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Building an LMS with Ubiquitous Software

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Handbook of Research on Instructional Systems and Technology

Volume I

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Chapter XXIV
Building an LMS with Ubiquitous Software

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ABSTRACT

Teaching institutions around the world are using large, unwieldy, and expensive learning management system (LMS) packages that are beginning to have profound effects on their whole organizations. Such LMS packages in turn go to great lengths to interoperate with the desktop information productivity software that almost all institutions use, Microsoft Office System. Since a very large part of the instructional content is generated in Office, it seems sensible to investigate whether straightforward extensions of the Office System could become an LMS in their own right. This chapter describes research and development that integrated Microsoft Office System, SharePoint Windows Services, and SharePoint Portal server (SPS) as the heart of an off-the-shelf LMS. Already designed to work closely with Office, SPS features are compared against the list of features expected of an ideal LMS. Where gaps in the LMS features were discovered in SPS, a number of small extensions of standard Office applications were proposed to fill these gaps and create a credible LMS. These Microsoft tools and custom extensions were put to use in teaching and administration during a 2-semester (8-month) trial at Bond University. The SPS installation was hosted in partnership with G-Netech Pty Ltd. This Bond University/G-Netech SharePoint Alliance project (BUGSA or SharePoint Alliance) was able to call upon combined research, development, and teaching expertise provided by the partners. The outcomes of the short trial support the concept of the Office System as a viable LMS.

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INTRODUCTION

When one surveys the choice of learning management system (LMS) software, one finds a very lop-sided situation. What were the two leading examples of a LMS deployed across the higher education institutions of the world, WebCT (WebCT, 2006) and Blackboard (Blackboard Academic Suite, 2006), have now merged into one company although for the time being the two products are still differentiated. Together these products account for 70-80% of the total market. Significant in the context of this chapter is that with a decade of development both products are available in enterprise versions comprising collections of major components, which include content management systems, portals, and communication tools. Such all-encompassing feature sets inevitably lead to high costs and significant training needs.

Despite such dominance, there is a long tail of alternative software for the primary LMS function. At the tail's end are the local in-house systems that each institution has developed with their own technical and teaching staff. Of late, there has been a significant effort by a group of 80 institutions worldwide to work together on producing a common learning environment called Sakai (2006). The Sakai Project uses an interesting variant of the open source development model called the community source model, which involves some financial inputs. What remains are open source systems with their growing group of users and several less significant commercial LMS packages that typically target the smaller institutions.

From their own product descriptions, the supplier companies extol the fact that an integrated LMS is an enterprise level system. Such systems by implication therefore require very significant support in terms of technical design, administration, and staff training in addition to content design and creation teams for the support of the teaching staff. It is not surprising that the founder of the WebCT LMS, Goldberg (2004), in his keynote presentation at AusWeb 2004 indicated that, in his experience for many institutions the LMS, has become the most important information system on a university campus after the payroll system! By implication, however, this entails a large cost in software acquisition, technical support, ongoing maintenance, and integration with other institutional information systems.

It is the authors' contention that an important avenue of LMS development has largely been ignored, that of adapting existing off-the-shelf content management and interactive communication systems intended for use by organisations in general across all industry and government sectors. One major example of this class of systems is the Microsoft SharePoint technologies (2006) aimed at generic Web portal and information repository use. As will be described in detail in this chapter, a very great advantage of SharePoint is its tight integration with the ubiquitous Microsoft Office applications. These are the main information content creation tools used by educators across the world and are licensed by very many institutions.

In the pages that follow, a case is made for adopting SharePoint as the foundation of an LMS. Examples and case studies show how this can be achieved. Some new developments that are happening now, and planned changes to Microsoft Office over the next months, are discussed. This shows that future trends will lend credence to the use of off-the-shelf software to compete with the highly specific and less flexible LMS packages currently in use. Leveraging existing software in this way helps in reducing software acquisition costs and training needs.

BACKGROUND

The authors have worked together for a number of years in a research centre environment where software development of new leading-edge solutions was the norm. Often these software packages were built from scratch unnecessarily, and the authors soon became proponents of the intelligent deployment of straightforward off-the-shelf software that can often be extended to provide support for new solutions. This comment applies to apparently mundane applications such as Microsoft Word, Excel, and PowerPoint. These applications can often be tailored for significant specific needs by writing embedded extensions in Visual Basic for Applications that manipulate the inherent document object models.

During their years of research collaboration, the authors have also been using and gaining experience with the often-ignored Microsoft Office System SharePoint technology (Microsoft SharePoint, 2006). Various research and development projects used SharePoint for a wide range of different purposes (Herring & Rees, 2001). The uses range from innovative collaboration environments based solely on the Windows desktop and Windows Explorer (Herring, Rees, Loch, & Rhodes, 1998) to distributed software engineering support (Herring et al., 2001) and research into military command and control systems (Barros, Herring, Hildebrandt, & Rees, 2000) as a replacement for a very complex, purpose-built collaboration system.

