WEB PAGE DESIGN: A STUDY OF THREE GENRES

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A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in
Information Science.

Chapel Hill, North Carolina

December, 1999

Approved by:

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Advisor

Abstract

Thomas Andrew Jackson. Web Page Design: A Study of Three Genres. A Master's paper for the M.S. in I.S. degree. December, 1999. 36 pages. Advisor: Gary Marchionini

This study involves a characterization, evaluation and comparison of Web page design elements, focusing on three specific Web site genres: education, government and shopping. Samples of fifteen Web sites from each of these categories were examined in the study. These web sites were evaluated on a set of criteria which dealt with homepage links, advertisements, navigation features, universal access and user support features, and use of advanced technologies. The results reveal similarities and differences among the three genres, and suggest ways that further analysis of these and other Web site categories will add to our knowledge of genre-specific Web design guidelines.

Headings:

Web-Accessible

Web-Sites

Web-Sites-Evaluation

Design-Evaluation

Introduction and Background

The World Wide Web (WWW) is a subset of the Internet; a collection of interlinked documents that work together using a specific Internet protocol called HTTP (HyperText Transfer Protocol). The Web uses a metaphor of individual pages, usually combined to make up web sites. Web pages are written in HTML, or Hypertext Markup Language, which tells the Web browser how to display the page and its elements. The defining feature of the Web is its ability to connect pages to one another, as well as to audio, video, and image files, with hyperlinks. Just click a link, and suddenly you're at a Web site on the other side of the world.

As the WWW increased in popularity, an explosion of new web technologies followed. These new technologies created new possibilities for both good and bad web design.

Web Design

There is an abundant amount of information available (both in print and on-line) that addresses the topic of so-called “good” web page design. Most of these web design manuals or style guides cover issues that are basically common sense. These guidelines include the following: user-centered design, clear and well-defined site navigation aides, no dead-end pages, direct access to the most popular pages in the web site and simplicity and consistency of design**.** But as the Web and its associated technologies advance, so

does the complexity of the design guidelines. A few of the more prominent web design guidelines are:

(a) Sun Microsystem's Guide to Web Style(http://www.sun.com/styleguide)

(b) World Wide Web Consortium Web Accessibility Initiative (http://www.w3.org/WAI/)

(c) Jakob Nielsen's Usable Information Technology (http://www.useit.com/)

(d) Yale C/AIM Web Style Guide (http://info.med.yale.edu/caim/manual)

(e) Ben Shneiderman's Designing the User Interface (Addison-Wesley, 1998)

(f) Jennifer Niederst's Web Design in a Nutshell (O'Reilly, 1999)

Shneiderman (Designing the User Interface, 1998, pp.575-579) proposed five important elements of web page design. These include:

(a) compactness and branching factors- recommend compact vertical design to reduce scrolling and increasing the number of links on an index page to reduce the number of levels that need to be traversed

(b) sequencing, clustering and emphasis-first item of the page is seen as the most important, cluster related items to show meaningful relationships, emphasize important items

(c) support for universal access- support for a wide range of computer platforms, browsers and monitor sizes. Issues include: display size, internet access speed, browser type and version.

(d) good graphical design

(e) navigation support

While these guidelines provide a good starting point for web page design, the great variety of web sites and guidelines will continue to evolve to meet the needs of specific applications and populations. Therefore, it is important to begin to distinguish what these applications and populations are. This study attempts to address this challenge.

Web Site Genres

Classifying web sites by genre is a difficult and challenging task. Shneiderman described four ways to categorize web sites. The primary method of categorizing web sites is by the originator's identity. These groupings would include individuals, groups, universities, corporations, non-profit organizations and government agencies. This identity is closely linked with the goals and content of the web site. This leads to the second method for categorizing web sites; by the goals of the originator. Goals include sell, advertise, provide access, offer services, create discussions and build communities. The third way of categorizing web sites is by the number of pages in the web site or the amount of information that is accessible. Web sites are divided into eight categories based on the number of pages contained in the site. These are summarized in the following table from Shneiderman (Designing the User Interface, 1998, p. 565):

Number of web pages	**Example genre**
1-10	Personal web page
5-50	Scientific paper
50-100	Book or Manual
500-5,000	Photo library
5,000-50,000	Newspaper of magazine
50,000-500,000	Telephone directory

500,000-5,000,000	Journal abstracts
>5,000,000	Library of Congress

The fourth way of categorizing web sites is based on measures of success. Examples would include the number of hits generated per day for a corporate web site or the number of products sold for a shopping or e-commerce site.

