Multimedia Support of Web Site Functionality and Interactivity

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Abstract: The purpose of this study was to identify and implement functional parameters of non-interactive and interactive Web sites. The results of this study indicated what enhancements would better suit the Web designer’s choice in the classroom. The importance of looking at Web site interactivity is to address user engagement in an online environment. For the purposes of this study, graduate students were surveyed and graphic designers, who serve as content-experts, were interviewed. Results indicated that all respondents were advanced Web designers who indicated a preference for interactive sites versus animated ones. Thus, the more interactive and relevant the site was the more engaged the user was in retaining the information presented. Recommendations gleaned from the results of this study are detailed and presented here.

Introduction

As online courses become universally accessible, the task of combining student expectations and conditions within an online classroom setting increases in complexity. Given these implications, instructors cannot simply tailor their curriculum towards every individual or design their content based solely upon subjective criticism. Instructors can however tailor their online course design towards gaining and retaining students’ attention and make their students’ online learning experience more meaningful.

In Umback and Wawrzynski’s findings (2005), students report higher levels of engagement and learning where faculty members use active learning techniques. While these active learning techniques apply specifically to collaborative interaction, it could be assumed that students are more engaged when interacting with peers and faculty and this interactive environment can also be transferred online whether students are tasked to work collaboratively or independently. Specifically and inline with this study, instructors who incorporate course Web sites in their online classes can expand the layout and design process by using interactive multimedia tools.

This study expands online educational mediums using Web site interactivity for the main purpose of allowing online course designers to utilize applications that are readily available to them. This study addresses research questions indicated below that determine if the level of interactivity, functionality and relevance of Web site design aids in user engagement in an interactive online environment:
• How do animated and interactive Web pages affect an online learner’s experience?
• How relevant or transparent is the site in terms of functionality?

Background

While there are varying opinions on whether interactive multimedia (IMM) makes a difference in learning or not, there is research that indicate the benefits to using IMM in the classroom (Hancock, Knezek, & Christensen, 2007). In Kingsley and Boone’s study (2008), significant differences between two middle school social studies’ student groups were found between pre- and post-tests which indicated that the experimental group who used IMM saw an increase in test scores which more than doubled those in the control group. Additionally, Squire (2006), who looked at Videogame design, stated that the interactive aspect of gaming in the realm of education has elementary school students asking, “Why read about ancient Rome when I can build it?” (p. 19).

Student engagement, according to Zhao and Kuh (2004), correlate positively when students are introduced to learning communities early in their academic career, and while this study targets the design process of Web interactivity, instructors can attempt to translate this same type of learning communities online whether students work independently or collaboratively. Using technology for educational purposes also plays a part in student engagement (Laird & Kuh, 2005). Therefore, the interactive capability of online learning which gives students something more than just a static experience and through which users construct meanings, actions and individual parameters in education opens the doors of possibility on how far an instructor can take the design of their online courses. The design process is virtually limitless.

The Metiri Group (2008) stated, “the most effective designs for learning, adapt to include a variety of media, combinations of modalities, levels of interactivity, learner characteristics, and pedagogy based on a complex set of circumstances” (p. 14). Thus, people learn better when there are various modes of learning, leading to a more meaningful learning experience, retention and an increased skill set. Having a static web page for informational purposes is appropriate for a specific audience but engaging members means more interactive design efforts. This is also relevant to Web site functionality.

Web site functionality in terms of its transparency, or how a user can utilize a Web site with little effort, also becomes a factor in maintaining users’ attention and keeping them on the site with minimal frustration. Wurtz (2005) defines Web site transparency as, “the extent to which the users are required to make an extra effort in order to find the information they are looking for” (p. 18). Therefore, if the ease of which an instructor’s site is navigational and functional, the less frustrated and more engaged the student will be in learning the content of the lesson. Additionally, if not designed properly, students may find the learning process counterproductive (Garcia, Quiros, Santos, Gonzalez, & Fernanz, 2007). Thus, students who find relevance in the curriculum and are engaged with the content of the course in terms of its ease of transparency and functionality will
find that IMM provides them with benefits in their online courses.

In this study, an online Web design course that utilizes a Course Management System (CMS) is additionally supplemented by a course Web site. Students in this course encounter multimedia means that provide them with examples of what their culminating project might entail while also learning basic graphic design principles. Typically, students are not required to incorporate interactive multimedia tools unless they are well versed in the software or program. Thus, it is increasingly important that the layout and design of an online Web course allows students to be exposed to interactive multimedia tools that they have not or would not otherwise encounter. Since students use the supplemented Web site primarily for scheduling purposes, assignment/project guidelines and other criteria, the main purpose of this study is to identify and implement functional Web design parameters of non-interactive and interactive Web sites.

For the purposes of this study, the Web site was modified based on one-on-one feedback and the modified site was then used for respondents’ survey opinions. The course through which respondents were enrolled in included course content such as, evaluating multimedia, multimedia design principles, flowcharting and storyboarding, levels of interactivity, multimedia authoring tools focusing on Flash and Java exporting, and development of an interactive learning object for multimedia-based delivery. Respondents garnered through this Hypermedia Design course served as an appropriate and preferred sample and were midway through the course content when the execution of this study was conducted.