In October 2003, the release of Microsoft Office System 2003 significantly enhanced the SharePoint technology. The existing portal server became SharePoint Portal server 2003 (SPS) and a significant reduction in licence costs made this software more accessible. SPS is designed so that it can scale across a large enterprise. At the same time, the underlying server technology has the capability to be effective for situations where only tens of users are involved. SPS needs Windows Server 2003 as the operating system together with the SQL Server 2000 database.

The underlying heart of SPS uses a free software enhancement for Windows Server 2003 and the IIS Web server called Windows SharePoint Services (WSS) that provides an extensive set of features to provide highly interactive collaborative Web sites. An added bonus allows WSS to be used stand-alone without SPS and may even utilise the free Microsoft SQL Server Desktop Environment (MSDE) for effective, small-scale deployments. As will be discussed in detail in a later section WSS Web sites provide substantial overlap with the requirements of an LMS as defined below.

From the authors' experience, it appears that SharePoint is viewed as a tool only suitable for the corporate environment where teams are engaged in typical commercial activities such as production, sales, and marketing. The authors attempt to show that SharePoint technologies are much more flexible than that, and can find a role as the foundation of an LMS system. This is particularly true of the primary role of delivering educational materials in an effective manner for teaching and learning.

With the imminent launch of Office System 2003, the Brisbane office of Microsoft Australia launched the *Spotlight on Office 2003* software competition to showcase powerful new uses of the software. The authors teamed up with G-Netech Pty Ltd to enter the "Education Services" software into the competition. The Education Services system consisted of a managed Sharepoint Portal Server and custom applications developed by G-Netech Pty Ltd staff with some Bond University student involvement. This university developed subject-specific Windows Sharepoint Services sites and used them as part of the trial. Deployed during May through September 2003, just prior to the Office System 2003 launch in October that

year, Education Services was selected as one of three finalists in the competition, and also won a prestigious Asia-Pacific Solution Developer Award.

Following on the education services case study Bond University approached G-Netech to initiate a further trial of SharePoint with participants from several faculties at the university. This became the SharePoint Alliance (SPA) case study that lasted for two semesters, a period of 8 months at Bond where there are three full 14-week semesters in each calendar year. The SPA case study added further experiences and examples to the authors' expertise and lends additional credence to the SharePoint LMS role.

Over recent months, Microsoft has begun to realize that SharePoint can even play other supporting roles with enterprise LMS systems such as Blackboard. The discussion concludes with comments on these plans and the type of resources that are likely to emerge. In addition, the next major version of SharePoint will play an even more important central role in the new Office 2007 System expected early in that year. Some early indications of the additional benefits are presented.

This article first compares the features that SharePoint technologies provide out of the box with the features of an LMS and shows the significant overlap. Next, the basis of the SharePoint Alliance (SPA) Trial conducted at Bond University is discussed. One of the authors taught a sample university subject using SPA and the experiences and outcomes are described in some detail. The paper ends with a discussion of the SPA Trial results with suggestions for improvements if the approach is adopted.

LEARNING MANAGEMENT SYSTEM CHARACTERISTICS

Bond University is Australia's first private university established in 1989. Bond has about 3,000 students across four broadly defined faculties and prides itself on high quality, small-class teaching. Any adoption of an LMS is intended to act as an out-of-class supplement to the face-to-face teaching that all students receive in class. Even in this supporting role, the list of characteristics that must be present in an LMS turns out to be the same as for distance learning except that the emphases on different LMS components are different.

At Bond, only a very small number of subjects are offered in a distance-learning mode. To date mainly static Web sites are used to support classes in a somewhat ad hoc manner. The LMS is intended to replace this teaching support with a consistent,

Table 1. Kennedy's learning management system features

1. Communication Tools	**2. Student Tools**	**3. Course Tools**
1.1 E-mail	2.1 My notes	3.1 Staff information
1.2 Student list	2.2 Student drop box	3.2 Assessment
1.3 Discussion board	2.3 Change your information	3.3 External links
1.4 Virtual classroom	2.4 Student calendar	3.4 Announcements
1.5 Student pages	2.5 Student manual	3.5 Course map
1.6 Group homepages	2.6 Student homepage	3.6 Study material
	2.7 Wiki	3.7 Search