Haas and Grams (1998) proposed a web page classification system that takes into account the purpose of the page, its intended audience, its surface content or format, the types of links it contains, and its relationship to the pages to which it provides links. This classification scheme resembles the Resource Type specification of the Dublin Core.

Do different genres use or require different design guidelines?

In this study, I was interested in characterizing any relationships between the web site genre and the design used with their homepages. This information will reveal any differences in design approaches used between different genres that could be used to improve the web site with regards to site navigation, homepage design, universal access, user support and use of advanced web technologies.

This research study involved the evaluation of web sites from three of the web site genres specified in Shneiderman's taxonomy (government, education and shopping). These web sites were evaluated based on a set of nine criteria. The following is a list of the criteria and a brief discussion of the significance of each criterion:

Homepage design/layout

Layout, in this study, is defined by the visual appearance of the web page as it is organized into sectors. These sectors represent visually distinct areas or groupings of the

web page's content. The layout of the homepage is an important factor in creating a strong, consistent visual appearance for the web site. It affects how information is presented and how much information can be clearly displayed in a given space.

Homepage size (in Kb)

Related to the concept of Universal Access is that of homepage size. If the web designer expects a large portion of the users to be accessing the web site over a modem, it's not a good idea to include large graphics or other large files on the home page. Users will generally not tolerate long delays. Surprisingly, Jakob Neilsen's list of The Top Ten Mistakes of Web Design has "slow download times"(Jakob Nielsen's Alertbox, 1996, http://www.useit.com/alertbox/9605.html) as the number one entry at an overwhelming 84% ! (The number two design mistake only occurred in 17% of the web sites examined).

Number of links on homepage (total, unique, and advertisements)

The number of links on the homepage is important to effective web site navigation. A larger number of links on the homepage gives the user more information as to the content of the site and options for accessing it.

Static vs. active advertisements

Active ads are those ads which incorporate some form of visual movement. Active ads tend to distract the reader more than static ads. Since they are commonly animated GIFs, they can increase the download times for the web page as well.

Navigation options

Table of Contents

A table of contents for a web site is similar to its printed media equivalent in that it is a text-based guide to the organization of the site. While printed media such as books are

arranged in a linear fashion, web sites are hypertext based but their functions are fundamentally the same. Tables of contents are effective supplemental navigation systems because users are familiar with them from books. They work well for large web sites that are organized hierarchically.

Index

Web site indices are detailed, alphabetical lists of terms that typically have more entries and fewer levels of hierarchy than tables of contents. Indices help users find what they are looking for when they know exactly what they want to find. Like tables of contents, they work well because users are familiar with them from books. Indices don't need to be as extensive as their print counterparts because the user can do a text search to find the more obscure references to a keyword.

Site Map

The site map as defined by Lynch and Horton (1999) graphically illustrates the web site's architecture. They can vary from hierarchical branching diagrams to graphic metaphors. Lynch and Horton describe some limitations for site maps as the following:

> "Site maps of complex web sites are at best simple metaphors that convey only the approximate outlines of the site content. Computer screens offer limited space, so site map graphics tend to oversimplify and exaggerate hierarchies of information" (Web Style Guide, 1999, p. 47).

They also state:

> "Site maps are inherently graphic and are thus harder and more costly to change than text lists when (inevitably) your site is reorganized or you add information" (Web Style Guide, 1999, p. 47).

Other interaction options

Text Search

Text search ability is very important for both large and frequently updated web sites. This facility, however, should not take the place of a well organized browsing structure but should compliment it. Keyword searches are particularly useful when searching for a specific piece of information.

