Course Material Accessibility and Organization: A Comparative Study of Google Sites and SharePoint

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Introduction

During academic years 2016 and 2017, the course directors for the Advanced Physics I (PH255) course in the core physics program in the Department of Physics and Nuclear Engineering redesigned the course website and chose a different hosting platform for the website. The new website design was also recently used for the Physics I (PH205) course in the spring semester of the same academic year. Previously, all core physics course websites utilized Microsoft SharePoint on the United States Military Academy (USMA) network. The new PH255 course website was instead established as a Google site. The decision to change the course website manifested from cadet feedback and requests for a website that was accessible on all technological platforms the cadets have access to, including their laptop computers, iPads, and phones. The SharePoint sites require a Common Access Card (CAC) enabled device that can login to the USMA network and precluded the cadets from accessing the course website from their iPads, phones, and from offsite locations (without logging in through a virtual private network). The Google site only requires internet access and it can be accessed from any location and on any device. This study compares the design and use of the Google site to the SharePoint site. The site’s effectiveness in increasing cadet use is examined and its ability to facilitate or motivate the learning process is considered.

Background

A large amount of research exists on the design and evaluation of course websites. To address the diversity of students, universal instructional design (UID) principles have been developed to help teachers produce content that is easily accessible and digestible by all users (Burgstahler, 2009). These principles were expanded on and applied to course website design to allow assessment of course websites. A study on distance education utilizing UID identified eight principles relevant to course website design: equitable use, flexible use, simple and intuitive use, perceptible information, tolerance for user error, technical and physical effort, learner community and support, and instructional climate (Elias, 2010). These principles provide a foundation for comparison between course website designs.

An additional consideration for course website design is student motivation to use the website in their learning. Feedback from students may be used to drive change with the intent of increasing student extrinsic and intrinsic motivation in using the website. High extrinsic motivation (perceived usefulness) and intrinsic motivation (perceived enjoyment) play a significant role in a student’s intention to use course material on a website to enhance their learning (Lee, Cheung, & Chen, 2005). Student motivation therefore becomes a tool in
evaluating employment of the UID principles from the perspective of the student.

As discussed, prior to Spring 2017, the Physics I website was traditionally located on SharePoint. The website for the Fall 2017 term remains at the following address: https://collab.westpoint.edu/pne/PH205/SitePages/Home.aspx (note: you must be on the USMA internal network and using Internet Explorer to gain access). Figure 1 is a screenshot of the SharePoint website.

During academic year 2016 and in the Fall semester of 2017, the PH255 Google website was refined and tested for possible future implementation for PH205. Due to the overwhelming success and popularity of the Google site, it was adopted for PH205 in Spring 2017. The website for the Spring 2017 term is at the following address: https://sites.google.com/a/usmaphysics.com/ph205/. Figure 2 is a screenshot of the Google site.
The Google site also supports easy viewing on mobile platforms such as iPads and cell phones.

**Approach**

A comparison of the SharePoint and Google sites was conducted using four of the UID principles: equitable use, flexible use, simple and intuitive use, and perceptible information. While the UID principles assist with the design of a new course website, a significant part of the feedback and future improvement of the site comes from the assessment of student motivation related to the use of the course website. The assessment of student motivation includes both extrinsic factors, where a student makes a calculated decision about his or her perceived usefulness of the site, and intrinsic factors related to perceived enjoyment such as happiness, joy, frustration, and anger (Lee, Cheung, & Chen, 2005).

A course survey was given to all cadets in PH255 to evaluate the new course website on Google and compare it to other course websites offered at West Point. SharePoint seems to be a very common option and it was the sole site used previously in the core physics program. Twenty-five cadets completed a mid-course survey and fifty-seven cadets completed the end of course survey, providing feedback on the course website. A direct cadet-level comparison was not conducted because no cadet had simultaneous access to both a SharePoint and Google website for the PH255 course. In previous semesters, course-end surveys did not include a
Assessment

The first assessment of the Google and SharePoint course websites is based on a comparison of the two sites for equitable use, flexible use, simple and intuitive use, and perceptible information. Table 1 summarizes the results of the UID principle based assessment. Each UID principle discussed was assigned specific indicators or site features to provide a common ground for website comparison similar to the analysis done by Tanya Elias (Elias, 2010).