Table 2. Learning management system feature list

	Feature	WSS Support	SPS Support
1	Structured access to and search of repository of learning materials with upload capability	Full support via document libraries per class	Institution-wide repositories
2	Cross-site searching for learning object names and content	Full support per class site	Institution-wide search
3	Fine-grained secure access based on user roles (staff, tutor, student, class representative, and so on) down to individuals	Full support	Full support
4	Subject events (schedules) for class times, assessment deadlines, reminders, and so on	Full support per class	Some support; extension required
5	Notices: announcements, news, task lists, surveys	Full support per class	Full support across institution
6	Discussion groups: inter-class communications, frequently asked questions	Full support	Full support at institution level
7	Notifications of Web site changes: additions, modifications, deletions	Full support via e-mail alerts	Full support at institution level
8	Class lists and group membership (tutorial, workshop, presentation)	Some support via users and contacts lists	Full support via active directory
9	Assessment submission and marks reporting	Very limited support	Simple workflow for document submission only
10	Template based creation of subject Web sites and Web site components	Full support	Full support
11	Real-time class communication; instant messaging, audio, and video	Some support via MS instant messenger integration	As per WSS

interactive collection of educational materials accessible online in 24x7 mode. Indeed at this time of writing Bond is starting the implementation of BlackBoard as the campus-wide LMS. However, there are positive signs that the early SharePoint experiences described here will carry forward into a joint use of BlackBoard. This is described further in the Future Trends section below.

Establishing a succinct set of characteristics that a LMS should possess is not straightforward when taking into consideration the wide range of teaching styles. Kennedy (2005), in surveying students' reaction to the open source Moodle (2006), gives a compact set of features outlined in Table 1 split across three broad support categories: tools for communication, students and course contents. The lists are comprehensive but are biased towards technical descriptions such as drop box and wiki, for example.

When Bond University began the process to choose an LMS a conventional Web-based teaching and learning working group was established (one of the authors was a member). The chapter authors put forward the education services enhancement to SharePoint before this group as a contender for the LMS. As part of this process group members were asked to draw up an ideal list of LMS features. Table 2 shows the feature list drawn up by the authors augmented with comments indicating whether WSS and/or SPS can support each feature. This second table incorporates the three tool sets from Table 1 into a single list.

It is interesting to contrast this list to one given in Wikipedia (Virtual Learning Environment, 2006), only discovered after Table 2 was first drawn up. Note that virtual learning environment (VLE) is the preferred term (changed recently from Managed Learning Environment) but with a note of several other equivalent terms, LMS is one of them. Only feature 9, assessment support, is missing from the SharePoint capabilities and to a lesser extent feature 8, full support of class lists. However, it is recognized that assessment support and centralized grade books play significant roles in teaching and learning. Class list management too is one of the larger administrative tasks for teaching staff, and any support of this activity is to be welcomed.

SharePoint ALLIANCE TRIAL

A small steering group of staff formed the Bond University-G-Netech SharePoint Alliance (SPA) trial to take place over two teaching semesters (semesters 2 and 3) between May and December 2004 (Bond University operates three full teaching semesters each year so that a 6-semester university Bachelors degree can be completed in two calendar years). With staff and equipment resources not being available from within Bond University itself it was decided to outsource the hosting of the SPA trial to a local IT company, G-Netech Pty Ltd. Four faculties, business, law, humanities and information technology, contributed equally to the very modest costs of the SPA trial.

Eventually staff in business, information technology, and humanities used SPA for teaching or coordinating student work. During the trial period, the university was being audited by the Australian Universities Quality Audit organization and some material pertinent to this administrative task was also entered into the SPA portal. A number of staff used additional SPA sites for planning and preparation of information content of various kinds.

Bond University contracted with G-Netech Pty Ltd to provide a managed server at a cost of USD 750/month to host the SharePoint Portal. The server used was a standard Dell dual-processor, one gigabyte RAM, 73-gigabyte RAID disk system as typically used for hosting. Setup and installation of all required software took less than one man day of labour. Microsoft provides universities with heavily discounted prices that make this enterprise level system extremely attractive

