or a "solution" in this context? Coordination of approaches to extensibility need not be prohibitive, but must be made explicit.

Sharing of Content

Sharing of content (i.e., offering courses across several campuses) is, or should be, a "pro" of the utility model. The fact that we must address the matter here implies priority: at present we are not able to realize this component of our LMS, and there is no simple resolution of the matter at hand. Yet when we lack a feature of such basic pedagogical advantage, there needs to be a mechanism to find a satisfactory fix, or at least a workaround, at the utility level.

Risk Management

Given the rapidly changing and somewhat unstable state of the course management system landscape, and the issues noted above specific to the Learn@UW service, a risk management plan is a requirement moving forward. Developing a backup plan and even an exit strategy is a task that requires careful attention at our early convenience. Absent an enthusiastic response from a LMS vendor, it falls to the Utility to undertake the task of applying pressure appropriately to elicit that response, or to devise a component of a risk management plan that at least identifies what must be done should the worst occur (cf. "Managing IT Risk in Higher Education: A Methodology", Mar 18, 2008, http://www.educause.edu/ir/library/pdf/ecar_so/erb/ERB0806.pdf).

Recommendation

5. **Charter a task force to formally review the Utility model.**

Collaboration

Introduction

Collective intelligence offers advantages by leveraging the expertise of many individuals, which is more productive than the isolated intelligences of disconnected, distinct individuals. It is through collaboration and communication that this collective intelligence is enhanced, shared, and put into practice. Collaboration fosters innovation.

A component of the academic experience involves collaborative activities to increase and enhance collective intelligence through traditional means - connecting people through physical spaces (e.g. classrooms, shared learning spaces). With the advent of the digital age, this has expanded through virtual learning spaces (e.g. virtual group spaces, Web 2.0). Aligning and leveraging the strengths of both these physical and digital realms will improve one's ability to connect with others with common interests/goals and work collaboratively regardless of physical location and campus affiliation. It is in our own best self-interest to do all we can to encourage and facilitate collaboration between distributed groups and individuals.

What Collaboration Means

Our vision of collaboration in the UW system is one where faculty, instructors, and students will use technologies and services to collaborate with peers across the UW System institutions (and beyond) in research and learning contexts. This environment will foster opportunities to share knowledge, expertise, and innovations within existing and expanding peer communities. In the context of learning, collaboration is central to active and engaged learning where groups of students can interact as well as faculty and students.

The following real-life example illustrates collaboration across a broad peer group unfettered by constraints such as time, geography, or course affiliation.

> *In the past, collaboration in my classrooms has been restricted to specific assignments, all completed within the framework of a lesson, unit, or even semester. With Web 2.0 technology now readily available, I have developed a collaborative project that will extend beyond the limitations of a single semester and class. Using MediaWiki, my students are currently developing a literary resource that will not only be used by my students in the upcoming semesters and years, future students will also be contributing to that resource. In short, I have students in 2007 that are collaborating with the students of 2011, and they know it. I am able to explain to them, right now, the purpose of the project and how it will be maintained in the future. This was impossible in the recent past, and the technology has redefined the borders of my classroom and how I can define "collaboration." Previously, I have experimented with various Web 2.0 technologies from different free services on the Internet. I was never sure of the stability of the service or long term support. Now, with local campus Wiki environment that I can rely on, I feel very comfortable and encouraged to continue building on this type of collaboration.*

We envision a comprehensive portfolio of services that accommodates the wide breadth of needs of students, faculty members, and staff. From the user perspective, it is important that these services offer flexibility (e.g. customization, feature sets), availability (e.g. integration with other services), and ease of use to enable collaboration. Through these services, existing (and potential) communities will identify opportunities, connect with each other, leverage their strengths, and find strategic alignment. The Learning Technology Development Council (LTDC) provides a successful example of such collaboration.

> *The UWS LTDC group is a group of instructional technologist representatives from all UW campuses. They meet on a regular basis via conference calls and occasionally face to face meetings to share knowledge and expertise, and collaborate in projects that advances the effective use of technology in teaching and learning. Some recent significant examples that benefit UW include the establishment of hybrid learning program at UWM, D2LLO project for D2L faculty training modules, the study of clicker technology by UWM, UWW, UWEC, UWO, podcast technology (UWM, UWW, UWC, UW-Madison, UWL), Wiki technology (UWW, UWGB) and many more. Campuses benefit each other's experience and leverage resources of UW campuses as a whole.*

The Curricular Redesign Grant program (overseen by the LTDC group) leverages collective intelligence in technology projects to a broader audience than a local level.

> *In the Intercampus Community of Practice (ICoP) project, 26 faculty from 6 UW campuses learnt about the possibilities of incorporating current technology into their courses while sharing their experience with each other. In the student response system project, 29 faculty from 4 campuses explored clicker technology for the first time and successfully established the technology in these campuses after a one year project, 72 faculty were able to be trained on the diverse applications of GIS system in their disciplines because expert faculty from UW-Superior was willing to share his expertise in two rounds of two day workshops. Emerging Technology grants allow pilot investigations on Second Life Virtual World and Flash technology. The collaborative opportunities of UW faculty were highly enhanced by the availability of Curricular Redesign Grants through the years.*

One important facet to highlight is the availability of a Federated Identity Management system, to allow people to use services, wherever they are offered. The ability to use a single identity, through a common authentication source, to connect with an extended network of peers and services would encourage collaborative opportunities.

From an administrative standpoint, the services must be cost-effective, regardless of where they are funded (e.g. campus, unit, or user). Sustainable funding is necessary to assure ongoing service, increased collaboration and expanding collective intelligence through peer communities.

Vision of the Future

The University of Wisconsin will provide an array of technologies at a System-wide level to facilitate intra- and inter-institutional collaboration. Students, faculty members, and staff will connect with each other, build relationships, contribute, learn, and innovate through available and easy-to-use technologies. Desirable outcomes will supersede any bureaucratic barriers.

Recommendation

6. **Develop a structure or process by which individuals can identify, locate, and connect with peers and colleagues.**
   Eliminating barriers, developing a technical environment conducive to collaboration, and building on existing communities are necessary steps toward building an effective collaborative educational environment but they are not sufficient to ensure its success. We recommend forming a task force to work on this mission.

People Support

Introduction

The most important resource in any organization is its people. Without the right people in the right jobs, even the best technologies and processes cannot succeed. In order for UW-System to achieve its strategic goals, we must not only implement new technology solutions, but we must also leverage the strengths and passions of existing faculty, staff and students, and provide on-going support for its most valuable resource: people.

The Vision of People Support

The success of any technology is directly based on the adoption rate, understanding and functionality of the product by the people. The vision of people support is one that is strongly distributed and transparent in nature. To be able to adopt a new technology solution with minimal frustration is directly relational to the quality and variety of support for the end user. This support may take many forms from paper and online manuals to instructional technology staff, peer faculty and trained student support staff.

