

# Functional Group Report

Compiled by the members of the eLearning Roadmap Group Functional Sub-Team:  
Amy Campbell, CIT (lead); Reed Criswell, Divinity; Jackie Gottlieb, Nursing; Willie Jennings, Divinity; Susan Gerbeth Jones, NSOE; Dick MacPhail, Chemistry; Stephanie Helms Pickett, Student Affairs; Neil Prentice, Sanford; Ken Rogerson, Sanford; Tom Schulz, NSOE; Kristen Stephens, Education; Victoria Szabo, ISIS; Keith Whitfield, Psychology and Neuroscience.

## Executive Summary

The Functional Sub-Group of the eLearning Roadmap Group was one of four working groups formed during summer 2010 to compile analyses of the three LMS products under investigation: Blackboard 9.1, Moodle 1.9, and Sakai 2.6. Our focus was on the functionalities of the three products, and how well they would meet current and future faculty, student and Duke strategic needs. Other teams investigated the technical, cost and strategic aspects of the LMSs.

## Goals of our analyses

The purpose of our work was to research and report on:

1. How well would each Learning Management System (Blackboard 9.1, Moodle 1.9 and Sakai 2.6) handle content migration from Blackboard 8?
2. How well will each system meet the needs of faculty for existing functions/uses?
3. How well will each system accommodate known or expected future functions/uses?
4. What is the usability level of each system by faculty and students without extensive help, training or reference to help materials?

## Methods

In order to investigate the questions above, we conducted research on the web, interviewed representatives of other schools, spoke with vendors or hosting providers, and tested functions within sample sites for each of the three systems. We collected our data in a Google spreadsheet visible and editable to all team members, and visible to the members of the full eLearning Roadmap Group.

## Results

After analyzing the data, we find Blackboard 9.1, Moodle 1.9 and Sakai 2.6 very similar in functionality. They each appear to meet current needs reasonably well. Each would need configuration and additional (external) systems to meet anticipated future faculty and strategic functional needs. Each appears to be usable to faculty and student users after the users gain initial familiarity with the systems. Blackboard 9.1 is distinct in that content migration to Blackboard 9.1 would be the smoothest, and faculty and students would be more familiar with it based on prior use of Blackboard 8, which would minimize faculty and student time required to transition to a different LMS.

# **Report of the Functional Sub-Group on Blackboard 9.1, Sakai 2.6 and Moodle 1.9**

The Functional Sub-Group of the eLearning Roadmap Group was one of four working groups formed during summer 2010 to compile analyses of the three LMS products under investigation: Blackboard 9.1, Moodle 1.9, and Sakai 2.6. Our focus was on the functionalities of the three products, and how well they would meet current and future faculty, student and Duke strategic needs. Other teams investigated the technical, cost and strategic aspects of the LMSs.

The members of our team were:

Amy Campbell, CIT (lead); Reed Criswell, Divinity; Jackie Gottlieb, Nursing; Willie Jennings, Divinity; Susan Gerbeth Jones, NSOE; Dick MacPhail, Chemistry; Stephanie Helms Pickett, Student Affairs; Neil Prentice, Sanford; Ken Rogerson, Sanford; Tom Schulz, NSOE; Kristen Stephens, Education; Victoria Szabo, ISIS; Keith Whitfield, Psychology and Neuroscience. CIT staff members Laura Atkinson, Neal Caidin, Shawn Miller, Andrea Novicki, Randy Riddle, and Haiyan Zhou assisted with the group's investigations.

Special thanks to Jackie Gottlieb, Neil Prentice and Victoria Szabo for leading the investigations of Moodle, Blackboard and Sakai, respectively.

## **Goals of our group**

The purpose of our group was to determine:

1. How well would each system (Blackboard 9.1, Moodle 1.9 and Sakai 2.6) handle content migration from Blackboard 8?
2. How well will each system meet the needs of faculty for existing functions/uses?
3. How well will each system accommodate known or expected future functions/uses?
4. What is the usability level of each system by faculty and students without extensive help, training or reference to help materials?