Figure 1. SharePoint portal home page

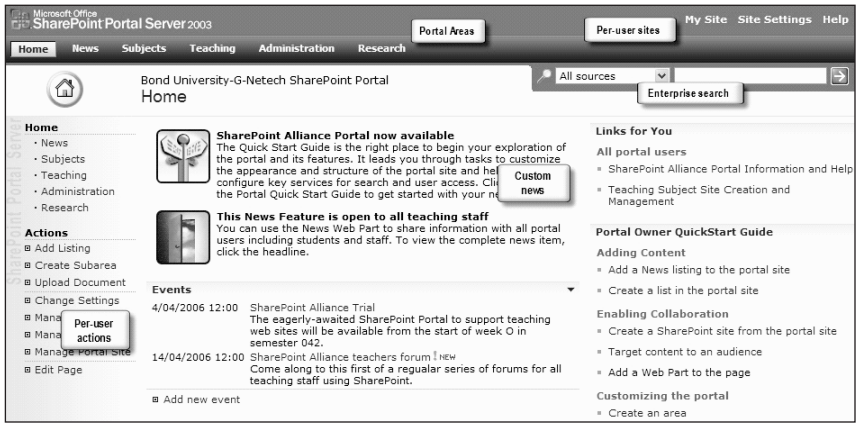


Figure 2. Sample My Site

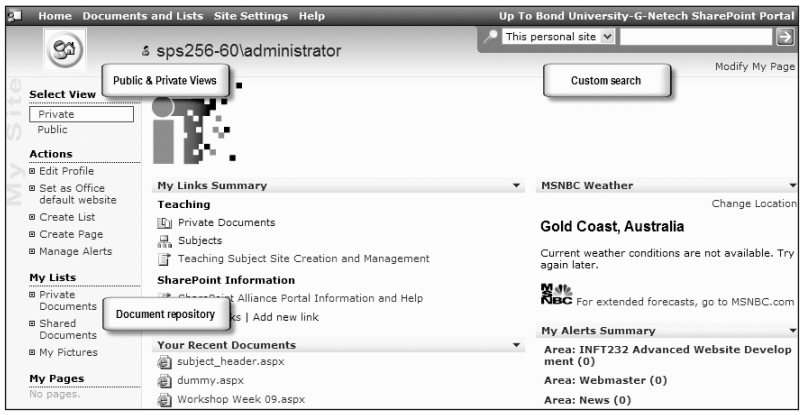
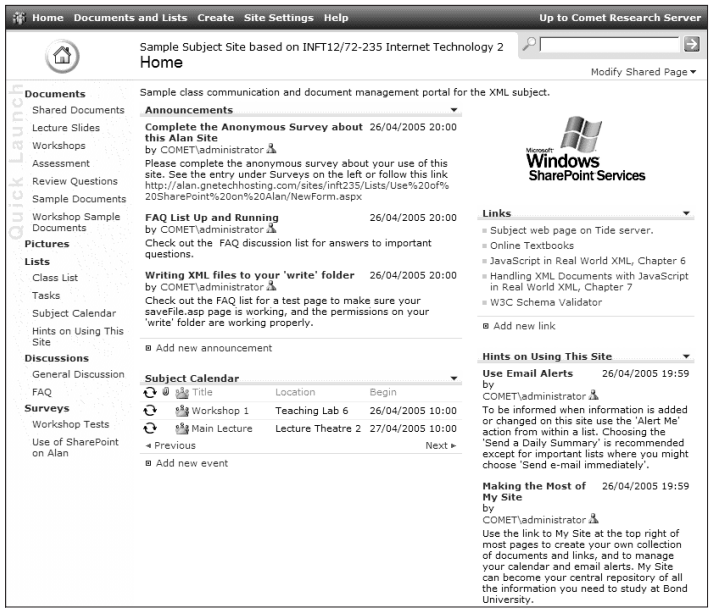


Figure 3. Sample Windows SharePoint services site for a subject



to deploy. At the time of the SPA trial, the annual cost for an SPS license was about USD 3,750. From a systems administration perspective, once the portal is initially set up, the administration of the information structure and content creation can be delegated to a group of end users. Using the role-based security of SharePoint the senior user group can in turn delegate further, thus spreading the administrative load and providing administrative control at the appropriate positions within the information and teaching hierarchy.

A sample portal home page is shown in Figure 1. This demonstrates some of the top-level features available to all users. A single sign-on for each user assigns roles that control the visibility of content and dictate access permissions. Major portal content areas are shown across the heading section and are easily customised. Depending on the roles assigned to them, users can perform a defined set of actions, or possibly none of the actions, listed in the left column. Figure 1 shows the actions available to an administrator. The main content in the central column shows the modules known as Web parts selected by the page author. In this case, the enterprise-wide news service is displayed together with the events Web part. News items can be targeted at specific individual or sets of roles so that list of news items each user sees is highly customised.

Two other major features appear at the top right of Figure 1. The enterprise search feature allows a number of search scopes to be defined ranging from portal areas, the whole portal, and specified external sources that are constantly indexed by the portal search mechanism. The second feature is "My Site," which is an individual, editable Web site that can be allocated to each user including all students. This Web site makes available a comprehensive set of portal Web parts for each user. A sample My Site is shown in shown in Figure 2.

The My Site user is given a powerful individual Web site that can be used to collect a wide variety of information related to the portal such as links, news items, tasks, and e-mail from an exchange server, and public and private documents. Different collections of information can be made available in the public and private views of the Web site. New pages, each containing several Web parts, can be added to the site and cross linked. Searching is also possible across the user's own My Site. At a single stroke, the My Site features satisfy the student tools section of Table 1.

Using the spotlight on office work mentioned above the first author was able to build subject Web sites very quickly for the SPA trial. A screenshot of the home page of the sample site is shown in Figure 3. Note that by default all WSS sites are split into three columns. Other layouts such as the more typical two columns are possible.