> *My students discussed their excitement with MP3 players and inquired about getting my lectures available as a podcast. Not knowing what to do for them, I discussed the subject with my peers who directed me to the Instructional Technology Office. After a brief meeting with their staff and students, I was developing and releasing my first audio podcasts to my students through iTunesU. After a bit of experience and even some helpful advice from some of my students in the class who also podcast, the quality has improved and it now becomes second nature and a standard learning tool in my classes.*

As new technology solutions are added to campuses, similar resources must be applied to the support structure in order to achieve a successful implementation and effective use. Many times support is considered after the fact, but with the correct forethought the support structure can make the investment in a new technology solution an incredible success.

> *The new blogging tool was added to campus. I know that this could be used for my creative writing class, however I didn't know what to do to get it going. I called the training department and they said that they had a manual, but didn't get access to the system until a few weeks prior. They asked if I would mind waiting for them to finish their testing and development of documentation before I stopped over. I'm sure I could use the blogging tool for my students in their creative writing class, but I guess I'll have to wait for another semester.*

Support must be flexible and expandable. As new technologies are adopted, more support is required, especially when the 'depth' of the technology solutions is explored.

> *As I was working in the learning management system (LMS), I realized the quiz feature could be used as a polling application as well. After playing with the LMS, talking to peers and calling the training office, I could now poll the students*

immediately after a lecture and discover if the points I was covering was comprehended. The system is flexible and can do many things I never thought of. I was encouraged to stop by to chat with the Instructional Designer in the Learning Technology Center to discuss other features of the LMS that I might be able to utilize. I told the other faculty in my department about the new capabilities, and now we have a special department meeting with the training office to go over more detailed training. They brought their student staff along who had some great ideas on how to use the tools that were a part of the LMS that we never thought of using.

Current Environment for People Support

There are many good things that are happening right now in people support:

- all institutions have a Learning Technology/Training Office
- both undergraduate and graduate students are involved in support giving them valuable experience and giving full time staff extra assistance
- training documentation for technology solutions are being generated
- some campuses have searchable Knowledge Bases for topics

This however is not enough especially at the current rate of technology growth on each campus.

Knowledge base applications are a great resource both for end users who are trying to support themselves as well as the support staff who need to research something quickly and then update the resource as needed. The ability to give accurate information is the more important feature.

More and more technology solutions are being implemented on campuses. The adoption rates are increasing as more and more faculty and students utilize these resources. Though the learning curves on some applications are minimal for end users, to develop some of these learning objects and get them into solutions such as a LMS requires much more training. Faculty who are currently using a LMS are now using it more fully developing complex content requiring special training on specific features that went widely unused before. This trend is increasing with the current technology, however the number of support staff on campuses have remained largely unchanged.

Recommendations

Since support directly affects the functionality, understanding and adoption rate, it is mission critical to ensure that support is forethought when applying any new technology solution or expanding any current system throughout the UW System. Support should always be a primary feature but also a transparent feature.

7. **Invest in the expansion and utilization of undergraduate student technology employees.** Budgets are traditionally tight and students need work experience. These students gain valuable experience while working with students and faculty.

Use of graduate students could allow tuition breaks for those willing to work in support and maintenance of systems, assist n training faculty and staff and increasing documentation in knowledge bases for end users to support themselves.

8. **Review campus learning technology support resources regularly to ensure adequate support as technology increase.**
   Each technology solution requires frequent re-evaluation to ensure proper functionality. The same must occur with the Learning Technology/Training Office on campus. The staffing of each area should be re-evaluated bi-annually to make sure adequate support is available as the technology solutions on each campus increases.

9. **Develop an online support community for UW faculty instructors**
   Users like to support themselves first. An online community model with a knowledge base allows users to research solutions themselves and allows the Learning Technology/Training Office staff to moderate the community and knowledge base to make sure the information presented to the users is accurate.

Conclusion

The e-Learning landscape is rapidly changing and it is important that the UW System be proactive and innovative in its approach to providing learning support infrastructure. In the eLWG's vision of highly engaged students and instructors working collaboratively in distributed groups across the state and the globe, learning occurs in an environment enhanced by the innovative and effective use of technology. The eLWG advocates for a robust teaching and learning environment characterized by engaged learning, using technology in the best ways possible to support and implement engaged and active learning with rapid innovation and deployment of promising technologies, in which opportunities meet innovators, and barriers to early adoption are disentangled. An important aspect of the eLWG's approach was considering the Advantage Wisconsin themes and the following table outlines the impacts of the eLWG's recommendations on Advantage Wisconsin.

eLWG Recommendation	Advantage Wisconsin Impact
Provide support for a diversified approach to access to high quality content	**Prepare Students** Ensure that students are prepared with the integrative learning skills, multicultural competencies, and practical knowledge needed to succeed in and contribute to a rapidly changing, increasingly global society. **IMPACT** Developing skills necessary to succeed in and contribute to an increasingly global society are dependant on and supported by the use of technology infrastructure to support engagement/active learning, pedagogical

strategies and environments that engage student in active learning, and access to high quality content. High quality information resources, including those that libraries purchase, lease, or create locally, must be expanded so that faculty and students can access information in all areas of knowledge, especially in new fields that are growing rapidly. Access to information must be increased so that students and faculty throughout the UW System, no matter where they are located, can equitably access needed information resources.

Operational Excellence
Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.

More Graduates
Increase the number of Wisconsin graduates and expand educational opportunities through improving access and increasing retention and graduation rates.

Implement Federated Identity Management	**Collaborations** Further leverage UW System's strengths and impact through collaborations among the campuses and with other Wisconsin partners. **IMPACT** Federated identity Management will continue the development of collaborative, inter-institutional, and cross disciplinary teaching and learning activities across the UW System **More Graduates** Increase the number of Wisconsin graduates and expand educational opportunities through improving access and increasing retention and graduation rates. **IMPACT** Federated Identity Management will broaden access to the UW by allowing sharing of resources across the UW System easily and from geographically dispersed locations. **Stronger Communities** In partnership with communities, address Wisconsin's greatest challenges and priorities through intensified engagement, research, and learning. **IMPACT** A Federated Identity Management system will improve one's ability to connect and collaborate with peers in existing and emerging communities. Portable identity management is critical to accessing shared resources and systems and negates the barrier of managing multiple credentials.
Have an exit strategy in mind when adopting technology solution	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient. **IMPACT** Having well-articulated exit strategies will enhance the flexibility and responsiveness of the UW System in responding to changes and developments in technology to support teaching and learning.