Table 1. Assessment of Course Websites Using Universal Instructional Design (UID) Principles

<table>
<thead>
<tr>
<th>UID Principle</th>
<th>Definition</th>
<th>Assessment Criteria</th>
<th>SharePoint Site</th>
<th>Google Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equitable Use</td>
<td>The ability for all students to access the course website from any location or platform</td>
<td>All course content online</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Website accessible by all cadets</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Website available anytime / anywhere</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiple-browsers compatible</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Flexible Use</td>
<td>Provides multiple tools for learning material (text, videos, slides, external links, etc.)</td>
<td>Multiple formats of material present on the site</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Native viewers available for alternate media</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Simple and Intuitive Use</td>
<td>Easy to understand, regardless of the user's experience, skills or knowledge</td>
<td>Simple interface</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Easy to navigate menus</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Searchable content from main page</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Perceptible Information</td>
<td>Information is perceptible to the user regardless of the conditions</td>
<td>Easy to view text</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site viewable for all window sizes / scaling</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

The following question was also asked on the course-end survey to stimulate qualitative cadet responses about their experience with the course website: “Did you find the Google course website more or less useful than a typical SharePoint (CAC login required) website? Would you recommend staying with this format? Why or why not?.” Select responses are included in the analysis and all responses are available in Appendix B. On the PH255 mid-course survey, a free response question asking for feedback was also included. All responses for the mid-course survey are available in Appendix A.

Equitable use is the ability of all students to access the course website from any location or platform. Overall, the SharePoint site fails to meet this principle. Cadets were only able to access the website on CAC-enabled devices while on the USMA network and on Internet Explorer. The SharePoint website, when accessed on Google Chrome and Mozilla Firefox, was unavailable due to security issues. The Google website has no login requirement, and is accessible from cadet laptops, iPads, and cell phones while anywhere with internet connectivity. The Google website works seamlessly on Internet Explorer, Google Chrome, and Mozilla Firefox. The accessibility of the site greatly increases the ability of cadets to access course information while on pass, outside of the USMA network, and without a computer. It also allows cadet-athletes to access the course website while traveling for competitions and does not limit where a cadet must be physically located to learn. Cadets were asked to compare the ease of access for the course website to other course websites they have used at USMA. Figure 3
shows the responses received given a Likert scale with 1 representing that the PH255 material is not as accessible and a 5 signifies the PH255 material is much more accessible than other courses.

The mean value of the responses is 4.2 with a standard deviation of the mean (SDOM) of 0.1. Cadet responses related to this UID principle also included the following: “Neat and organized - I like how you don’t need to use internet explorer to access it,” “I hate having to use my CAC to log on to get notes or a powerpoint,” and “I thought the Google website was much more accessible. Also, I could get to it on my iPad which was very helpful when I didn't have my computer. Keep this format.” These results confidently show that the cadets feel that the course material was generally easier to access than other USMA course websites.

Flexible use is inherent in a course website that provides multiple tools for learning material. Both SharePoint and Google sites allow for the integration of multiple formats for material. The drawback to the SharePoint site comes from the need to download the additional material and find a program to run it, while the Google site has many native viewers for most file types and allows for the consumption of material directly through the course website. In addition, both SharePoint and Google sites allow for direct links to information located outside the course website. Both websites also have a calendar feature, however, many cadets find the course calendar on Google useful in that they are able to import the entire course calendar onto their personal Google calendar. Responses for how the Google calendar aids in cadet organization for the course show that cadets that used the calendar generally felt that it aided in their organization. A score of 1 on the scale represents “Not at all” while a score of 5 represents “Very Much.”
The results give a mean response value of 3.4 with a SDOM of 0.4 which still shows above neutral scores. Cadet responses for the flexible use principle include the following: “It was easier because it smoothly linked to Google Docs,” “It allowed me to easily download pdf's and send them to my iPad via google drive so that I could do the suggested problems using my iPad and apple pen,” and “cadets are able to import the class Google Calendar into their own personal calendars for better organization.” Overall, the Google site outperforms SharePoint in the flexible use category due to the imbedded viewers for various file types (pdf, PowerPoint, Excel, Word, and video files).

A simple and intuitive website is one that is easy to understand, regardless of the user’s experience, skill, or knowledge. Both websites have a fairly simple interface with sections that contain folders, documents, and text. The Google site menus are a bit easier to navigate given that all important files and folders require no more than one mouse click to access. The SharePoint site could be organized in such a manner as well. The current SharePoint site is modeled after a computer file system and is built around multiple folders in folders. The main page for the Google course website is designed to provide information for all course aspects in an easy to view layout. The SharePoint site instead has links to different areas of material and requires navigating throughout the site to find the desired documents. SharePoint does better in the searchable content area, however. On this site, users can search all content available on the site including the embedded files and folders. The Google site does not allow for searching the files posted on the page but only allows for searching the text and headings included on the site.