Several of the important LMS features from Table 2 are shown in Figure 3. On the left appears the main content navigation showing document libraries (repositories) for various types of subject study materials, subject calendar, outstanding tasks, class list, discussion forums, and surveys. The main page content appears in the central column, which shows the important announcements with automatic expiry dates and the upcoming events in the subject calendar–vital information for the students. On the right is shown a series of useful hyperlinks to both internal and external teaching resources and some hints. The search box in the top right is standard on all pages in a WSS site. Searching for keywords in titles and document contents plays a vital role in improving the user experience of any LMS.

Thus, the portal and Web site contents in Figure 1, Figure 2, and Figure 3 exhibit all the LMS features of Table 2 except for nine. The instant messaging requirement of feature 11 relies on the use of Windows Messenger or MSN Messenger symbols appear to the right of user names the

user can click to contact that user with Windows or MSN Messenger.

Nevertheless it can be seen that the SharePoint technologies otherwise provide the bulk of the features one would expect to find in a full-featured LMS. It was on this basis that some staff at Bond decided to instigate a trial of SharePoint with a view to determine its suitability primarily for teaching delivery, but also for the related teaching preparation and administration processes.

WEB SITE AND PORTAL COMPONENTS

According to the Wikipedia definition, "portlets are reusable Web components that display relevant information to portal users." SPS supports the portlet concept but refers to them as "Web parts." SPS and WSS are delivered with a standard set of about 20 useful Web parts such as documents and links lists, calendars, announcements, tasks, discussion boards, surveys, and so on. Every new list that a Web site owner creates becomes a new Web part. Once created the Web parts can be arranged in columns making up a page by simple dragging and dropping into position.

Web part glue facilities are also incorporated so that Web parts can be linked together with the output of one Web part being input to another. Simple glue can be applied without programming. More powerful Web parts can be coded to work with the Web part object model available to the standard application program development tools such as Visual Studio.

The two SharePoint technologies acting together provide the dual architecture that is typical of enterprise portal software that is used to implement an LMS:

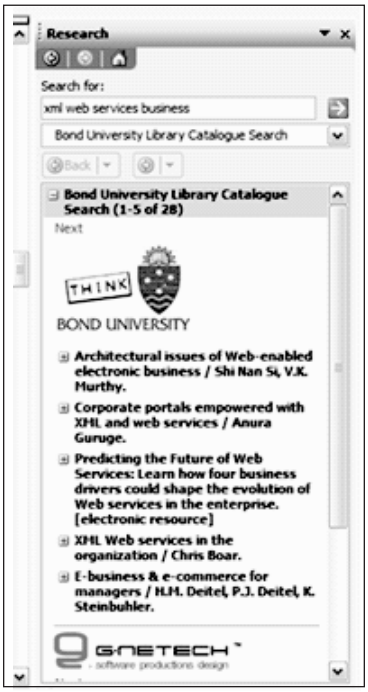
- The outer or community level where institutional information is located plus an information set potentially customized for each individual user.
- The inner Web sites where educators locate information and interact with tools specific to a teaching class, educational activity such as content preparation and planning, or administrative processes.

In the case of Blackboard, for example, these functions are embodied in two separate major modules that are almost separate products in their own right. In the case of SharePoint, the community level is a single product, SharePoint Portal server 2003, and the inner Web sites sit above the IIS Web server and constitute an additional software layer for which is a standard component of the Windows operating system.

SharePoint Portal server provides a number of important features at the university community level controlled by an administrator with portal responsibilities:

- The overall portal information structure is made visible via institutional areas and regions, and a single sign-on gives access according to each user's role.
- Each page at the top portal level varies dynamically according to individual user role so users see a view personalized for them.
- Users are provided with their own Web site called "My Site"; users can copy and link to resources and learning objects and create and upload their own Web part content.
- Cross-portal news and announcements targeted at particular user audiences defined by the institution.
- Information islands located in individual Web sites are aggregated to provide a cross-portal search with users only able to access information specific to their role.