	Resources Balance, diversify, and grow the university's financial resources and facilities while developing its human talent. **IMPACT** Developing and exercising exit strategies depends on flexibility, portability, and adaptability. This requires the ability to accept change and adapt, regardless of whether one is leveraging, consuming, providing, or supporting a given technology.
Create and maintain a centrally managed instructional technology sandbox environment	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient. **IMPACT** A centrally managed instructional technology sandbox environment will allow quick and thorough explorations of new and emerging technologies to support teaching and learning.
Charter a task force to formally review the Utility model	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient. **IMPACT** Reviewing the Utility Model will allow the UW System to respond to and address changes in both the needs and strategies of instructors, but also trends in emerging technologies.
Charter a task force to develop a structure or process by which individuals can identify, locate, and connect with peers and colleagues	**Collaborations** Further leverage UW System's strengths and impact through collaborations among the campuses and with other Wisconsin partners. **IMPACT** Chartering a task force to develop collaborative structures will enable the UW System to identify ways to eliminating barriers, develop a technical environment conducive to collaboration, and build on existing communities - necessary steps toward building an effective collaborative educational environment across the campuses and the state.

Invest in the expansion and utilization of student technology employees	**Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.
Regularly reevaluate learning technology support resources to ensure adequate support is available as the technology solutions on each campus increase	**Resources** Balance, diversify, and grow the university's financial resources and facilities while developing its human talent. **IMPACT** The success of any service is largely dependent upon the effectiveness of its support to its users. A consistent and intentional reevaluation of existing support structures and resources is the first step in ensuring the success of emerging and developing technology solutions.
Develop an online support community for UW faculty instructors	**Resources** Balance, diversify, and grow the university's financial resources and facilities while developing its human talent. **Operational Excellence** Advance operational excellence by becoming more flexible, nimble, responsive, and cost efficient.

We hope our recommendations will add to the considerable contributions technology-enhanced learning has made across the UW System and will make continued contributions to broader System initiatives.

Appendix A. - Teaching and Learning with Technology - Review of recent literature

REVIEW ARTICLES

Papastergiou, M. (2006). Course Management Systems as Tools for the Creation of Online Learning Environments: Evaluation from a Social Constructivist Perspective and Implications for their Design. International Journal on E-Learning, 5(8), 593-622.
Database abstract: A study examined recent research on the applications of Course Management Systems (CMS) in academic institutions. Findings revealed that CMS are currently used in a variety of disciplines for on-campus, mixed-mode, and complete online courses; creating such environments by means of CMS still poses significant workload on faculty for structuring online interactions and monitoring and supporting students; and facilities currently offered by CMS still do not effectively support alternative forms of assessment and collaborative knowledge building activities.

Thomas, MK, Lan, Cooper, et al. (2006). Teaching Courses Online: A Review of the Research. Review of Educational Research, 76(1), 93-135.
Author Abstract: This literature review summarizes research on online teaching and learning. It is organized into four topics: course environment, learners' outcomes, learners' characteristics, and institutional and administrative factors. The authors found little consistency of terminology, discovered some conclusive guidelines, and identified developing lines of inquiry. The conclusions overall suggest that most of the studies reviewed were descriptive and exploratory, that most online students are nontraditional and Anglo American, and that few universities have written policies, guidelines, or technical support for faculty members or students. Asynchronous communication seemed to facilitate in-depth communication (but not more than in traditional classes), students liked to move at their own pace, learning outcomes appeared to be the same as in traditional courses, and students with Prior training in computers were more satisfied with online courses. Continued research is needed to inform learner outcomes, learner characteristics, course environment, and institutional factors related to delivery system variables in order to test learning theories and teaching models inherent in course design.

ASSESSMENT AND LEARNING OUTCOMES

DeNeui, D L, & Dodge, T L. (2006). Asynchronous Learning Networks and Student Outcomes: The Utility of Online Learning Components in Hybrid Courses. Journal of Instructional Psychology, 33(4), 256-259.
Author Abstract: The current research focuses on the impact that learning management systems (LMS), specifically the Blackboard interface, are having on courses in psychology. Blackboard provides instructors with access to a powerful web-based instructional platform. One of the main benefits to students is the

unfettered access to virtually anything an instructor presents in the classroom. For example, access to syllabi, course notes, interactive demonstrations, handouts, audio or videotaped lectures are all possible via this interface.

Currently, few empirical studies have examined the impact of LMS on objective measures of student learning.
The current project examines the relationship between the frequency of usage of these various utilities and student performance in a hybrid class. Results revealed a significant positive partial correlation between overall usage and their exam scores. The implications of these findings are discussed with respect to the current course; however, a discussion of the broader pedagogical implications is included as well. Reprinted by permission of the publisher

Hamann, K, Pollock III, P, Wilson, B, et al. (2005). Active Learning through Reading and Writing in Online Discussion Boards: Assessing the Effects on Learner Outcomes. Conference Papers -- Midwestern Political Science Association.

Hamann, K, Pollock, P, Wilson, B, et al. (2005). Does Active Learning Enhance Learner Outcomes? Evidence from Discussion Participation in Online Courses. Conference Papers -- American Political Science Association.

Mayer, R E, & Clark, R C. (2008). E-learning and the science of instruction. Pfeiffer: San Francisco, CA. (book)
Mayer is a cognitive psychologist who has conducted a large amount of research on the efficacy of various forms of multimedia in learning. This book, now in its second edition, recommends appropriate uses of multimedia in instruction, based on Mayer's research.
Contents: E-learning: promise and pitfalls -- How do people learn from e-courses -- Applying the multimedia principle: use words and graphics rather than words alone -- Applying the contiguity principle: align words to corresponding graphics -- Applying the modality principle: present words as audio narration, rather than on-screen text -- Applying the redundancy principle: explain visuals with words in audio or text: not both -- Applying the coherence principle: adding interesting material can hurt learning -- Applying the personalization principle: use conversational style and virtual coaches -- Applying the segmenting and pretraining principles: managing complexity by breaking a lesson into parts -- Leveraging examples in e-learning -- Does practice make perfect? -- Learning together virtually -- Who's in control? Guidelines for e-learning navigation -- E-learning to build thinking skills -- Simulations and games in e-learning -- Applying the guidelines.

Moskal, P, Dziuban, C, Upchurch, R, et. al. (2006). Assessing Online Learning: What One University Learned about Student Success, Persistence, and Satisfaction. Peer Review, 8(4), 26-29.
Author Abstract: The article presents the role of Internet in higher education. More than 73 percent of matured people in the United States use the Internet. In light of

this, universities and colleges are turning to Web-based instruction to serve the needs of the students. Statistics show that more than 2.3 million students used an online course in the fall of 2004 and this educational mode is increasing more than 18 percent a year. The data show how important these online resources in the lives of Net Generation students. The abundance of Internet resources serves as the primary portal of knowledge which gives student an easy access to information.

