**ABSTRACT**

Due to various shortcomings of the Blackboard Learning Management System (LMS) [2, 3, 5, 6, 8] and the pedagogical benefits of having students learn one of the most popular browser-based collaboration and document management platforms used in the computing industry today, the use of Microsoft's SharePoint application as an LMS in a university environment is explored. This paper covers motivations for developing a SharePoint site for use in computer science courses. It also covers discovered benefits of the two year experiment along with critical steps in establishing a secure and easy to manage course SharePoint site.

**INTRODUCTION**

In the fall of 2014, an adjunct opportunity was presented to one of the authors to teach a freshmen level computer science course. After the first semester of teaching a course at a university that relied upon the Blackboard Learning Management System (LMS) [1], with which the instructor had no experience, he decided to see if he could manage a course using a SharePoint site the following semester. The Blackboard LMS is the university recommended platform with a significant percentage of faculty begrudgingly using it as a perceived only option. SharePoint is a widely used collaboration and document management platform [7] and the instructor had extensive

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experience with the SharePoint in industry. After learning the university had a license to run a SharePoint site, the instructor worked with the university's Information Technology Services (ITS) SharePoint administrator to setup a site to manage his computer science course as an “approved” experiment. Most critical to the university was that security and privacy issues were addressed so as to protect the students using the site. The site would contain grades and other information covered under FERPA regulations. If the experiment proved to be a successful alternative to using the Blackboard system, the ITS department wanted to make sure it was clear that widespread adoption by faculty would not be possible immediately. Significant infrastructure and administrative changes in order to govern, support and secure such extensive use would be required.

RATIONALE

Using SharePoint as an LMS alternative was motivated further by the following factors.

• The limitation of implementing a cross-numbered course, which requires cumbersome dual entry of many items when done in the Blackboard LMS.

• Using SharePoint aligned with a new university sustainability initiative aimed at reducing paper usage in courses. The implementation allowed no paper to be used at all during the semester, including test administration.

• Since a course in “Fluency in Technology” was one of the courses being taught, using SharePoint met a learning objective to expose students to popular software used in industry.

• The steps required to grade student assignments in Blackboard were greatly reduced by using the built-in functionality of SharePoint. For any assignments involving a Microsoft Office file, the process of grading was reduced to the three steps: one-click-open => annotate and grade => save.

• Due to the underlying database capabilities of SharePoint, views of student work sets are easily generated.

• Use of SharePoint is encouraged for faculty collaboration by the university. Gonzaga has made a commitment to support SharePoint which ensures better security and reliability when compared to a third-party software package not supported by the school's ITS department.

DISCOVERED BENEFITS

Some unexpected benefits of using SharePoint as a course LMS were discovered as we used the system over the past two years. Since SharePoint is primarily a collaboration tool, students began using it for work in other courses. Students could generate discussion documents similar to a shared google doc. Even after just two years of using SharePoint, we have realized a benefit of viewing a student's portfolio of work for the entire course. This has been a helpful tool in writing student recommendations for employment and graduate schools. Students have also used the tool to share their portfolio for prospective employers. Finally, we have used the tool to manage advising signups during the
registration periods each semester, enabling a seamless method for students to make appointments, all within the boundary of one tool. All of the SharePoint features we have used to deal with course management and faculty administrative tasks can certainly be achieved using various software packages available in the market place. The major benefit of using the SharePoint tool for both faculty and students has been the single consistent tool to accomplish the various tasks without having to switch applications.

**CRITICAL SETUP STEPS**

Although we have not had to write any custom code to modify the behavior of the SharePoint installation, we have had to research and experiment with certain settings beyond the default settings in the standard enterprise setup. Many of these could certainly be customized by the SharePoint site administrator and saved as a template so the setup would not be so cumbersome for faculty new to the system. Again, we were given the necessary permissions to experiment with this pilot largely due to the expertise with industry SharePoint sites of an author. Due to FERPA regulations, the security setup is vital and the components described below would likely be too technical for many faculty members to implement without some assistance.

The main goal of the setup was to ensure security that 1) protected content, 2) ensured privacy, and 3) enabled collaboration. The built-in versioning capabilities of the system serves as a deterrent to student mischief that might violate academic honesty policies. Through a systems design process we first developed a SharePoint site architecture diagram (see Figure 1) to encapsulate our goals of the system. The first level of security is provided by the university SharePoint root site collection access login system. Only individuals with a university login account can access the SharePoint managed site collection. Once in the SharePoint site collection, only students enrolled in a course can access a specific course site, and only students enrolled in a specific term/section can access the section subsite. As can be seen in Figure 1, an instructor site is created that may contain multiple course sites. Each course site may contain individual term/section subsites. Each of these sites has varying levels of access as noted in the diagram.