Figure 4. Bond University Library catalogue search in the word research pane



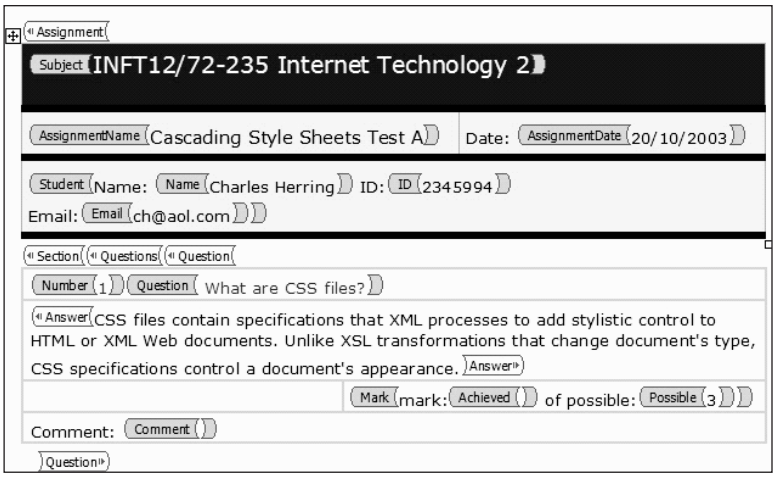
One of the authors acted as the portal administrator for the SPA trial, but with less than 200 portal users the news feature was used only a little, and searching was allowed across the whole portal content. Other features such as single sign-on, My Site and portal user roles were exercised much more fully.

As previously mentioned software developers can build custom Web parts to provide virtually any functionality both in terms of integration within the SharePoint system or to interface to external systems. An example customized Web part was developed by one of the authors to permit a consolidated event calendar view for each user. The motivation for this was to give students the ability to see all of their lectures, labs, and any other appointments on a single event list in one view within their My Site pages. This demonstrated the flexibility of extending the system to provide new learning management specific features.

Another example of extending the Office System was the development of an "Office research pane" within Word that provided the ability for a user to query the Bond University Library catalogue directly. Figure 4 shows how a query to the library information system appears within the Word research pane. Students can easily follow the hyperlinks associated with the library resources and insert references into their Word documents with one click.

One of the new applications in the Office System suite is InfoPath. InfoPath is an XML-based "smart" forms creation and deployment application. InfoPath is integrated with SharePoint form libraries into which the form templates are placed. Clicking on an InfoPath form opens a Web page in which the user can enter the data required by the form. A submit button uploads the form contents to the Form library. From here, users can view and manipulate data originating from InfoPath

Figure 5. Assessment document in word using smart tags



forms. An InfoPath assessment and submission form was developed to demonstrate this capability and to allow students to submit details of an assignment and attach the assessment document set to the form.

Finally, a Word "smart document" was developed that showed how it is possible to build, submit, and mark assessments. The assessment is created as a Word document with specially marked smart sections where students enter their answers. On completion, the students upload their documents to an assessment document library, a drop box. There the assessor opens these smart documents in Word. Figure 5 shows the document opened in Word with the smart tags displayed, normally these tags would be hidden during actual assessment. The smart code assists the marker by reading correct answers from a database and displaying them in a form in the Word task pane (not shown) with fields for the assessor to allocate marks for each answer section and enter comments. A submit button merges the marks and comments into the students' original documents which are placed in another document library from where the students can download them. This solution required a specific test (on Cascading Style Sheets) to be created with correct answers and marks allocation. Custom code was then added to create the task pane functionality. As a result of this experience the authors realise that a wizard approach is needed to make such assessments generic. However, it is pleasing to see how little code is required.

Of course, the survey Web part built into WSS can be used very easily to build quizzes and online tests. The surveys can be exposed at the correct times and each student limited to one attempt. Once completed the collected survey responses (quiz answers) can be hidden from other students (or exposed if need be). However, there is no built-in assessment process. The assessor must view each response and allocate marks manually. Nevertheless, the survey Web part does contain a useful graphical summary of responses that can be used to assess student opinion in an automatic way.

From the initial analysis and from experience it is clear that SPS and WSS are weak in terms of support for class assessment. A set of specific assessment Web parts need to be written to march

the features of other LMS packages. However, the two extensions described above help to fill the gap in SharePoint assessment support.

SAMPLE SUBJECT ON SPA

At Bond, where the primary teaching delivery is face-to-face in small classes, the need for high-cost multimedia-based interactive educational material is substantially reduced. The instructors provide the teaching interaction, do the demonstrations, act the roles, encourage student group activity, and so on. Of course study materials and external electronic resources still need to be available on the subject Web site.

The first author created four subject Web sites during the trial, two in each semester. The features used were substantially those shown in Table 2:

- Document libraries for subject description, lecture slides, lecture notes, tutorial and workshop handouts, assessment sheets, marks, data files, and all other documents used in the subject. Students mostly receive printed copies of these materials
- Lists for class members, class calendar, and upcoming tasks
- Several additional Web part pages that contain additional subject content.
- At least two discussion groups, the unmoderated general discussion group and a moderated FAQ group for more formal queries
- A number of surveys to elicit student opinion and for simple supervised online test submission
- Hyperlink lists to internal and external educational resources

For instructors, document library and list creation is as simple as clicking on the "create" link at the top of the subject home page and selecting from the list of options that includes a custom list creation mechanism. Each document library and list is a new Web part and can be placed in any Web part page. Document libraries also become Web folders so that Windows Explorer can be used to drag and drop documents between folders on the instructor's local machine and the subject sites. All Office applications can open and save directly to Web folders, while most Windows applications exhibit this behaviour as well. Little or no staff training is needed as this is a simple extension of the normal document management activities on any Windows machine.