Thompson, M E, Theis, J G, & Malikowski, S R. (2007). A Model for Research into Course Management Systems: Bridging Technology and Learning Theory. Journal of Educational Computing Research, 36(2), 149-173.
Author Abstract: Course management systems (CMSs), such as Blackboard, Desire2Learn, or WebCT, have become a common resource at universities, colleges, and distance learning organizations. Research into how these systems are used for learning is in an early state. Currently, this research focuses on technical features in a CMS more than research about how people learn. **This article recommends a model for CMS research that equally considers technical features and research about how people learn.** Technical features and learning research are diverse topics. The model was developed by reviewing literature from each topic and should provide a conceptual middle ground. Findings from current CMS research are presented using the model, to show its relevance and adaptability. This model should also ease the process of synthesizing research in CMSs created by different vendors, which contain similar features but label them differently. Implications for developing learning activities in a CMS are also described. (Contains 1 figure and 3 tables.)

Wilson, B M, Hamann, K, Pollock, P H, et al. (2004). Assessing the Impact of Online Discussions on Learning. Conference Papers -- American Political Science Association.

CURRENT TRENDS AND FUTURE OUTLOOKS

Brown, M, & Brown, M. (2007). Mashing up the Once and Future CMS. EDUCAUSE review, 42(2), 8-.
Database abstract: The article reviews two course management systems (CMS) software, including the models Web 2.0 and the Web 1.0.

Creese, Guy. (2007). Google Apps in the Enterprise: A Promotion-Enhancing or Career-Limiting Move for Enterprise Architects? Burton Group 2007, available from http://www.burtongroup.com/Research/PublicDocument.aspx?cid=1111 (password protected)
Publisher abstract: In February 2007, Google announced Google Apps Premier Edition (GAPE), a collaboration and communication solution offered as software as a service (SaaS). Initially combining a portal, e-mail, instant messaging (IM), calendars, document sharing, and concurrent document creation -- all for the price of $50 per user per year -- the solution rapidly caught enterprises' imaginations.
This Burton Group study suggests that quickly adopting GAPE without understanding

its quirks or looking at other alternatives is likely to become a career-limiting move. Happily, looking at the larger picture -- studying a variety of SaaS-based collaboration and content solutions -- is a career-enhancing move. Issues for higher education to consider include the SaaS delivery model, the capabilities of the solution, and Google as a company.

Franke, Thomas L. "How Technology Will Shape Our Future: Three Views of the Twenty-First Century" (Research Bulletin, Issue 2). Boulder, CO: EDUCAUSE Center for Applied Research, 2008, available from http://www.educause.edu/ecar (password protected)
Publisher abstract: This research bulletin explores three of the most compelling views of our longer term future, the role of technology in those possible futures, and the impact these alternative futures may have on higher education. The alternatives range from a future of extreme constraint and possible collapse (Heinberg's peak oil scenario) to one of unprecedented abundance, where most of the current work of higher education will be automated (Kurzweil's singularity). Between these extremes is the more immediate future of globalization and the intensified competitive and collaborative world its proponents espouse (Friedman's flat world).

The Horizon Report. (2007). Austin, TX: New Media Consortium.
Publisher Abstract: The 2007 Horizon Report looks at six selected areas--"User-Created Content," "Social Networking," "Mobile Phones," "Virtual Worlds," "New Scholarship and Emerging Forms of Publication," and "Massively Multiplayer Educational Gaming"--the project draws on an ongoing discussion among knowledgeable individuals in business, industry, and education, as well as published resources, current research and practice, and the expertise of the NMC community itself. The Horizon Project's Advisory Board probes current trends and challenges in higher education, explores possible topics for the "Report," and ultimately directs the selection of the final technologies.

Maloney, E J, & Maloney, E J. (2007). What Web 2.0 Can Teach Us About Learning. The Chronicle of Higher Education, 53(18), B26-.
Database abstract: The article discusses the effects of computer and Internet technology on higher education. While technology has extremely promising benefits for education in the United States, it has mainly been used to facilitate the delivery of content rather than change the ways people are educated. The author believes the problem is that most course-management systems were developed at a time when the Internet was seen primarily as a mechanism for information delivery. To improve this, teachers should look toward the evolution of "Web 2.0," which focuses on new means of creating and presenting data.

McGee, P, Carmean, C, & Jafari, A. (2006). Managing Courses Defining Learning: What Faculty, Students, and Administrators Want. EDUCAUSE review, 41(4), 50-54.
Author Abstract: The use of Learning/Course Management Systems (L/CMSs) has exploded in higher education. Recently, these authors served as editors for a book,

"Course Management Systems for Learning," which explored current L/CMS design and usage by documenting best practices, research, standards, and implementations. Although the final section of the book addressed future designs, for these authors this project raised additional questions not only about the next L/CMS design but also about the next generation of e-learning environments--that is, the complete set of technology tools that students and faculty members will need for support of their day-to-day learning, teaching, and research, whether in face-to-face, online, or hybrid courses. In order to answer these questions, the authors undertook a research study that involved interviews with faculty, scientists, librarians, students, and administrators, who were asked to list the top three advantages and the top three shortcomings of L/CMS, as well as the top three features that they felt would be most useful in the next generation of e-learning environments. The views of faculty, students, and administrators regarding the advantages and shortcomings of current L/CMSs fell into three key areas: compatibility and interoperability, usability, and smartness/dumbness. In envisioning a future e-learning environment, the stakeholders talked about desired features in the areas of smart systems, environment, archives and storage, multimodal/multimedia communication channels, collaboration tools, and mobile computing. (Contains 1 figure and 7 notes.)

McQuiggan, Carol A.. "A Survey of University Faculty Innovation Concerns and Perceptions that Influence the Adoption and Diffusion of a Course Management System." ED492812
Author abstract: Survey research was conducted to describe university faculty innovation concerns and perceptions that influence the adoption and diffusion of a course management system (CMS). Significant differences were found between adopters and nonadopters on their perceptions of the CMS attributes, on their Stages of Concern, and on their communication channels. Nonadopters' perceptions and concerns differed significantly across their intent to use the CMS. Implications for theory, practice, and research are discussed.

New Tech for the Virtual Classroom. (2007). BizEd, 6(1), 56-58.
Journal abstract: The latest versions of course management systems and digital content have enhanced and added features to help educators design more dynamic online courses and to provide the assessment tools needed to meet today's increasingly rigorous accreditation standards. Details of some of the assessment tools available, assistance available for faculty, and how manufacturers are providing more effective e-learning are provided.

Salaway, G, and Caruso, J. (2007). The ECAR Study of Undergraduate Students and Information Technology, 2007. Boulder, CO: EDUCAUSE Center for Applied Research.
Publisher Abstract: This document presents the key findings of The ECAR Study of Undergraduate Students and Information Technology, 2007. This 2007 ECAR research study is a longitudinal extension of the 2004, 2005, and 2006 ECAR studies of students and information technology. The study, which reports noticeable changes from previous years, is based on quantitative data from a spring 2007 survey and

interviews with 27,846 freshman, senior, and community college students at 103 higher education institutions. It focuses on what kinds of information technologies these students use, own, and experience; their technology behaviors, preferences, and skills; how IT impacts their experiences in their courses; and their perceptions of the role of IT in the academic experience.