Pull-down and Pop-up Menus

Pull-down and pop-up menus provide for multiple navigational options while taking up little in the way of screen real estate. This allows the web designer to include many navigational options on a single page. The down side of this is that many of the available options are initially hidden from the user. This encourages the user to a navigational choice without first seeing all the available options.

Universal access issues

One of the biggest challenges for web page designers is dealing with the variety of browsers and platforms, each with its own unique support and implementation of HTML. The features and capabilities of these browsers improve with every new release, but that doesn't mean that the older versions are no longer being used. Most users do not keep up with the latest and greatest in browser software.

Designing for the lowest common denominator.

Unfortunately, according to Niederst (1999), a minority of web designers subscribe to the idea that the web should be accessible to everyone. Those who do stick to older HTML standards and make sure that their pages work on all browsers, including the text –based Lynx browser. They will also tend to avoid using -or provide alternatives

that don't use- the current advanced web technologies such as Java, JavaScript and plug-ins.

Taking the Site's Purpose into Account

Another important factor in making web design decisions is knowing how the web site is going to be used. Are the users interested in obtaining information quickly or are they looking for entertainment? This issue should be taken into consideration when deciding whether to incorporate cutting edge technologies. If the site's main purpose is informational, restricting it based on client-side technology is probably not a good idea. However, if the site is intended mainly for entertainment, the use of advanced web technologies could improve the overall user experience at the site.

File Size

Graphics are arguably the most important element contributing to the web's current popularity, however, a good web designer sees graphics as a two-edged sword. Graphics can certainly enhance the web user's experience but at the same time they can increase the time it takes the web page to load in the user's browser. Large graphics mean substantial download times, especially if one is using a modem. If the graphics are excessive in size, the user will become frustrated and impatient and likely to move on to another site instead of waiting. Therefore it is very important to keep the file size of graphics as small as possible.

Responsible web design includes making pages accessible to even to users with disabilities, such as the hearing or sight impaired. The World Wide Web Consortium (W3C) launched the Web Accessibility Initiative (WAI) which hopes to make the web more universally accessible. The WAI develops technologies, HTML guidelines and tool

as well as promoting education and research in this area. The success of these initiative, however, depends on web developers adopting the proposed guidelines. Many vision impaired users use a text browser (i.e. Lynx) in conjunction with text-to-speech software. This means that the content of graphics may be lost.

Not all users accessing the web site will be have the same technologies available. These differences can lie in the web browser version and type, computer platform, screen size and internet access speed. This requires the web site designer to take various steps to accommodate these "disabled" users. Web site design and style guides suggest such things as providing alternate text for images so that text- only browsers can use the web site. Internet access speed limitations dictate the avoidance of large and/or unnecessary graphics. Web designers should also check the appearance of the web pages on different platforms and browsers. The pages should also be checked on small screen sizes (640 x 480 pixels) with 256 (8-bit) colors. It is important to remember to design not for your machine but for that of the average reader.

W3C Guidelines

The World Wide Web Consortium (W3C) is the organization involved with developing common standards for the web. The W3C lists the following as some of the highest priorities for accessibility in their Web Content Accessibility Guidelines 1.0:

"In General (Priority 1):

1. Provide a text equivalent for every non-text element (e.g., via "alt", "longdesc", or in element content). This includes: images, graphical representations of text (including symbols), image map regions, animations (e.g., animated GIFs),

applets and programmatic objects, ASCII art, frames, scripts, images used as list bullets, spacers, graphical buttons, sounds (played with or without user interaction), stand-alone audio files, audio tracks of video, and video.

2. Ensure that all information conveyed with color is also available without color, for example from context or markup.

3. Clearly identify changes in the natural language of a document's text and any text equivalents (e.g., captions).

4. Organize documents so they may be read without style sheets. For example, when an HTML document is rendered without associated style sheets, it must still be possible to read the document.

5. Ensure that equivalents for dynamic content are updated when the dynamic content changes.

6. Until user agents allow users to control flickering, avoid causing the screen to flicker.

7. Use the clearest and simplest language appropriate for a site's content.

And if all else fails (Priority 1):

8. If, after best efforts, you cannot create an accessible page, provide a link to an alternative page that uses W3C technologies, is accessible, has equivalent information (or functionality), and is updated as often as the inaccessible (original) page"(W3C *Web Accessibility Initiative*, http://www.w3.org/WAI/).