## **Methods**

In order to investigate the questions above, we conducted research on the web, interviewed representatives of other schools, spoke with vendors or hosting providers, and tested functions within sample sites for each of the three systems. We collected our data in a Google spreadsheet visible to and editable by all team members, and visible to the members of the full eLearning Roadmap Group.

One caveat is that we were able to investigate the current versions of each of the LMS products, but not future versions. Moodle 2.0 and Sakai 3.0, and versions of Blackboard after 9.1, are on the horizon and may have substantially improved feature sets and capabilities but we are not able to comment on those.

# Results

## 1. Migration

One of the primary requirements voiced by faculty from across Duke when learning about our LMS investigations, was that any LMS change would include conversion of their existing content into the new system, so they wouldn't lose years of work creating established course designs and materials in Blackboard. Faculty are concerned about the time cost they will incur with any LMS change, both from redesigning their course sites, and learning how to effectively use the new system.

Our investigations suggestion that content and course design would be easily migrated from Blackboard 8 to Blackboard 9.1. Since these are two versions of the same product, we anticipate nearly all data would move smoothly to the new version, with the possible exception of data contained within Blackboard 8 plug-ins such as Learning Objects' blog and wiki, or Wimba Voice Tools. Site organization, while more flexible than in Blackboard 8, is also at least somewhat familiar to faculty and should allow faculty to quickly get "up-to-speed" using Blackboard 9.1.

Content migration from Blackboard 8 to Moodle 1.9 could be partially accomplished using a migration tool from LSU, which would transfer content (files) from Blackboard 8 to Moodle, placing the files in the Moodle content area. Course site structure and organization would not be maintained and much of the sites would have to be recreated. Moodle is structurally different than Blackboard and treats course organization differently; faculty will likely need orientation to Moodle's approach before effectively rebuilding their course sites.

Similarly, content migration from Blackboard 8 to Sakai 2.6 may be possible using modifications of the bFree tool developed by UNC. However, once content is ported over, the course site structure will have to be recreated. Since Sakai treats course organization differently than Blackboard, faculty will likely need orientation to Sakai's approach before effectively rebuilding their course sites.

From the perspective of migration of content and ease of transferring sites to a new system, moving to Blackboard 9.1 would be the best choice. If Moodle or Sakai are chosen, Duke should develop a migration plan that includes hiring temporary personnel to consult with faculty about instructional and course site design, and help faculty transition their materials and activities to the new LMS.

## 2. Meeting the needs for existing functions/uses

Based on our analyses (see Appendices) the three LMSs appear to be substantially similar with regard to baseline (existing) functions. There are several points of difference, but most are minor. One concern is the continued availability of Wimba Voice Tools (or similar functionality) in Sakai and Moodle, with the Blackboard purchase of Wimba. There are also some differences in the equation editing capability (not supported in the current version of Sakai), and foreign language display (poor for non-Western languages in Sakai, especially for right-to-left languages).

### **3. Meeting the needs for future functions/uses (including strategic needs)**

Based on our analyses (see Appendices) the three LMSs appear to be substantially similar with regard to future faculty and strategic needs. To more fully meet these needs, each of the three systems would require additional plug-ins, more robust integrations with other campus systems, a learning outcomes tracking system (or integration with external system) and a content management system. In addition, Duke should pursue options to support distance and international learners such as off-line interaction with content, and access on mobile devices.

### **4. Usability by faculty and students**

Our analysis here focused on usability of the system without a lot of hand-holding, training and reference to documentation after the initial conversion. How intuitive is the system to use? Our assumption is that Duke faculty will continue to build their own sites and generally won't have personal or departmental instructional designers to build sites for them.