The last assessment criteria for this UID principle was a mobile interface for the website. The Google site has a similar and intuitive mobile platform interface compared to its desktop interface. The SharePoint site has no mobile access or interface. Additionally, the Google site presents all course material for a given lesson in one readable .pdf file for each lesson. This includes the lesson page(s) from the course summary, blank suggested homework problems, and associated solutions. The previous SharePoint site required cadets to access multiple folders and files to get each piece of information contained in the current lesson files. This is a website-
independent feature that could be easily implemented on any host service. Overall, the main differences for this category are that SharePoint has a superior content search feature while the Google site contains a simple mobile interface. All other features could be implemented on both sites.

The final UID principle evaluated was that the information is perceptible. This means that the site presents the information to the user regardless of the conditions. The Google course website outperforms the SharePoint course website in regards to perceptible information. Individual screen preferences may require cadets to scroll horizontally to view material on the SharePoint site, while the Google site adjusts viewing windows to allow all information to be available across the website. All links to material on the SharePoint site are in a gold color that does not show up well against the white background of the page. Adjusting text size further confuses an observer as links to files split into multiple lines. The Google site features miniature viewing windows that allows the user to scroll horizontally if a link is longer than the window it is displayed in. Overall, the Google site is more easily viewed across multiple platforms, browser types and sizes, and mobile devices.

Student motivation also plays a significant role in the overall effectiveness of a course website and, therefore, should be assessed and included in the assessment of the site. Extrinsic motivation or perceived usefulness is closely tied to the UID principles discussed previously. A major factor influencing the perceived usefulness of a website is ease of access. This is very closely tied to the equitable use UID principle and means that the site should be accessible from anywhere, on any platform, and it is easy to receive the information being sought. For both the Google and SharePoint sites, course materials were readily available. Lesson documents and suggested problems are posted at least an entire block of instruction in advance (about 10 lessons) on both websites. Again, the Google site outperformed the SharePoint site in terms of accessibility due to browser compatibility and network restrictions for the SharePoint site. The layout and organization of material on the site can also influence student lesson preparation. A cadet commented that “it was very easy to click on the suggested problems and practice” using the Google site. The PH255 mid-course survey also included a question on this intrinsic motivation factor. For the remainder of the figures in this paper, a Likert score of 1 represents “Not at all” while a score of 5 represents “Very Much”.
The results give a mean response value of 3.4 with a SDOM of 0.2 which still shows above neutral scores. This shows a slight increase in student motivation to prepare for class due to the website organization. As mentioned in the simple and intuitive use section, each lesson also had its own file that the cadet could access for use during lesson preparation. This feature is something that can be implemented independent of the website platform but it certainly influences student motivation as demonstrated in Figure 6.

Results support that making information more readily accessible may motivate cadets to prepare for class. This simple and streamlined organization of material on the website is just one less barrier to get a cadet into the books and prepared for lessons.

Student acceptance and usage of a course website also depends highly on intrinsic factors and emotions. Such emotions may include happiness, joy, frustration, and anger. These factors are more difficult to assess and no direct attempt to assess them was made. Some of the course end feedback responses indicated some level of intrinsic satisfaction with the website: “...it was
more easily accessible and the overall GUI is more intuitive and aesthetically appealing.” “More useful, everything was in one place and all easily accessible,” and “I loved it because it was easy to use and seemed more adaptable.” For improved data in this area, cadets should be asked specifically about their emotions when using the course website.

Conclusions and Future Research

The Google website was extremely popular among the cadets and may have influenced their general level of preparation for class. When assessed using the UID principles, the Google site does very well across the board. There may also be other website services that are able to meet the same goals, however, the SharePoint site lacks in its accessibility given the requirement for CAC access and a connection to the USMA internal network. The current generation of cadets seems more motivated by ease of access to information on the internet and the ability to utilize technology inside and outside of the classroom. Cadet feedback on the end of course survey supported this argument: “Please tell the rest of the departments to use Google. It can be accessed from my phone, does not require a login, and is a lot easier to follow…” and “The course website is incredibly easy to navigate. I think all courses should use google as opposed to sharepoint.” The use of a Google course website, as opposed to SharePoint, is desired by cadets to facilitate course material access from any device at any time.

This research leaves a fantastic opportunity for more in-depth and refined studies on this subject matter. Two simultaneous course websites (Google and SharePoint) may be offered to allow for direct comparison of cadet experiences. An attempt should be made to make as many components the same on both websites to allow for a fair assessment. Course end survey questions should also be refined and updated to better assess the employment of UID principles and student motivation (both intrinsic and extrinsic). It may also be possible to track specific usage data such as cadet time spent on the website, website traffic, number and frequency of downloads, and more. The use of the Google site or a similarly accessible site will continue in Physics I given the positive cadet feedback. Perhaps this study will also inspire other course directors to consider a similar option for integration in their respective courses.