Cast-Bobby

CAST (Center for Applied Special Technology) is a non-profit organization whose mission is to "expand opportunities for people with disabilities through innovative uses of computer technology"(CAST, http://www.cast.org/bobby/about.html) . Bobby is a web-based tool developed by CAST that checks web pages for their compliance with the W3C Web Content Accessibility Guidelines. In addition, Bobby checks for compatibility with different browsers.

Help/support features

Feedback

Users frequently have questions or comments concerning a web site. These concerns can range from not being able to find information, problems encountered, suggestions for improvement, praise for a well-designed site or other useful information. This feedback is integral to providing good user satisfaction.

FAQ

One of the internet's original help features is known as the FAQ (frequently asked questions) page. This page consists of a list of the most common questions regarding a web site or topic and their answers. FAQ pages are good way for web sites to provide support to new users who tend to have the same types of questions. A well designed FAQ page can improve the users' understanding of the information and services offered by the web site and reduce demands on the support staff.

Help

Help pages can cover a broad range of user support features. They are places where the user can go to get questions answered about the web site. This could include a

list of common problems and solutions (FAQ), a means to contact user support via e-mail (feedback) or possibly an online tutorial.

Tutorial

Tutorial offer step-by-step instructions on how to perform a specific task associated with the web site. These tutorials can include graphics as well as text to explain how the task is accomplished.

Use of advanced web technologies

Advanced web technologies, for the purpose of this study, include the use of such things as Java, JavaScript, audio, video, plug-ins or animated GIFs. These technologies have the potential to greatly improve the functionality and user experience of the web site but usually come at the expense of large file sizes.

Methodology

This study involved the examination of web sites/homepages from different web site categories or genres. Three categories were chosen for this study; education, government and shopping web sites. These three genres were chosen because they represent easily definable categories with contrasting goals.

A "representative" sample of web sites from each of these categories was desired, over a simple random selection of sites. This provided a more meaningful analysis among and between web site categories. In order to obtain a set of representative web sites from each of the three categories, two web based web site ranking services were consulted. These services were Media Metrix and Hot 100.

Media Metrix (http://www.mediametrix.com) and Hot100(http://100hot.com/)

Media Metrix is a company that produces products that include syndicated audience measurement services, technology measurement, e-commerce measurement services, qualitative measurement and custom applications of the company's patented metering methodology. This technology tracks web site statistical information using a series of measures which include the number of unique visitors-- all unique visitors are unduplicated (only counted once).

Hot 100 collects data on a daily basis from many different sources, representing the Web-surfing patterns of more than 100,000 surfers worldwide. Whether these patterns are representative of web users as a whole is unknown; on the Hot 100 web site, one finds the following: “We protect the privacy of the people we sample, so the exact demographics are not known”(Hot100, http://100hot.com/help/methodology.html). Approximately 60 percent of the people they sample are from North America and 40 percent are from elsewhere in the world. Hot 100 includes data from universities, businesses, and home users, although AOL, Prodigy, and CompuServe users are not represented. They do not disclose their exact data sources for competitive reasons and to ensure that webmasters do not try to influence their sites' ranking. Hot 100 tracks single-page views only.

The Media Metrix and Hot 100 lists for education, government and shopping were used as sources for the web sites evaluated in this study. These provided a pool of web sites which, hopefully, are representative of their respective genres.

Evaluation Criteria

After selecting the top 15 web sites in each of the genres (education, government and shopping) each was evaluated using the criteria found on the Web Site Data Collection Sheet (see Appendix A). The web sites selected for this study are found in Appendix B.

What follows are the methods by which each web site was evaluated using these criteria:

Layout

The layout criterion was determined by visually comparing the overall layout of the web site's homepage with a series of 15 basic layout templates (see Appendix C). The layout which was the closest match was assigned to the web site. The assignment of a layout to a particular homepage was somewhat subjective.

Homepage Size (Kb)

Home page sizes were measured using WebBuddy software from Dataviz. This software measures the size of the specified web page in kilobytes. This included all graphics and other files associated with the initial download of the homepage.