St. George, A. (2007). Imagining Tomorrow. EDUCAUSE review, 42(6), 106-.
Author Abstract: Each year, the members of the EDUCAUSE Evolving Technologies Committee identify and research the evolving technologies that are having the most direct impact on higher education institutions. The committee members choose the relevant topics, write white papers, and present their findings at the EDUCAUSE annual conference. This year, under the leadership of Committee Chair Art St. George, the committee selected seven evolving technologies, presenting a brief overview at EDUCAUSE 2007. Published below are excerpts from the white papers on each topic, written by individual members of the committee: the Web, by Malcolm Brown; Google Apps, by Sharon Collins and Carlos Morales; Web conferencing, by Kelvin Bentley and Sharon Collins; m-learning, by Saiid Ganjalizadeh; 3D printing, by Michael Berman; virtualization, by John S. Moses; and information lifecycle management and physical storage technologies for digital preservation, by Beth Forrest Warner. The full white papers can be found on the Evolving Technologies Committee Web site (http://www.educause.edu/EvolvingTechnologiesReports). These white papers address many other strategic areas for each evolving technology: key questions to ask; the implementation challenges; the major vendors and how to judge among them; how to proceed and the issues to be addressed; and the likely impacts in the next three to five years.

Willen-Daugenti, T. (2007). The 21st Century Learning Environment: Next-generation Strategies for Higher Education. San Jose, CA: Cisco Internet Business Solutions Group. (Draft—October 19, 2007)

Executive summary: The internet has already enabled the transformation of higher education by streamlining campus administrative processes, enhancing facilities such as dorms and classrooms, enabling digital libraries, expanding access to distance learning, and creating more-engaging learning environments through video and simulations. Even so, many institutions are trying to understand how the next generation of internet technologies will impact their students and institutions. These technologies include Web 2.0, multimedia, virtual presence, gaming, and the proliferation of next-generation mobile devices. In this paper, the Cisco Internet Business Solutions Group presents its vision for how higher-education institutions can use these technologies to enable the 21st Century Learning Environment. In this environment, learners have complete access to any higher-education resource, including experts, lectures, content, courseware, collaborative dialogs, information exchanges, hands-on learning, and research—no matter where they are located. If full enabled, the 21st Century Learning Environment will blur the line between on- and off-campus experiences and remove barriers to learning and research—greatly improving the quality of education for students globally.

Appendix B. - Historical Context of Learning Management Systems at University of Wisconsin

The history of the Learning Management System (LMS) at the University of Wisconsin is a long and fruitful one. UW has been using LMS technology since it first came out in 1996, which follows from the UW's long tradition of distance education.

There are several periods of use. The first, from roughly 1996 until 2002, saw many LMS products used in a period of experimentation. First Class, Learning Space, Web Course in a Box, WebCT, Blackboard, and Prometheus were all products that had some following during this initial period. This was also a period where the web technology itself was emerging and changing rapidly. The second period was launched by an RFP that determined a single LMS for the entire UW to use. That RFP process selected Desire2Learn which was implemented in 2003, replacing several other products most notably Blackboard and WebCT. The LMS here was seen to be at the "center of the online instructional universe," with a few limited integration points to other systems, all of which were run within the UW. We are now in a third period, where the LMS is being widely used, but many other web-based tools are also being used from external (non-UW) sources.

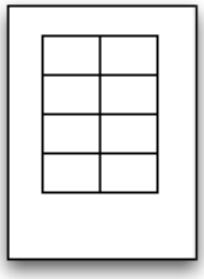

Figure 1: 1998: LMS as self-contained

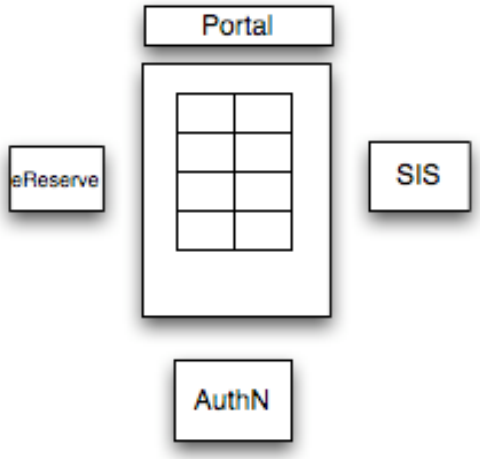

Figure 2: 2003: LMS w/ limited integration

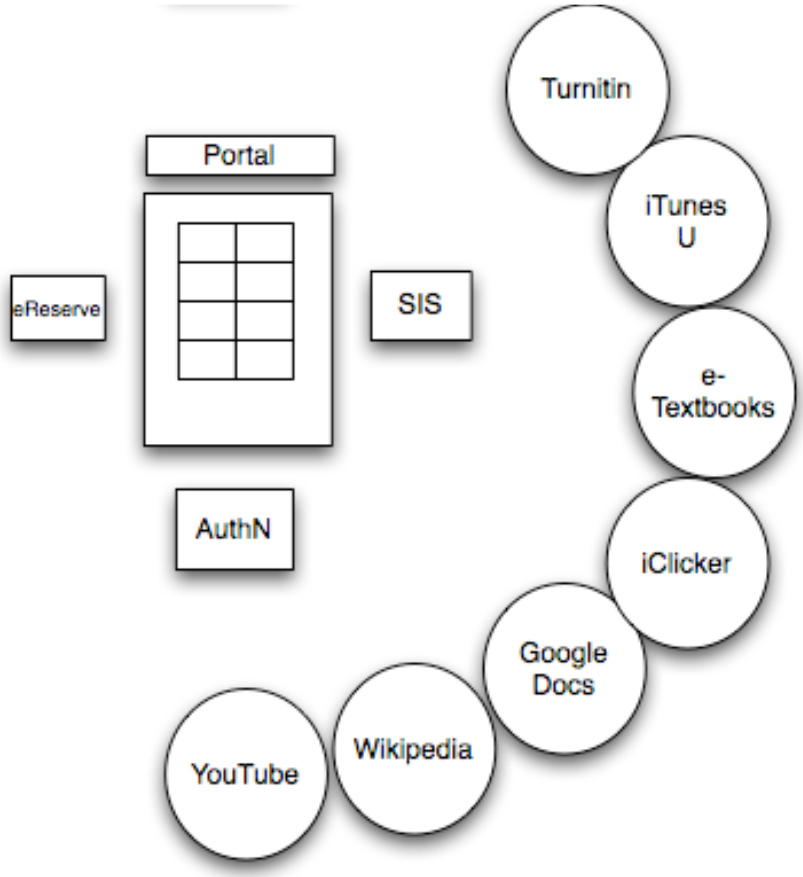

Figure 3: 2008 LMS and many others

The trend here is that the LMS, and by extension the Web, has gone from being a novelty item for a few pioneers to a mainstream "enterprise" system that could be used in any course; and this in just a 10-year period. However, the change has not stopped (just like the evolution of the Web has not stopped). We are seeing a wave of new web-based tools and services that are coming from multiple non-UW providers. These new tools may or may not be integrated with our UW eLearning system; for the most part they are being done as standalone separate tools. For students, this trend is natural, they expect to see a LMS in use and are not surprised to see other tools getting used too. For faculty, and to some extent the support staff, this can be overwhelming.