Methods

This study surveyed graduate students based on interactive and non-interactive Web pages. The educational environment this research addressed was that of post-secondary education. In particular, this research was meant to impact the online course designers’ choice in utilizing IMM and creating a functional and transparent Web site. The technologies employed consisted of static Web pages primarily with content information and Adobe® Flash® for use in creating the IMM.

A static Web site was previously constructed to augment an existing CMS for a Web design course and was modified based on animated and interactive components using Adobe® Flash®. Participants navigated through both static and animated, then static and interactive Web pages respectively. The changes from the static to the animated page included a banner, video with audio and a quick cartoon-like animation; the changes made from the static to interactive page included an interactive quiz and timeline. Participants filled out a survey for each respective page, which included questions for the static Web pages like text size, text color, overall page color, clarity, graphics and image usage and relevance to the course content. For the animated and interactive Web pages, participants were asked about their engagement with the pages, whether it gained and kept their attention, and if the audio, video, banner, interactive quiz and calendar was relevant. Additionally, graphic designers who served as content-experts completed an online questionnaire and were asked questions that related to their expertise on graphic
design, online education and its relevance to education and how interactivity, creativity and innovation are incorporated into the classroom.

The study participants consisted of 12 graduate students and 4 content experts. The survey was administered entirely online to the graduate students containing 19 Likert-scaled and 3 open-ended questions for both the static and animated/interactive Web pages based on participants attitude towards the layout, design, opinion of relevancy as well as recommendations for improvements. Content experts were administered an online questionnaire with 8 open-ended questions based on their graphic design experience and their attitudes toward general Web site design processes and its relevancy in education.

More females (81%) than males (19%) were represented in this study and more participants were under the age of 30 (73%) compared to those who were over the age of 40 (27%); particularly, there were no participants between the age of 30 and 40. Most participants considered themselves as having an average level of understanding in Web design coding and had designed a Web site before. While everyone had a social networking site available, most made modifications on a regular basis (75% respectively). Most participants had already taken an online class prior to this study (81%) and all participants averaged at least 2 hours a day on the Internet for recreational purposes.

Results

Overall, more participants indicated that while the original static Web pages were transparent, they preferred more interactive pages over animated ones. When asked whether participants agreed or strongly agreed on the following, more than half or 67% responded that the overall color of static Web pages gained their attention, while 59% stated the size and color of text was appropriate, and 33% agreed or strongly agreed that the overall graphics placed on the page were boring and insignificant. Whether the static pages were transparent, participant responses agreed or strongly agreed that they were transparent (94%); however, less than half or 44% indicated that the static pages were relevant to the course itself (Figure 1).

![Figure 1. Percentages based on static web page participant opinion](image)

Values represent percentage of those who agreed and strongly agreed.
When participants were asked whether the animated and interactive Web pages gained and kept their attention (Figure 2), more students strongly agreed or agreed that it did (80% and 95% respectively). In terms of participants agreeing or strongly agreeing that the pages were transparent, there was a 10% increase from the animated to interactive page. Based on the relevance of the animated versus interactive pages, there was a 42% increase from the animated to interactive page (Figure 3).

![Figure 2](image2.png)

**Figure 2.** Percentages based on participant opinion of animated and interactive web page gaining and keeping attention²

![Figure 3](image3.png)

**Figure 3.** Percentages based on animated and interactive web page participant opinion³

**Qualitative Responses**

According to qualitative responses of the animated page, participants stated that while the scrolling banner across the page which prompted updates to changes in the course schedule was relevant, it was unnecessary and included comments such as,

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² Values represent percentage of those who agreed and strongly agreed.

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- “The banner was very relevant to the course. However, maybe it scroll within the web page margins rather than go off and come back.”
- “…I didn’t like the scrolling banner – I think it’s better left as stationary.”

In reference to the video on the animated page, most respondents did not find relevance to the course content itself and included comments such as,

- “I felt the video seemed inappropriate only because it was of a picture from the instructor’s personal life.”
- “The video box can be eliminated.”
- “I liked the video, but felt it was a little unnecessary – unless, this is the first day of class.”

More participants’ opinions wanted to see changes such as,

- “A video of student work samples and a glimpse of what students can expect from this course.”
- “More coherence to text with animation.”

Overall, the transition from a static to animated page was deemed unnecessary unless the animations themselves had relevance to the course content itself and majority of participant responses indicated that there was too much going on in terms of the animation playing at the same time the video was playing and having a scrolling banner on the top of the page. All participants agreed that there is a benefit to having an animated site if,

- “…it is planned and has a very specific purpose.”
- “…it (animation) does make the website more interactive and much more attractive, however, there is a fine line between appropriate and overdone.”
- “…for demonstration purposes.”

According to qualitative responses of the interactive page, most participants stated that the quiz IMM was relevant to the course content. Comments were included such as,

- “I liked all the changes, especially the quiz.”
- “I liked this version of the page, the interaction made more sense to me.”
- “I liked the interactive quiz.”