Links-Site and Ad

The number of hyperlinks on the homepages (total and unique) was recorded by manually counting the number of links on the page in the web browser. Initially, I intended on using one of the web site caching utilities that downloads a given web site to your local drive allowing the user to access the page without being connected to the internet. However, this approach was not consistently accurate. Because of the various ways in which hyperlinks can be implemented (i.e. through CGI) on the web today, certain links would not be recognized by the software. Ad links were differentiated from

site links using the researcher's judgement based on the contextual clues and the off-site destination of the link. This was validated by following the links in question and evaluating the pages directly.

Ads

If advertising graphics were present on the home page, they were classified visually as being either static (no movement) of active (animation of some sort).

Site Map, Tables of Contents and Indices

Site maps tables of contents and indices were determined by looking for links using the words "site map", "table of contents" or "index" or some close approximation thereof. These navigational features were classified as being either present on the homepage, linked from the homepage or not present. As mentioned earlier, site maps are normally defined as being a graphical representation of the web site. In practice, this was rarely the case. Most of the links that were labeled "Site Map" were in fact nothing more than tables of contents. This study only focused on the labels used (i.e. Either "Site Map" or "Table of Contents") and not on the contents of these pages.

Text Search

Text search elements were identified by the presence of a text box with an accompanying submit button and the word "search". This navigational feature was classified as being either present on the homepage, linked from the homepage or not present.

Other Interactions

These elements were evaluated by looking for other methods of user interaction with the web site located on the homepage. These elements could includes such features

heading. The content of these pages was characterized by providing help and assistance with site navigation or use.

Feedback

If the home page offered a link to a Feedback page (or not) it was recorded under this criterion. Feedback pages were identified by the presence of the word "Feedback", "Contact" or an equivalent heading. The content of these pages was

characterized by providing a means to submit user feedback or to contact the webmaster, usually in the form of an e-mail message, regarding the web site's implementation, design, navigation or other concerns.

FAQ (Frequently Asked Questions)

If the home page contained a link to a FAQ page (or not) it was recorded under this criterion. FAQ pages were identified by the words "FAQ" or questions" or a similar title. These pages were characterized by a list of common questions and their answers.

Tutorial

The presence (or absence) of a link to a tutorial page was noted as well. A tutorial page was identified by the word "tutorial" or a similar concept. A tutorial page gives the visitor a step by step demonstration on the use of various features utilized by the web site.

Java

If the home page incorporated a java based feature (applet) it's presence (or absence) was noted here. The source code for the page was examined and browser status messages were observed to check for the presence of a Java applet.

JavaScript

If the home page incorporated JavaScript based feature (applet) it's presence (or absence) was noted here. The source code of the page was examined to determine if JavaScript was being used.

Plug-ins

If the home page used some technology requiring the use of a plug-in (or not) it was noted under this category. Use of plug-ins was determined by looking at the source code for the page.

Animated GIF

The use animated GIFs on the home pages was noted under this criterion. Animated GIFs were identified first by looking for animation on the homepage and then confirming the file type by invoking a "save image" dialogue box.

Bobby Approved

To determine if the home page met with Bobby approval standards the URL was submitted from the Bobby home page found at http://www.cast.org/bobby/. This returned a web page with Bobby's accessibility and browser compatibility errors and either a "Bobby Approved" or "Not Bobby Approved" message.

Data Collection and Validation

The data collection was conducted using the Web Site Data Collection Sheet (Appendix A) from March through June of 1999. Each criteria was evaluated in the order it appears on the sheet and using the methods described above. This procedure was first validated with the help of Dr. Marchionini by comparing our evaluations of the same web site until a consensus was reached.

Discussion of Results (see Appendix D)

Layout

The homepage layouts observed covered virtually the entire range of layout templates. Of the sixteen possible layouts, all but six were seen in this survey. In order to

reveal layout trends among and between genres, the five most frequently occurring layouts were focused on. These five layouts are summarized here (see also Appendix C):

(a) L-1 is a basic two sector layout with a narrow sector down the left side of the page.