Based on conversations we had about system usability, faculty and students like all three systems, once they get used to them. Schools which switched to a new LMS, identified an ideal process of massive user education and communication up-front, and a gradual transition. Nevertheless, they report faculty will find the change disruptive, at least at first. A major training effort will be needed with any of the LMSs for the first few years. However, after most faculty have become accustomed to the new LMS, our investigations suggest a similar level of training and documentation as currently available should suffice if the system is changed at the same frequency (if the new system is modified and enhanced more frequently, additional training and documentation resources will be needed).

### **Summary**

After analyzing the data, we find Blackboard 9.1, Moodle 1.9 and Sakai 2.6 very similar in functionality. They each appear to meet current needs reasonably well. Each would need configuration and additional (external) systems to meet anticipated future faculty and strategic functional needs. Each appears to be usable to faculty and student users after the users gain initial familiarity with the systems. Blackboard 9.1 is distinct in that content migration to Blackboard 9.1 would be the smoothest, and faculty and students would be more familiar with it based on prior use of Blackboard 8, which would minimize faculty and student time required to transition to a different LMS.

### **Functions/configurations/system abilities we strongly suggest**

- Better content management than currently available in Blackboard 8. In Blackboard this means purchasing the Content System; in Moodle and Sakai this means investigating options for plug-ins or parallel content systems which would integrate with the LMS to allow richer and fuller use of the LMS.
- Inclusion or integration of a student learning outcomes system.
- Movement toward real-time integration with PeopleSoft for handling course creations and faculty and student enrollments, and processing adds and drops rapidly.
- Development of stream-lined movement of grades from the LMS to PeopleSoft.

### **Process recommendations for moving forward**

If Moodle or Sakai are determined to be the best future LMS for Duke:

- We strongly recommend having a functioning pilot with the new system, before making the final decision. Since part of our analyses are based on web reports and interactions with vendors (who are trying to sell products), a pilot will allow us to thoroughly evaluate the system in the Duke environment to be sure it will meet our needs.
- It is critical that Duke develop the system to meet baseline user expectations and existing functionality levels before converting. This includes integration with PeopleSoft (at least to the current extent and with the current functions, e.g., user and course site creation, handling of cross-listed courses, etc.), integration with library systems for e-reserves and LibGuides, integration with DukeCapture, and ability to create voice recordings similar to the Wimba Voice Tools ability.
- We recommend contracting with a hosting provider for at least the first 1-2 years, to enable Duke IT staff to gradually learn about the new product and how to best support it.

For any upgrade (to Blackboard 9.1, Moodle or Sakai)

- Duke should provision higher levels of trainers and instructional designers to work with each faculty member so that they understand the capabilities of the new system more fully. Our investigations showed that faculty aren't aware of many of the configuration options currently available in Blackboard 8. Any new system will have unfamiliar options of which faculty should be made aware. Considering that a transition to Moodle or Sakai would be conceptually different from Blackboard 8, we would need to anticipate conducting multiple workshops and one-on-one training sessions for each faculty member who uses the LMS, as well as providing course conversion (migration) support.
- The system should be managed to take advantage of the flexibility it offers, including development of processes for easier system change management (adding new functionalities, building integrations, etc.). The system should be resourced appropriately (or hosted at the level that provides these types of system enhancements) so as to allow flexibility that better meets user expectations. Updating and enhancing the system should be actively occurring at all times.

## Appendices containing elaboration on our analyses:

### A. Comparison of functionality overall

#### *Baseline functions: functions the current Blackboard system provides*

Our analysis showed that most of the common functions faculty and students have come to expect exist in all three LMSs, at least at the high level. Some places where differences might be worth noting:

- Equation editor - not available in Sakai 2.6 natively, can be partially provisioned with a plug in such as Sferyx (equations in the Lessons tool only).
- Treatment of non-Western languages (including right-to-left languages) - poor in Sakai 2.6. Good in Moodle, which has 70+ language packs developed by the community.
- Access control to content based on various criteria (called “adaptive release” in Blackboard) - more sophisticated in Blackboard, allows multiple criteria. Good in Moodle 1.9 and improvements planned in Moodle 2.0.
- Audio recording (Wimba Voice Tools) - Because Blackboard purchased Wimba recently, it’s not clear if Wimba Voice will continue to be available in Moodle or Sakai; not clear what other options exist for audio recording in Moodle and Sakai. rSmart (Sakai vendor) states that rSmart is currently pursuing Wimba integration. Remote Learner (Moodle vendor) states that integration with Wimba exists, and there are other plug-ins which can provide similar functionality.
- Peer review tool - exists in Blackboard 9.1 and Moodle (called “Workshop” tool), coming in Sakai 3.0 but not currently possible.
- Sharing question banks between faculty/courses - possible but not streamlined in Bb, and easier in Sakai with a searchable question bank, Moodle allows sharing between and within courses.

#### *Faculty requested functions (future functions)*

Our analysis showed that most of the functions requested by faculty and students are similarly available (or not available) in all three systems. Some notable differences:

- Access to content without a login (direct URL, for example) - Bb will allow this with the addition of the Content System, Sakai does this natively, Moodle can also do this with correct permissions settings according to Moodle vendor Remote Learner.
- Managing large courses with multiple sections (including control of TA access to just their own students) - Moodle may have better section management and TA permissions tools based on our research (using “Groups” tool in Moodle can meet this need).
- Content management - each tool has a within-course content repository, and each has option to provision a more full-featured parallel content management system to allow sharing between faculty and sites.
- Batch or drag-n-drop upload of files - Bb and Sakai allow WebDAV, Moodle with .zip or ftp access using built-in functionality (WebDAV with ELIS plug-in from Remote Learner).
- Auto-set up and apportioning students into groups, and group assignment management (all students in group get same grade, etc.) - Blackboard allows this, Sakai can

accomplish some but not all of these functions, base Moodle does some of this, existing “Team Assignment” plug-in will accomplish this.

- Extra-credit assignments in the gradebook - same
- Calendaring - Moodle and Sakai both seem to have more flexible and powerful uses of calendar for gathering and display of course dates/assignments than Bb. Sakai allows subscription to external calendars via iCal. Moodle allows its calendar to be downloaded or shared in iCal format.
- View of student progress through course activities - Bb provides this as “Performance Dashboard,” Moodle and Sakai do not currently provide this but Moodle 2 will do so.

### *Strategic functions*

These were derived from review of the [eLearning Strategic Themes Report](#) compiled by the Strategic Sub-Group in July, 2010. Notable differences are listed below:

- Ability to bring non-Duke people into the site - in general this depends on Duke policies regarding identity management outside the scope of the LMS. One note is that Sakai can allow (if we enable this) faculty to send invites to the system by email address.
- Outcomes tracking and assessment - each system can provide this with their own product (Blackboard Outcomes Module, OSP for Sakai, ELIS from Remote Learner for Moodle). Moodle and Sakai can integrate with Chalk & Wire e-portfolio system; Blackboard was in negotiations with Chalk & Wire (July 2010). In addition, Blackboard building block “EAC Outcomes” can provide rich analyses of existing quiz data, and can provide online course evaluations.
- Ability to showcase/display student work (or export student work) from the LMS - possible with Content System in Blackboard (by setting public permissions); Sakai appears to allow setting content to “public,” Moodle can allow content to be publicly visible with correct permissions settings according to Moodle vendor Remote Learner.
- Integration of the gradebook with PeopleSoft - this would have to be built for Blackboard and Sakai. Remote Learner (for Moodle) has a supported plug-in (“Integration Point”) which allows automated .csv files exports of grades; programming PeopleSoft to input these would be a separate project.
- Accessibility and functionality with screen reading software such as JAWS - Remote Learner (for Moodle) seemed confident that Moodle was accessible. Both Blackboard and rSmart (for Sakai) mentioned improvements have happened and more are being worked on. Sakai version 2/7/2.8 will be substantially improved from version 2.6.
- Support for off-line access (for online or international learners, for example) - Blackboard can provide this through a building block “Backpack” from Agilix; for Moodle there are community projects for this but we found no further information; Sakai has no option for this that we’re aware of.
- Seamless access on mobile devices - for Moodle a number of schools have been developing projects in this area, for Sakai much of the development is waiting for Sakai 3.0 but it’s possible to have a reasonable experience now, for Blackboard they are in active development; current versions of their mobile interface are fair to good.