Creating announcements, new class events, tasks, links, and other list contents is a simple matter of filling in a form for each item. Microsoft Excel is fully integrated with SharePoint and can be used to download or upload any list. Teaching and learning content creation could not be simpler.

Of course, many of the same benefits apply to student access to the teaching Web sites. Their ability to change lists and document libraries on the subject site is appropriately restricted, but on their own My Site they have access to much the same functionality. In common with most of the popular LMS software no student training is needed apart from the occasional demonstration in class to overcome the usual initial reticence to alter information on a Web site.

In the opinion of the instructor, probably the most useful feature of SharePoint is the e-mail alert capability. For any list or document library, the user can nominate to be informed by e-mail of changes in content. The e-mail can be sent immediately, or most usefully, in a daily or weekly summary consolidated from all nominated lists. Hyperlinks in the e-mail take the user directly to the list items in question so that the new information can be viewed directly without having to navigate from the home page of the site. The benefits to students, too, should be obvious, and

Figure 6. Distribution of site accesses per week

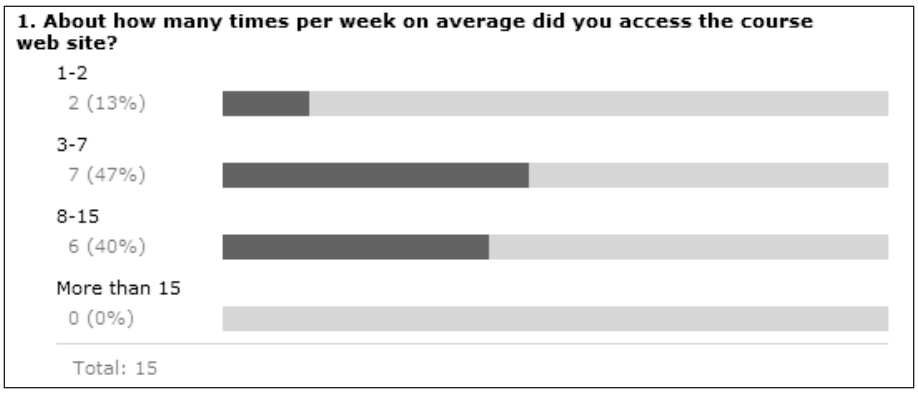


Figure 7. Subject Web site page access log

User	Total Hits	Recent Month
gnetech\jostensj	355	84
gnetech\jwatson	123	2
gnetech\jwinberg	223	73
gnetech\kkha	482	402
gnetech\mdavidse	976	383
gnetech\mrees	1038	341
gnetech\omisje	423	140
gnetech\wlee	557	257

in several surveys students nominated this feature as the most beneficial. However, despite constant urgings not all students by any means expended the effort (only 3 clicks per list) to switch on e-mail alerts. In fact, the surveys show that only just over 50% of the students used e-mail alerts during the subject.

The end of semester surveys yielded detailed results that show strong student support for SharePoint as a beneficial learning tool. Only a few representative samples are presented here. From a class of 19 students there were 15 responses to the online survey. One important question asked students to give an indication of how often they accessed SPA and Figure 6 shows the distribution. Assuming a 5-day studying week the results indicate the site was accessed 1-2 times each day.

Again, from a survey students were asked to rate from 1 (low) to 10 (high) how well SPA supported various class activities, the results

were: communicating with the lecturer 7.9, communicating with classmates 6.7, during practical assignments 7.7 and overall 6.8. Staff-student communication came top with a somewhat surprising practical assignment support a close second. This latter result is probably due to the general discussion group where students often help each other (usually in the early hours of the morning just before an assignment deadline), and a FAQ discussion group where the instructor answers questions about problems with the practical assignments.

When asked about the good features of the SharePoint sites the top three, in order, were e-mail alerts, document libraries, and class calendar. The three least useful features in order were My Site, Web page layout, and login problems. It was disappointing to see the apparently very useful My Site not being used to any great extent. A possible explanation is the short time limit of the SPA trial, and the students knowing that the My Site information they gathered was only likely to be temporary. In addition the mechanism for downloading their carefully gathered site content at the end of the subject was not spelt out in detail by the instructor. This is a lesson that all instructors using LMS packages that offer individual student sites will do well to remember.

The login problems stemmed from the need to allocate students additional user accounts for the SPA trial—our technical services group were not able to allow the on-campus authentication system to be accessed from the external G-Netech hosting site. The problems with the Web site layout are more puzzling since the site templates have been carefully designed. A possible explanation is that once a document in a library or an additional Web part page is opened the connection with the Web site can be lost unless the content creator is careful and consistent.