(b) L-5 is a three sector layout with two narrow sectors; one across the top and one down the left side of the page.

(c) L-11 is has three vertical columns with a single horizontal sector across the top.

(d) L-14 is the same as L-11 but without the top horizontal sector.

(e) L-15 features a single centrally placed sector.

Figures 1-3 summarize these data:

Figure 1

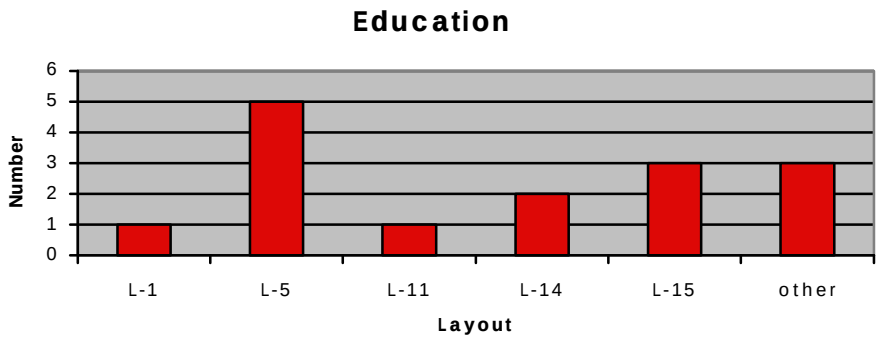


Figure 2

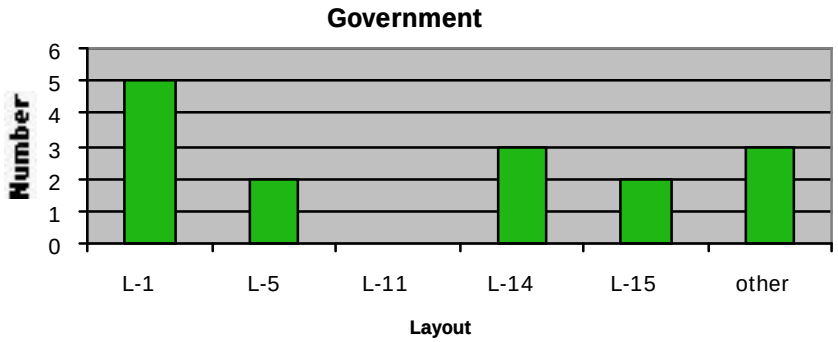
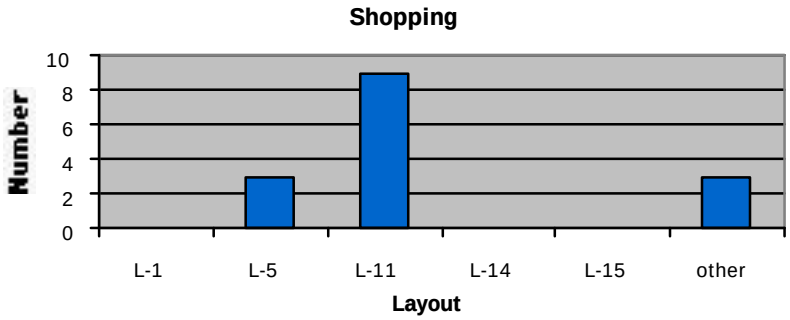