Many are suggesting that "personal learning networks" is an emerging trend. This is an online world, one that encompasses all aspects of learning in one's life, not just what happens in the for credit classroom. The picture of this world has all the elements from the 2008 LMS and many others, with the non-university aspects seemingly having more influence on "lifelong learning."

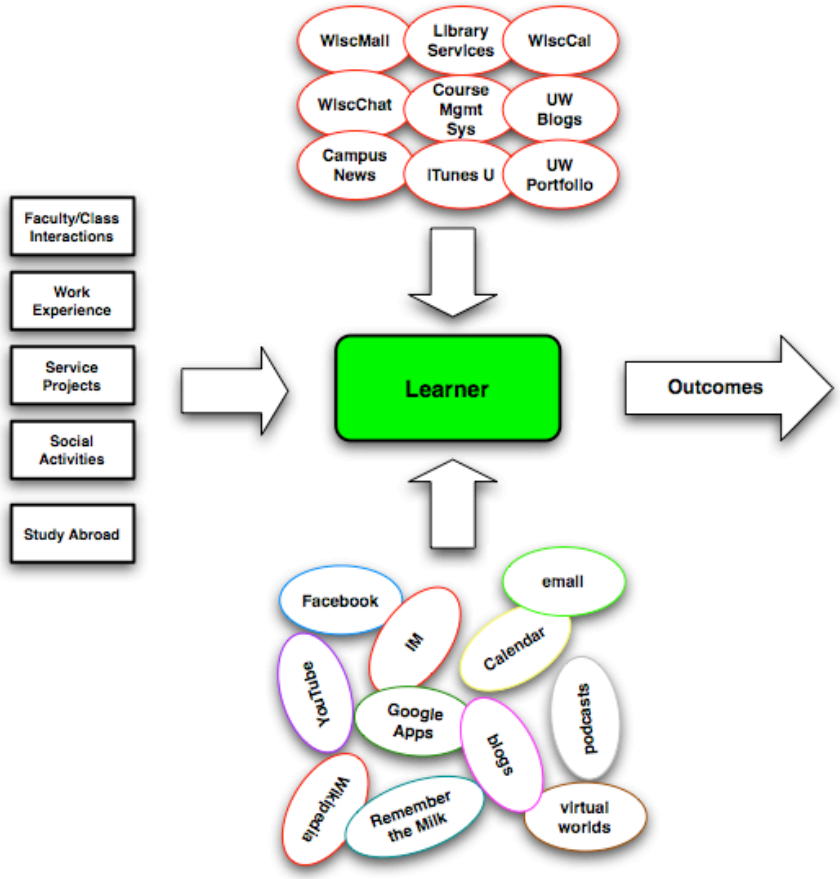

Figure 4: Personal Learning Network

In terms of what may evolve over the next 5 years, a number of questions emerge:

- Will the LMS continue to be at the heart of our instructional technology or will a plethora of tools take over?
- Can the LMS continue to be a monolithic system of integrated tools? Can the tools become available for use outside the LMS?
- Can traditional LMS's become extensible and flexible enough to meet unknown future needs?
- How can our IT infrastructure allow for, and even promote, effective instructional use of a large assortment of digital tools in a cohesive manner?
- With proven success comes a higher expectation for online technology by both students and faculty. Will funding be increased to meet these expectations?
- Will a personal learning network emerge as the hub of learning technology?
- How can we (staff and faculty) effectively pick and use appropriately from these many technology options?
- Do we have a choice to not use many of the "commodity technologies" that are commonplace outside the classroom?
- To what extent do we teach our students to be effective digital learners (both consumers and producers of knowledge in today's world)?