## **B. Comparison of products based on commonly used tools** (from [eLearning-user-profiles.pdf](#))

These tools represent baseline for our faculty, and need to continue to work well in any new system.

### *Very commonly used tools:*

- Announcements - similar across all three systems, ability to email or send out new content
- Content sharing (documents, links) - each system allows posting of documents and links by faculty, for use by students. Each allows upload via WebDAV of batches of content (natively or with a plug-in), and has an intra-course content repository.
- Gradebook - each system has a gradebook and at a high level they provide similar functions, although UNC reports that “Blackboard Grade Center provides more” than Sakai 2.6. It’s clear that specifics here will differ because gradebooks can be complex, but there are no show-stopping gaps between the three systems that we are aware of.
- Emailing to the class - each system can do this

### *Moderately common:*

- Discussion boards - each system contains discussion boards
- Groups - each system can provide groups functionality (Blackboard and Sakai, and Moodle with the “Team Assignment” plug-in, can handle group assignments by accepting one submission from the group, assigning one grade to all group members. Blackboard and Moodle provide a random group creation function (specify group size and the LMS creates the appropriate number of groups and enrolls students in those groups)
- Surveys - each system can provide surveys

### *Less common:*

- Wikis - each system can provide wikis
- VoiceBoards - Blackboard 9.1 can provide VoiceBoards (and other Wimba VoiceTools). Sakai natively allows voice recording in the Assignments area only. Remote Learner (for Moodle) says that integration with Wimba Voice exists now. Sakai is talking with Wimba about integration. Not clear what Blackboard’s recent purchase of Wimba will mean for these integrations. Duke would ideally need to discover plug-ins which allow on-the-fly audio recording for Moodle and Sakai (we know some exist for Moodle, not sure about Sakai).
- Blogs - each system can provide blogs, and Duke also now provides WordPress for those wishing to have course blogs.

## **C. Comparison based on nine teaching scenarios** (from [eLearning-user-profiles.pdf](#))

For each of the 9 teaching scenarios described in the document, the key teaching functions and needs are listed below, along with a comparison of the LMSs with regard to that function.

“Same” means that all three systems provide that function in a similar manner (or don’t provide



it). We realize that there may be differences in the details and in the specific options provided with that tool, but weren't aware of any major gaps unless they are listed.

#### Scenario 1. Exploring contemporary issues in a medium-sized interdisciplinary course

- Faculty distributed content (documents, links, etc.) - same
- Communications via announcements/email - same
- Bringing in web-based/web 2.0 content easily - same (each would involve linking or embedding, such as with YouTube codes)
- Group assignments and grading group assignments - Blackboard and Sakai can accept one submission from the group, and assign one grade to each group. Blackboard can allow faculty to provide same comments/feedback to each group member. Moodle accomplishes these tasks with the "Team Assignments" plug-in.
- Student work often needs to be visible to outside audience - same (not easy to do with any of them unless you have a content management system or portfolio system with public access. Without such options, faculty will probably need to use external tools with any LMS. Note that in Sakai faculty can set content to be accessible, but it's not clear that this also applies to student work).

#### 2. Engaging students in a humanities seminar

- Looking closely at historical texts, digitized special collections materials - same
- In-class seminar discussions - n/a (refers to in-class activities not relevant to the LMS)
- New data visualization, timelines, spatial analysis tools - same (accomplished with external tools).