The built-in SharePoint page access log analysis can be a useful educational tool for the instructor. A part of the access log for a subject Web site over the semester is shown in Figure 7. A student with a very low access count compared to other students might need some additional help, especially one with a negligible value in the last month of the subject! With Bond semesters consisting of 70 weekdays and taking the average value of 500 page accesses over the semester gives a figure of seven page accesses per day. If the student figures shown in Figure 6 are accurate this means between 3 and 7 pages are viewed on each visit to the subject site.

Note that the instructor in this example, mrees, has the highest access count, which is to be expected. A detailed statistical analysis has not been performed but a simple inspection of eventual overall grades against site access counts shows the students with the highest grades always have very high page access counts.

Probably the primary use of the log data is to determine which pages are the most popular so that the most valuable resources can be identified. Other interesting data gathered shows the students' choice of operating system and Web browser on their own machines. Being information technology students, the range of different browsers is wider than normal. Fortunately, another major benefit of SharePoint is its ability to work with all popular browsers.

FUTURE TRENDS

The usefulness of SharePoint technologies to support LMS features is likely to lead to increased deployments in higher education institutions. The cost of the SharePoint Portal server and SQL Server is likely to be an obstacle for smaller installations in the first instance. A more likely scenario is the use of Windows SharePoint Services to begin a small-scale LMS deployment where no SPS or SQL Server licences are needed. A typi-

cal example of such a situation is the University of Vermont Business School (2006). Here WSS was used successfully by both staff and students as part of a much larger trial of a collection of Microsoft software including Office.

In October 2005, Blackboard and Microsoft (2005) issued a press statement indicating that they had started a project to link up the Blackboard Community Portal with SharePoint Portal server. Very soon after this announcement came the news that the Blackboard Learning for Microsoft .NET (2005) had been released which would indicate that the SharePoint/Blackboard integration when running on Windows would be made more straightforward.

The integration work is still progressing and looks likely to join the Web parts model in SharePoint with the Blackboard building block architecture. An obvious mechanism to use is the Web services for Remote Portlets protocol proposed by the OASIS Technical Committee (OASIS WSRP, 2006). The first author eagerly awaits the outcomes of this project as it will be an intelligent marriage of SharePoint and Blackboard, and will allow the author's expertise to be leveraged into the future. Bond University eventually decided to implement Blackboard 7.0 from May 2006.

Probably the most exciting development will be the introduction of a major new design for SharePoint in the forthcoming release of Office 2007 due in early 2007. Not only will SharePoint become the heart of the Office System with even tighter Office integration, it will be partnered by the new Groove Server, which will bring full-featured shared workspaces to Office users. The many additions will make SharePoint even more attractive as an LMS, blogs, RSS feeds, and wiki pages being just a few of the examples.

CONCLUSION

Over the SPA trial, six coordinating teaching staff created nine teaching sites that were used throughout one full semester. About 15 other staff members, administrative and teaching, were allocated SPA accounts, and they experimented with SharePoint for short periods. Apart from student teaching, SPA was used for course planning and preparing educational content as well as some administrative tasks such as the quality audit.

The majority of the teaching staff reported their satisfaction with SharePoint although they were not able to carry out student surveys. It should be remembered that the use of SharePoint as an LMS reported here is very specifically as a supplement to face-to-face teaching, which is the main delivery paradigm. At Bond SharePoint was trialled against existing static Web sites. SharePoint proved to be more collaborative, interactive, and easy to populate with content. To this extent, the SPA trial was successful.

Surprisingly considering the corporate origins of SharePoint the administrative experiment with the quality audit was not a success. The intention was to present documents about the audit on a Web site, and then to survey all staff to determine that they had accessed the documents. The need to allocate new accounts for up to 400 staff was not a barrier. Despite the ease of creating the survey itself, the inability to incorporate the survey Web part into another page satisfactorily was the eventual stumbling block. Web part features became the limiting factor.

There is considerably less doubt of the usefulness of SharePoint as a collaborative intranet for designing courses by teams of teaching staff (Dain, 2003). SharePoint is also valuable for forging a community of practice and expertise as described in McFerrin, Tewson, and Wallis (2003). Such a collaborative environment encourages the sharing of ideas and exemplars.

It should not be forgotten that the major defect in SharePoint as regards its use as an LMS lies in the lack of a centralized grade book and compelling features for online testing, the submission of assessment and marking. The authors did show that a relatively small development effort is needed to start to add customized assessment features using InfoPath forms and Word smart documents. Further development of more powerful assessment Web parts would further improve SharePoint's standing as a complete LMS.

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KEY TERMS

FAQ: Frequently asked questions.

LMS: Learning management system.

SPA: SharePoint alliance trial.

SPS: SharePoint portal server.

Web Part: Portlets supported by SharePoint.

WSS: Windows SharePoint services.