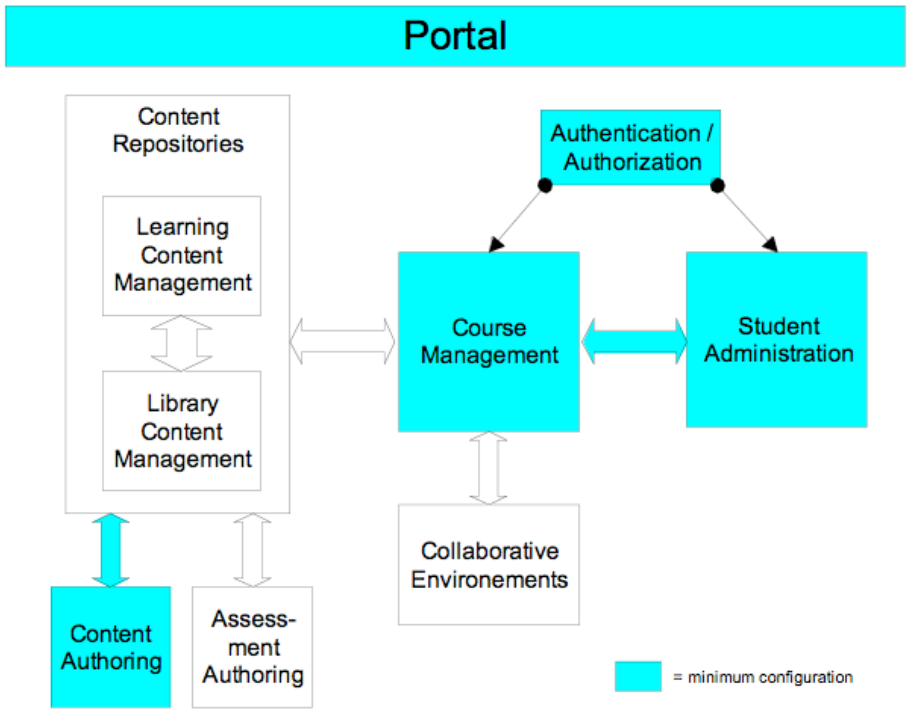

Figure 5: LMS in 2002 UW eLearning RFP

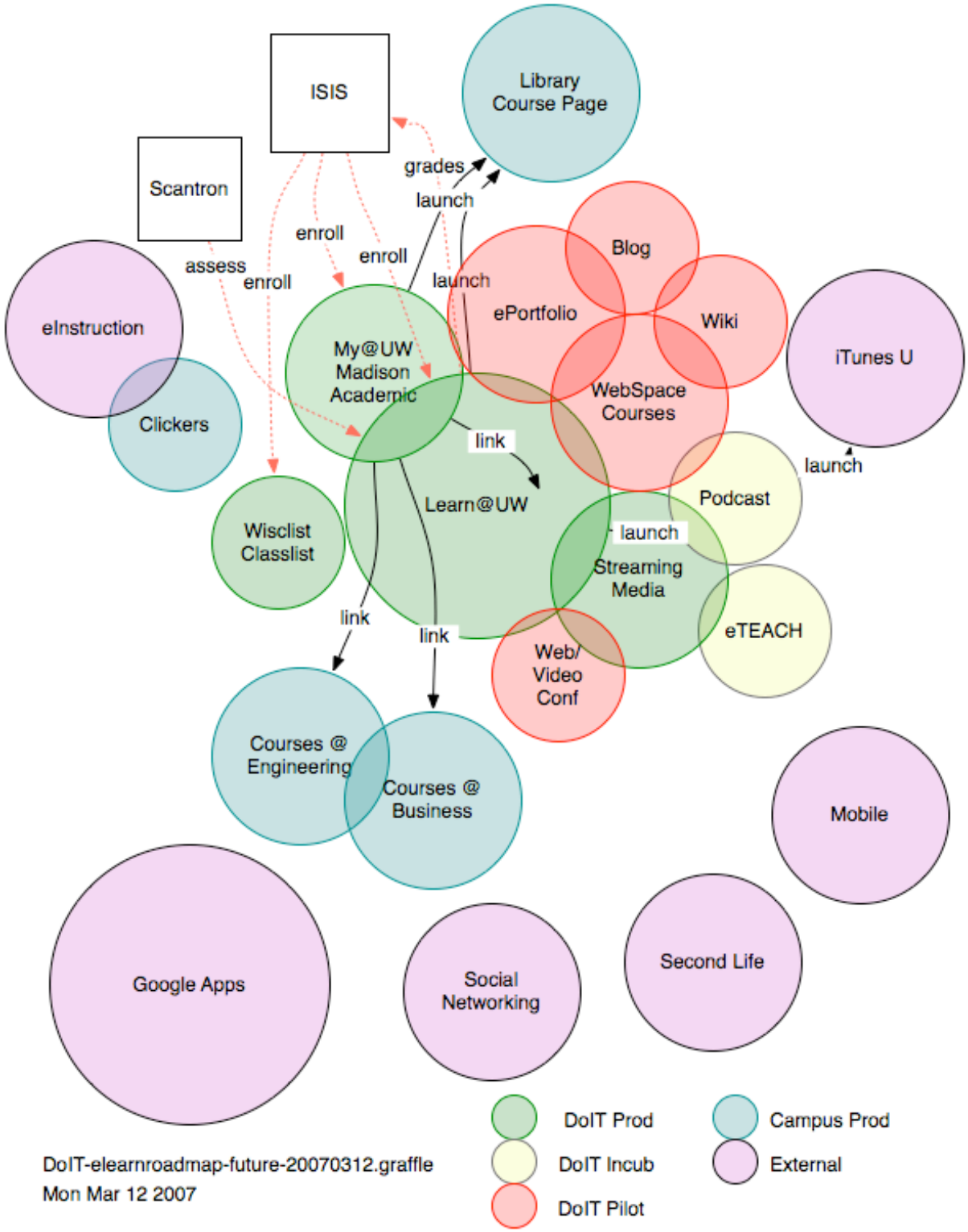

Figure 6: UW-Madison 2007 eLearning Systems

Appendix C. - Task Force on Library Integration with D2L

Final Report to Council of University of Wisconsin Libraries was delivered on March 23, 2007.

> In January, 2006, the Council of University of Wisconsin Libraries appointed a Library Integration with D2L Task Force "to examine programs already in place in the UW System that provide library content in D2L and to recommend possible strategies that could be shared across the System to promote Library/D2L integration." The Task Force derived from the University of Wisconsin Libraries *Strategic Directions for 2003-2005* which states:
>
> > *The University of Wisconsin libraries will provide library services and information resources to make teaching, learning and research more productive and rewarding.*

The 55 page final Task Force report is available online at:

http://www.uwrf.edu/library/eLearning/CUWL_D2L_TaskForce_Final_Report.pdf

Appendix D. - Faculty Survey

To: UW Faculty
From: e-Learning Vision Working Group/UW System e-Learning Infrastructure Task Force
Re: Input needed: Future of Teaching and Technology in UW System

The e-Learning Vision Working Group is part of the UW System eLearning Infrastructure Task Force. The mission of the task force is to investigate the evolving the e-learning landscape and set some directions for the future. Our task is to learn from faculty what you envision happening with technology in teaching in the next five years or beyond. You were recommended to us by your campus Learning Technology Center representative.

We hope you will take some time to consider the following questions and write a response to us by **Monday, December 10th**. Your response can be a Word document (see attached) or just simply a reply to this email. We encourage you to use examples, scenarios, and any other ideas you want to share. This is your chance to think in a very futuristic manner.

1. UW Campus:

2. Your academic discipline:

3. When you think about your teaching, how might future changes in technology enhance your classroom or online teaching? This could be technology you know about, or technology you could see being developed in coming years that you think is needed to enhance teaching and learning in your discipline, or in higher education in general.

4. Provide us with one or more scenarios of how you envision using a particular technology in your teaching in five years. Please dream, be innovative, forward thinking, and don't hold back on providing your ideas about a technology that would really make a difference.

5. Please share any other thoughts you might have about what might enhance your teaching with technology in the coming years.