#### 3. Guiding discussions in an introductory social sciences course

- Readings from textbook or posted online - same (all would need library e-reserves integration)
- PowerPoint used in class to guide discussions and spur questions - n/a (in-class activities)
- Research papers (offline with hand-grading) - n/a (this faculty member collects papers on hard-copy and hand-grades).
- Use of video resources (some on the web, some restricted access on local streaming server) - same (would be ideal to have better local media management options such as Kaltura, and have these integrated with the LMS)

#### 4. Moving between face-to-face and online teaching

- Narrated PPTs for communication of content - same (creating the narrations outside LMS, upload of content. Ideally would include DukeCapture integration).
- Web conferencing sessions - same (web conference tool outside the LMS, would like integration/single-sign-on for Duke-supported web conferencing tools).
- Heavy use of discussion boards - same
- Email or Skype for one-on-one communications - same

#### 5. A department-based support approach to elearning course tools

- Basic website with syllabus and other course documents (outside the LMS) - same
- Email list and private file sharing space - same
- Student assignments submitted electronically - same
- Virtual computing to access restricted software - same (need integration or link)

#### 6. Leveraging elearning tools to meet the complex needs of a faculty-administrator

- Recorded slide shows shared with students - same
- Large courses with grading distributed across TAs - This could be accomplished in Blackboard and Sakai manually (creating groups for each section, assigning one TA/group); Moodle is better able to automatically set this up and restrict access to only the TA's students (in the gradebook and across the course site as a whole).
- Attendance tracking - same as far as we know (workaround by having gradebook column, or having clicker integration)
- Providing administrative (non-course) sites in the same LMS for efficiency - Sakai and Bb more flexible or intentional about this, Moodle would allow this but perhaps not as flexible in that it's designed mostly for courses.
- Integrated calendaring (department calendar integrated with LMS) - Sakai allows subscription to external calendars via iCal, Moodle can share site calendars via iCal export or link.
- Program-level student outcomes data - Bb with Outcomes, Sakai with OSP or integration with Chalk & Wire, Moodle has outcomes tracking internal which provides some level of tracking, or could integrate with Chalk & Wire.

#### 7. Multimedia intensive teaching to develop student language proficiency

- Distribute multimedia links and files - same
- Text discussions - same
- Audio recording and discussions - Bb with Wimba Voice license or with Wimba function built into Bb, others with Wimba or other tool (not clear if Wimba Voice will continue to be available to other LMSs besides Bb). Sakai provides audio recording in the Assignments tool only. Moodle has other plug-ins that provide this functionality, in addition to Wimba Voice.
- Assignment submission - same
- Blogs, wikis and social media tools - same (Facebook integration?)

#### 8. Instructor resource repositories

- Content sharing between multi-section courses with common syllabus - All would need some type of external or additional system for this. In Blackboard this would be best accomplished with the Content System, Moodle could use Al Fresco content repository or others or could use the meta-course approach to share a repository site with all relevant users, Sakai would need some external content management system (perhaps Xythos?)
- Annotations by faculty about best uses of materials - Unclear if content management systems would provide this in other than a rudimentary fashion. Perhaps would need a learning object repository (for what it's worth, the NC Community College System allows

Duke to use its Equella learning object repository, which integrates with Blackboard and Moodle).

#### 9. Courses co-taught with a partner institution

- Students at remote site need to access Duke tools (assume students NOT enrolled through Duke SISS; if they are, they would be treated like Duke students) - constrained by identity management; it would be ideal to streamline processes for requesting credentials. This is dependent on institutional policy questions which cross all LMSs. Note that Sakai allows (if administrators turn it on) instructors to invite external colleagues to Sakai by email address (Sakai login credentials are provided on-the-fly), but this would require management by some entity to clear those accounts after some amount of time, etc.
- Web or video conferencing used - same, outside the LMS but would be useful to have integration
- Student online collaboration outside of class time - same