Figure 3



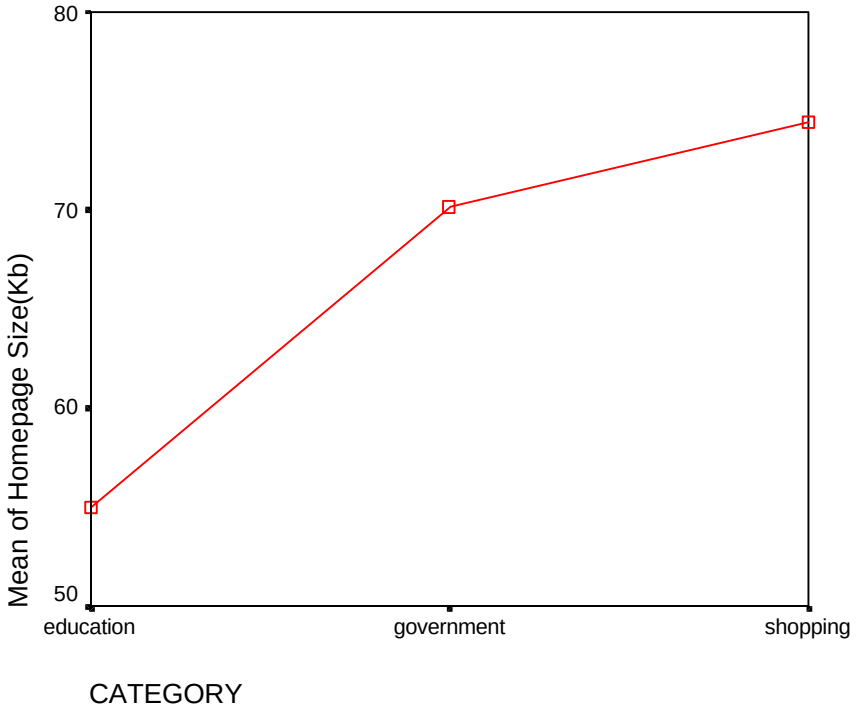
Both the education and government sites have a fairly even distribution of layout types while the shopping genre has a predominance of layout 11. Since Layout 11 is a three column layout it allows for more information to be displayed on the homepage. This is reflected in the correlation between shopping sites and number of links on the homepage.

Homepage size

The size of the homepages did not exhibit a significant statistical difference between website genres, however shopping and government homepages did appear to be somewhat larger than those in the education genre as seen in Figure 4. It is not surprising

that shopping homepages would have larger homepage sizes due to their tendency to use complex layouts and animated graphics. Perhaps a larger sample size would help to reveal any significant differences in homepage size.

Figure 4



Links

There was a statistically significant difference between the number of links on the homepage between shopping sites and both education and government sites. Shopping sites had an average of 83.9 links on the homepage while education and government had only 33.2 and 34.6 respectively (see chart below).

Ads

The advertisement data showed that 73% of the shopping sites had ads on their homepages compared to 33% for education sites and none for government sites. This

difference was indeed significant. The ads that were found were more likely to be static than active in both education and shopping sites

There was also a statistically significant difference in the number of homepage ads and ad links between shopping and both education and government sites. Shopping sites had a mean of about 2.5 ads per homepage while education sites had a mean of 0.27. This difference is not too surprising due to the commercial nature of shopping websites.

Navigation Features

The site map data showed no differences across the genres. No sites featured site maps on the homepage while only roughly one 25% had them linked from the homepage (75% of sites in all three genres did not contain site maps). This is partly a matter of semantics. The traditional description of a site map is a "graphical representation of the web site" (Lynch and Horton, Web Style Guide, 1999). Most of what the sites in this study labeled as "site map" was actually nothing more than a text table of contents. Of the sites that did not have either a site map or a table of contents, most did have the other feature. In fact, when looking at all three genres together only 4% of the sites had neither a table of contents or a site map. Table of contents also showed no statistical significance between genres. All genres were most likely to have some form of table of contents on the homepage (60 – 86%).

Even though the index data did not prove to be statistically significant across genres, there did seem to be a tendency for shopping sites to have indexes on the homepage while government sites were more likely to have indexes linked from the homepage. This observation is probably linked to the finding that shopping sites had significantly more links on the homepage.

Text searches were found on the homepage of shopping sites most frequently while both government and education sites were mostly likely to have them linked. Strangely enough, shopping sites were also most likely to not have a text search feature at all.

Other interaction mechanisms were also found on shopping site homepages an overwhelming 80% of the time, compared to 13.3% for both education and government sites. Overall, shopping sites offered more options for site navigation on the homepage than both education and government sites.

Universal Access and User Support Features

Although not significant, government sites tended to offer text only options more frequently than the other genres. None of the genres offered much, if any, in the way of other low bandwidth options. While about half of the education and government sites met with Bobby approval, none of the shopping sites adhered to this standard.

All sites in all three genres offered some form of user feedback but shopping sites offered the highest percentages of help, FAQ and tutorial user support features.