Associated with each term/section subsite, a Submission Center list library is created that allows students to submit assignments of any data type as an attached file. Any submission by a student can be viewed by only that student and the instructor. The instructor will see all submissions of all students and can easily filter the view to look at all submissions of a particular assignment and any subgroup of students down to an individual student's assignment. Since SharePoint is integrated with the Office365 suite of products, annotating any document is easily achieved by simply opening the document and modifying it. All modifications are saved and the student can view the graded assignments simply by opening them from the same submission location. Any new assignment posting is achieved by the instructor adding the new assignment to the assignment master list. Students will then see the assignment listings in a dropdown widget so they can select which assignment their submission is tied to in the Submission Center. Students will be able to see assignment grades immediately upon posting.
There is no spreadsheet type of calculation built in to a SharePoint list so using a separate spreadsheet is required to maintain computed overall grades. The Blackboard grade center works well if the number and weight of all assignments is known prior to a course. However, if assignments are created during a term an external spreadsheet is likely needed anyway when using the Blackboard LMS, so the SharePoint implementation does not increase the workload. We have investigated developing some custom code to automate the creation of such spreadsheets. Although this coding would be straight-forward, it remains as a future enhancement.

A common criticism about SharePoint is the confusion generated by implementations that frequently lack navigation to move around a SharePoint site collection [4]. This can easily occur if care is not taken to provide the necessary navigation for each component of a collection. Three critical navigational information must be present on each page of the site: 1) current site is obvious to the user, 2) links exist that navigate back to the parent site, and 3) links exist to navigate to all immediate subsites.

A second common tendency found in SharePoint sites for users coming from a desktop experience, is to use folders to organize data on a site. Due to the built-in metadata capabilities of SharePoint, the use of folders to organize data is a hindrance to the filtering power of creating views within the system. We have added a Document Type column to each course level document library. Documents can then be tagged by selecting from a domain of values such as Lectures, Exams, Assignments, Code,
Administration, and so on. This domain can be modified to meet the needs of individual instructors. When setting up the Document Type column, an instructor can choose to allow multiple selections. This is what provides filtering capabilities beyond those available in a typical folder implementation. For example, code samples may be associated with lectures, exams, and homework assignments. With folders an instructor would need to decide whether to put code all in one Code folder or intersperse code throughout Lecture, Exam, and Assignment folders. In a SharePoint document library the student could filter for Code to see all code regardless of purpose or they could filter on Lecture to see all notes and code that relate to lectures. Figure 2 shows how the properties of a file are set and shows a portion of a document library with a Document Type column.

![Figure 2 - Document library with a Document Type column](image)

SharePoint includes a wide variety of applications that can be added as web parts. The choice of content and placement of web parts can be configured to meet the needs of each instructor. Students can choose to set alerts to notify them of additions or changes to content of a web part. We suggest students set up alerts on the Tasks and Documents web parts to be notified via email when new assignments are posted. Figure 3 shows the layout of a course site that has web parts for announcements, a link list, a task list with a timeline, and a view of the main document library.
The Submission Center is effectively a list that, due to the permissions settings, allows students to submit an assignment via attaching a document(s) to the submission. Submissions are identified by the Assignment Name selected by the submitting student. Other metadata useful to track assignments (all configurable) are creation and modification dates, created and modified by tags, and grades assigned (see Figure 4).

Collaboration among students is achieved via document sharing permission settings. Monitoring synchronization of document modifications can be achieved via a checkout capability (See Figure 5).
Setting up the security for the various sites is a critical step in achieving the privacy desired for access levels. The permissions are set so only the instructor and student can see and modify submissions. The “Submission Center” is a custom list with Submission Description, Grade, Assignment, and Assignment name columns. Once the Submission Center list is created the permissions are established via the “Advanced Settings” option. To set the permissions so only the submitting students and instructor can view a submitted assignment, the “Advanced Settings” option for the Submission Center list contains the options to set the “Read access” and “Create and Edit access” (see lower left of Figure 1).

It is strongly recommend that verification of the security settings with the SharePoint administrator is done before having a site go live. Also, a good practice is to have the students submit a simple document on the first day of class and verify only the student and the instructor can view their submitted assignment.

CONCLUSION AND FUTURE DIRECTIONS

The use of SharePoint as an option for a Learning Management System can prove to be a rewarding experience. Students' feedback indicates they easily get comfortable with the tool, and it provides them with an opportunity to gain experience with a common tool they will use in their professional careers. From a faculty member's perspective, the tool allows efficiency improvements in course management tasks such as grading and daily communication with students.

Since SharePoint is designed to be customizable, there are a number of enhancements that could be developed by adding custom web apps to an implantation used for course management. Adding a feature to manage the grades via an excel spreadsheet would allow most of the course management to remain with the top-level site and avoid using an external spreadsheet. Automatic population of the enrolled students via an interface with the university registration system would reduce the start of semester setup time. However, this is not a large task presently. Other enhancements could be added to match favorite features found in more traditional LMS systems. From our
experience, the capabilities of the system have met our pedagogical needs adequately while improving our efficiency in managing a course when compared to the current LMS system.

REFERENCES