#### D. Comparison based on common elearning practices (from [Common-eLearning-Practices-at-Duke.pdf](#))

- Distribution of course materials
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs - same
    - easy multimedia management external to LMS - same
    - control access to public while allowing non-Duke colleague access - same
- Creation of assignments by students
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs - none listed
- Access to Duke network restricted resources
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs
    - provisioning access to Duke resources for those outside Duke - same (unrelated to LMS, relates to institutional policies for identity management)
- Collecting and tracking student assignments
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs
    - Tools to support common distributed grading practices such as dividing among pool of graders, restricting access to enter/edit grade at the assignment level - better supported in Moodle
- Providing feedback on student assignments

- Current (baseline) - same
- Emerging - same
- Unmet needs
  - better tools for annotation - same (typically detailed annotation would need to be done external to the LMS, but each LMS has basic commenting features for online quizzes and assignments).
- Delivering self-graded quizzes or online problem sets
  - Current (baseline) - same (may need integration with Maple TA or WebAssign), no native equation editor in Sakai but plug-ins may provide partial functionality
  - Emerging - same
  - Unmet needs
    - portability of problem sets - same
    - outcomes tracking or integration with outcomes systems - Bb provides Outcomes Tool; Moodle and Sakai can integrate with portfolio products or with Chalk and Wire; Blackboard in negotiation with Chalk & Wire as of July 2010.
- Managing grading records and student outcomes data
  - Current (baseline) - same
  - Emerging - same (integration with Chalk and Wire and other assessment portfolio products possible)
  - Unmet needs
    - one click grade export from LMS to STORM - same (needs custom integration work)
    - “More flexible gradebook tools to implement complex grading” - same (not sure what this means, but functions in the three gradebooks are substantially similar as far as we have been able to determine).
- Instructor communication with enrolled students outside of class
  - Current (baseline) - same
  - Emerging - same (except Wimba audio, which may end up being only in Blackboard at some point)
  - Unmet needs - none listed
- Preparing and delivering live presentations - N/A (this refers to in-class activities)
- Preparing and delivering online presentations
  - Current (baseline) - same (created outside the LMS, linked or embedded in the LMS)
  - Emerging - same (except Wimba audio, which may end up being only in Blackboard at some point)
  - Unmet needs
    - Managing learning module content (access, organization, storage) - same (would be through external or parallel system)
    - faculty need for greater fluency with multimedia production; need for greater Duke capacity to support multimedia creation by faculty, departments - same (outside the scope of the LMS)
- Showcasing student projects

- Current (baseline) - same
- Emerging - same
- Unmet needs
  - more options for easily showcasing student work - same (each would need some add-on or parallel system such as an e-portfolio system)
  - ability to protect student intellectual property - same (outside the LMS)
- Advising and mentoring communications, mentoring student research
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs
    - Staying connected with students out in the field or in remote international locations - same
- Providing information to prospective students; marketing course and program offerings
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs
    - making some LMS content publicly visible - Bb can do this with the Content System, Moodle and Sakai can do this with control of permissions - CHECK THIS)
    - integration with location-of-record for course information such as course description (STORM) - same (would require new integration for all).
- Gathering feedback from students on their learning experience
  - Current (baseline) - same
  - Emerging - same
  - Unmet needs
    - Feedback at the lesson level - same (could use Classroom Assessment Techniques or other options inside or outside the LMS),
    - More substantial comments from students, perhaps with online course evaluations - Blackboard Outcomes System includes online course evaluations, or any of the three systems could use online surveys)
- Tracking student learning outcomes data at the program level
  - Current (baseline) - same
  - Emerging - same (integration with Chalk & Wire; see relevant comments above)
  - Unmet needs
    - links between LMS and outcomes systems for cross-course and program level analysis - Blackboard Outcomes System will do this, OSP for Sakai will do this, Moodle has basic outcomes tracking built-in but further investigation would be useful to fully understand the scope
    - Systems to organize qualitative data about student outcomes, non-numeric data, non-course data (e.g. field experiences), student work samples - same (probably a portfolio or blog system, outside the LMS)
    - integration with potential institutional repositories (e.g. honors' & Masters' theses) and exhibitions of exemplary student project work (e.g. Films) - same (would require additional custom integration).