Thank you for taking time from your busy schedule to do some forward thinking and provide us with ideas to consider for the future. **Please send your response back to patricia.fellows@uwc.edu by Monday, December 10, 2007**

eLearning Vision working group:

Pat Fellows (UW-Colleges)
Jeff Bohrer (UW-Madison)
Valerie Malzacher (UW-River Falls)
Lorna Wong (UW-Whitewater)

Summary of themes extracted from faculty survey input

1. Use of media in course material – streaming media, podcast in easy to use format
2. Student-produced media projects; increase in student ownership of curriculum
3. Classroom tools – such as clickers, webcams, portable instructor computers to be more widely available
4. Discipline specific technology equipped labs – gaming, kinesthetics
5. Specialized software available to faculty who needs them in local settings (labs, offices)
6. Learning Object Repository for learning objects – easy to use tool for creating and using learning objects
7. Collaborative tools – community forming tools – managed within campus - wikis, blogs, IM, Podcast, eportfolio
8. Support for virtual environment – Second Life
9. Synchronous chat tools with audio/video capabilities -- webcams, Skype, Breeze, IM, Wimba
10. Publisher generated content that can be readily integrated within LMS

Consolidated list of themes from Faculty Responses to explore

1. Significant use of media by faculty and students
    a. Modern media formats and tools: Flash, podcasts, streaming, easy-to-use editing tools
    b. Ease of media material development & integration into LMS
    c. Media production tools easily accessible for students to use in projects and assignments (labs, assistance, equipment, LMS integration)

2. Significant interest in better resources and support for in-classroom technology
    a. Most campuses have moved beyond technology available in general access labs and general desktop software
    b. Big desire for discipline-specific software and hardware
    c. Need local support for specialty software and discipline-specific labs and tools
    d. Tools available for students – media creation, gaming, e.g. kinesthetics course etc
    e. Clicker technology support to allow for wider adoption
    f. Classroom collaboration Technology – students to work together in a document or a problem
    g. Webcams in the classroom

3. Web 2.0 technology
    a. Availability and support of collaborative and community building tools that are locally managed – wiki, blog, IM
    b. Pedagogical applications of collective content and knowledge building, transformation from teaching centered to learner centered paradigm
    c. Integration of LMS with web 2.0 tools

4. Learning Object & LO Repository
    a. Development, sharing, and archiving of learning objects among UW campuses and beyond
    b. Easy integration of learning objects with LMS
    c. Easy to use tools available for faculty - e.g. screen capture, content creation, podcast tools
    d. Assessment of the use of learning objects on learning outcomes

5. LMS 2.0
    a. Work with vendor(s) to leverage more robust and feature rich set of tools for LMS
    b. deeper and wider integration of publisher resources – test banks, content, simulations…etc – avoiding multiple login and tracking
    c. deeper and more seamless integration of library resources and bibliography managers
    d. Push for easier and deeper integration with Web 2.0 tools, eportfolio, synchronous tools as desired
    e. Better implementation of online assessment – protect integrity- prevent cheating

6. Emerging Technology
    a. Provide ability and environment for investigating virtual worlds (e.g. Second Life) for teaching and learning – single faculty activities is costly and most likely not effective
    b. Promote inter-disciplinary collaboration or programs for developing and using gaming for teaching and learning

7. Other related themes to consider
    a. Increase in need for students to demonstrate learning outcomes/goals
        - At UW-Madison, we are beginning to discuss broad liberal education outcomes (LEAP). We are not talking about senior-year testing but rather accumulated evidence that students have met certain goals.

          It seems like the most obvious tool that could help with this is the e-Portfolio. As you know, eports can be good at collecting student work, making connections across courses or experiences, allowing the student to reflect (most important) on all this, and sharing their portfolio with employers, parents, advisors.

          Initiative worth noting: Epsilen project http://www.epsilen.com.

    b. Leverage of social networking for learning
        - Adding a peer interaction layer to the course management system. Imagine students connecting with students based on topics or courses in a comfortable online environment....a study group that

meets online rather than in the dorm. Perhaps even an instructor social network that would connect faculty on topics of teaching, research or content.

Initiative worth noting: ELGG networking system http://www.elgg.org.

c. Increase in need for personal learning environments
    - Amount of information available to learners is staggering and growing
    - Trends are towards integrating knowledge across courses/disciplines (see LEAP goals)
    - Today's course mgmt systems are instructor-centric relying on the instructor to pull together relevant resources
    - A need for students to create their own learning environments, customized for their areas of study, and made efficient based on their preferences - a personal portal like My Yahoo or iGoogle with feeds, note taking, publishing, sharing, web clipping, friends, etc.

      The concept of a PLE has been discussed/envisioned for a while now (search Google or Wikipedia). This would be a substantial *learner-centric* tool. Sort of like bookmarks or RefWorks on steroids.

d. Library research that effectively supports classroom learning

Appendix E. - Complete Recommendations

- **Provide support for a diversified approach to access to high quality content**
  With the rapid development and availability of digital asset repositories that fit different technology formats, recommending a specific learning object repository solution may not be prudent. We support a diversified approach to the learning object repository concept that leverages the efforts already in place within UW (e.g. UW Digital Collections, MINDS@UW, and WFR/LCS) and that allows content to be shared outside of the learning management system (LMS).

- **Implement Federated Identity Management**[12]
  Teaching and learning in a virtual environment requires that faculty and students can easily collaborate with partners, access restricted digital resources, take courses, and access administrative services. We expect the on-going development of a well-managed, common approach to authentication and authorization that enables the portability of identity information across multiple resources and systems. A Federated Identity Management approach would serve UW well for Access to High Quality Content. The In-Commons Federation, which the Madison campus has already joined, is a likely federation structure for the UW to adopt system-wide.

- **Have an exit strategy**
  Ideally any newly implemented technology solution will be a long lasting partnership; however, there are unforeseen circumstances (i.e. lawsuits, vendor bankruptcy, and change in technology or security) that can force a conversion to a different technology solution. Faculty and students should be forewarned of such possibilities and be prepared for an exit strategy to any technology services. All new UWS technology systems should have an exit strategy as part of the RFP and as part of any implementation. In particular, this suggests the means to "export" content should be well understood before any broad use of these content technologies.

- **Create and maintain a centrally managed instructional technology sandbox**[13] **environment**
  This environment, equipped with hardware and software capable of supporting modern applications, would provide a place for new teaching and learning tools to be housed. These tools would be accessible to appropriate UW faculty, students and staff regardless of their campus affiliation.

---

[12] Identity management allows us to tell if individuals are who they say they are, whether they are affiliated with the University and what entitlements that affiliation allows. It permits data custodians and service providers to control access to information and/or services, according to an individual's identity, roles and responsibilities (http://www.vc.wisc.edu/Docs/IMLG_Progress_Report_November05.pdf)

[13] A sandbox is a safe environment to experiment and test in. Sandbox implies the system would not be a "full production" environment with access for all users.

- **Charter a task force to formally review the Utility model**

- **Charter a task force to develop a structure or process by which individuals can identify, locate, and connect with peers and colleagues**

- **Invest in the expansion and utilization of student technology employees**
  Budgets are traditionally tight and students need work experience. These students gain valuable experience while working with students and faculty. The use of graduate students could allow tuition breaks for those willing to work in support and maintenance of systems, assist in training faculty and staff, and increasing the availability of documentation in knowledge bases for end users to support themselves.

- **Regularly reevaluate learning technology support resources to ensure adequate support is available as the technology solutions on each campus increase**

- **Develop an online support community**
  Users like to support themselves first. An online community model with a knowledge base (or "knowledge management model") allows users to research solutions and allows the Learning Technology/Training Office staff to moderate the community and knowledge base to make sure the information presented to the users is accurate.