References


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Appendix A: Midcourse Survey Results

Response summary for: Compare the ease of access to course materials on the PH255 website with other courses at USMA.

Response summary for: Does the organization of the course website influence your level of class preparation?

Response summary for: If you use the calendar feature on the website, how much does use of it aid in your organization in the course?
How much do the by-lesson course summary .pdf files with suggested problems influence your level of class preparation?

Response summary for: How do the by-lesson course summary .pdf files influence your likelihood of attempting to solve suggested problems?
Appendix B: Course End Feedback Qualitative Feedback

E7. Did you find the Google course website more or less useful than a typical SharePoint (CAC login required) website? Would you recommend staying with this format? Why or why not?

There were 57 responses.

1. More useful. Very easy to access
2. I like the Google course. It was easily accessible.
3. Yes, it was much easier to access.
4. Yes, I prefer Google's services, but when the rest of USMA uses CAC websites it just adds another bookmark, so it might not be the most convenient for everyone here.
5. Yes, Google course website was convenient, easy to use, and a significant improvement over the sharepoint websites I have visited.
6. N/A
7. More, I loved it because it was easy to use and seemed more adaptable.
8. It was very useful as it was easily accessible and navigable.
9. Yes, I found the site easy to navigate despite the amount of information that needed to be presented on it.
10. Yes, this google website enabled me to access the documents and download them easily, where as a CAC login share point might not be so easy to navigate.
11. Yes
12. It was easier because it smoothly linked to Google Docs.
13. Much more useful. It allowed me to easily download pdf's and send them to my iPad via google drive so that I could do the suggested problems using my iPad and apple pen.
14. N/A
15. The Google course website was very helpful and should definitely be used in the future.
16. Yes.
17. It is great - I can log in anywhere.
18. Much more useful. Easier to navigate.
19. I did find it particularly useful and easy to access; I would recommend staying with the format.
20. More useful, everything was in one place and all easily accessible.
21. Yes, it was more easily accessible and the overall GUI is more intuitive and aesthetically appealing.
22. I used the course website for everything.
23. More useful because CAC login can be annoying and picky
24. I thought the google website was more user-friendly and readily available to access.
25. It made documents really easy to look at although it was sometimes difficult to find stuff
26. I thought that was helpful
27. Yes. The ability to download to google drive was very helpful
28. I would recommend it so much more than the typical SharePoint because it is much more accessible on an Ipad or civilian computer over break.
29. So much more useful. Please tell the rest of the departments to use Google. It can be accessed from my phone, does not require a login, and is a lot easier to follow than say
Blackboard (which sucks and will eventually be replaced by Google classroom anyway). In fact, tell USMA to switch to google email as well. Microsoft is a pain.

30. more helpful, easy to find sources
31. More useful
32. I found it much easier to access and get content from, especially since it did not require any sort of login. Accessing shared files from Google Drive is also very easy. Additionally, cadets are able to import the class Google Calendar into their own personal calendars for better organization.

33. yes, better format, more accessible
34. Yes, I don't think I used the SharePoint.
35. I enjoyed Google course website because CAC login would not work occasionally.
36. I have no preference.
37. More useful, yes, easily accessible
38. Yes. I don't know how to use a sharepoint.
39. Yes it was very helpful. It was very easy to click on the suggested problems and practice. Also the calendar was very useful so that I could see when labs and wprs were.

40. Doesn't matter this is important to our learning.
41. Yes, because I have a google drive and can save the files directly to my drive.
42. not enough experience to have a valid answer
43. Yes. The google website was easily accessible and easy to use.
44. Yes very much better, I hate having to use my CAC to log on to get notes or a powerpoint
45. I found the Google course website to be more useful because it didn't require some bogus code to be put in for me to access it. (It's more accessible even from the iPad).

46. More, Yes, because I don't have to constantly be typing in my pin number other than that I don't really care.
47. I liked the google website because it was easy to access from my ipad.
48. Much more useful. It was far easier to navigate than sharepoint
49. More useful because it was very easy to access and gain information.
50. Yes. It was more up to date, and I kept it bookmarked. It made things simpler.
51. Much more useful, it was easier to access and worked better with the software in my computer.
52. Meh. No difference.
53. Yes. I very much appreciated the google website. It was well organized and very helpful as a source of course material.
54. yes. easy access
55. I thought the Google website was much more accessible. Also, I could get to it on my iPAD which was very helpful when I didn't have my computer. Keep this format.
56. I did like this format. I found it much easier to work with than SharePoint and I could access it from my iPad.
57. More useful than the SharePoint. Stay with the website.