Overall, all participants deemed the transition from the static to interactive page beneficial and when asked about the perceived benefits, one participant stated that,

- “Yes, I can see how it can be useful if done well.”

However, while the interactive page gleaned positive results in terms of what participants expect users to engage in, a few included comments such as,
- “There is too much information on this page.”
- “Since there is a lot of text, what would be nice is to minimized/hide/gray out the weeks that have passed by so it would be easier to see what’s current.”

**Content Experts**

All content experts who were graphic designers understood basic design principles such as color, layout, graphic and text and used Adobe® Dreamweaver® as their Web authoring tool. All content experts also believed the intrinsic value of an online education towards innovation as such,

- “I believe online education is important especially since our society is moving towards information technology.”
- “Web design is incorporated into the educational realm with the understanding that it is essential to the student demographic especially with the added economic demands we all face today.”

Besides having a transparent site, most content experts stated the challenges to Web design is creativity and innovation in addition to learning the tools. Content experts added statements such as the following in terms of creating an interactive site,

- “…relevance and clarity is key.”
- “…basic graphic design principles are key.”
- “Besides basic design principles and functionality, students need to understand how this site will benefit them in the long run.”

Overall, content experts noted that Web designers can follow basic design principles; however, making a site interactive should be a natural, intrinsic necessity for all designers, not only to appeal to a specific demographic but also to gain and keep users’ attention.

**Discussion**

The results of this study indicated that users prefer interactive IMM in relation to online courses. As users transitioned from static Web pages to animated and interactive ones, transparency and relevance declined, a factor contributed by the design itself. Both survey and content experts found the intrinsic value in online education and lent their wisdom on how Web design IMM relevance and transparency work in sync.

Online students were typical to those who use online for recreational purposes (Wurtz, 2005), in that most participants suggested less text-laden pages. Using IMM to replace text-laden pages could increase user engagement if designed properly and made relevant to the course design. Unnecessary design issues with the banner, video and animation was the primary problematic theme for the animated page which most likely contributed to the minimal 10% increase from 40% to 44%, in transparency between the animated and interactive page. The 42% increase from the animated to interactive page can be
attributed by the quiz function of the interactive page and although some respondents did not see the relevance of the timeline function, the interactive quiz was deemed more pertinent.

An important component in participant opinion was the quiz function of the interactive page. Users ultimately wanted some level of interactivity in a site where they felt they were actively engaged (Garcia et al., 2007; Palombella, & Johnson, 2005). User engagement is also in line with content experts’ statements that interactive sites should already be an incorporated process for Web designers. Additionally, while users agreed overall that both the animated page and interactive one was engaging and kept their attention, all respondents indicated through qualitative responses that the overarching problem was the design of the page itself.

**Study Limitations**

The limitations to this study were obvious. Besides altering the design itself, participation faltered due to the time limitation in opening and closing the administration of the survey. Furthermore, the target population was isolated to one class of participants, resulting in a small sample size. However, without discounting the fact that the content experts were avid Web designers and survey participants were in the stages of learning the IMM tool, the main overarching problem was with the design process itself which was evident with this researcher’s design structure of using too many animations to address the animated page and a limited amount of interactive tools on the interactive page.

**Conclusion**

This study suggests that IMM is beneficial to online learning and users do feel engaged when they directly interact with the course content. Allowing students to interact using IMM games and/or the like requires invested time in mastering the tool itself. While this may be seen as a determent among the other responsibilities faculty already have, the pedagogical potential is unlimited. Faculty are equipped with learning objects and templates at their disposal that can help speed the process of the high learning curve associated with IMM tools.

By addressing the aforementioned research questions of how do animated and interactive Web pages affect an online learner’s experience, this study suggests that if designed properly, the animated Web pages are necessary only if it pertains to the course content. In reference to the interactive component of the research question, online learners want some level of interactivity because it gives them a sense of directly interacting with the site itself. Thus, online learners are engaged with the site rather than just reading information from the Web page.

In terms of the second research question which asks how relevant or transparent is the site in terms of functionality, the more relevant the animation or interactive the site is to the course content and the more transparent or operational the site is for the user, the more likely the designer will be in gaining their users’ attention and keeping it.
Therefore, the user is engaged in the process if the site is relevant to the course content, is functional and if they are in direct interaction with the site.

With more students opting for an online education in these economic times (‘‘As Gas Prices Rise,’’ 2008) and as classroom management issues arise, student engagement becomes more important. Course instructors should opt to rise to the occasion of incorporating IMM into the course design. The recommendation of this researcher is to include interactive elements into an instructor’s Web site in order to gain and keep their students’ attention as well as have students directly interact with the site. Instructional designers can also aid less technical instructors in constructing the site which can be cost effective in that most instructional designers are already equipped with Web authoring tools and in most cases have available to them an IMM tool; the capabilities in using both to make the site more interactive would be that it aids in student engagement and therefore would only enhance the online classroom experience.
References