Advanced Technology Features

The only advanced technologies used with any frequency across all the genres were JavaScript and animated GIFs. JavaScript was used fairly equally across all three genres, while animated GIFs tended to be used more on shopping site homepages. Very few, if any, of the sites used Java, audio or video on their homepages.

Conclusion

The number of links on the homepage is significantly more numerous on shopping sites compared to both education and government sites. Possibly the increased number of links on shopping homepages increases the visibility of their products, which may increase their chances of making a sale. But further study of the nature of these links is needed to definitively explain why the number of links on shopping homepages is generally higher.

The number of advertisements is also is also significantly greater on shopping homepages compared education and government. This result is not unexpected given the commercial nature of shopping web sites.

Shopping web sites also tended to offer more navigation options on their homepages compared to education and government sites. This is probably related in part to the greater number of links found on the shopping homepages.

The area of Universal Access was one in which shopping sites were certainly deficient compared to education and government sites. Perhaps this is an area which shopping web site designers should focus more attention.

Shopping sites tended to use advanced technologies more frequently than education and government sites. This finding is possibly related to the fact that shopping site development has greater funding and other resources than the other two genres.

The rapid increase in popularity of the World Wide Web has spurred the development of many Web-based technologies which have, in turn, created many new options for web page design. This also means that applying the concept of effective and

useful web design is becoming more complex and difficult in practice. Thus, the means of application of this concept must be reevaluated on a regular basis.

In other words, Web design guidelines must be adjusted to keep pace with the ongoing changes in web technologies. Different genres of web sites will have their own unique subsets of guidelines which more closely correspond to their goals. This study has attempted to characterize some of the design criteria for the web site genres of education, government and shopping. Further analysis of other web site genres would add to our knowledge of genre-specific web design guidelines. Studies such as this one should be repeated in the future as new web technologies are introduced.

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Appendix A

Web Site Data Collection Sheet

Name:

URL:

Date:

Category:

Homepage Design/Layout: (see Appendix C)

Homepage Size (Kb):

Number of Links on Homepage:

	# links total	# unique links
Site Specific		
Ads		
Total		

Advertisements:

Yes No

If Yes → Number of Ads:
Active or Static:

Navigation Options: (Indicate if is present on homepage (H), linked to from homepage

(L) or not present (NP))

Site Map	
Table of Contents	
Index	

Other Interaction Options: (H, L or NP)

Text Search	
Other Forms	

Viewing Options / Universal Access: (Y, N or not applicable (NA))

Text Only	
Low Graphics	
Advanced Technology Free	

Support Features: (Y or N)

Help	
Feedback	
FAQ	
Tutorial	

Use of Advanced Web Technologies: (Y or N)

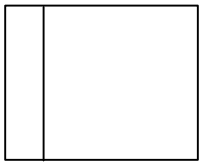
Java	
Javascript	
Plug-ins	
Audio	
Video	
Animated GIFs	

Appendix B

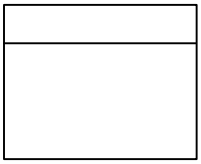
Websites	*URL*	*Date Evaluated*
Education		
Berklee	http://www.berklee.edu	5/30/99
Carnegie Mellon	http://www.cmu.edu	5/31/99
Harvard	http://www.harvard.edu	5/4/99
MCPS	http://www.mcps.k12.md.us	4/27/99
MIT	http://web.mit.edu	5/3/99
Stanford	http://www.stanford.edu	3/23/99
Colorado	http://www.colorado.edu	5/31/99
UC-Berkeley	http://www.berkeley.edu	5/11/99
UCLA	http://www.ucla.edu	5/11/99
Illinois	http://www.uiuc.edu	5/10/99
Michigan	http://www.umich.edu	4/26/99
UNC	http://www.unc.edu	5/12/99
UNM	http://www.unm.edu	5/12/99
Texas	http://www.utexas.edu	5/10/99
ZDU	http://www.zdu.com	5/31/99
Government		
California	http://www.ca.gov	5/14/99
Digital Daily	http://www.irs.ustreas.gov/prod/cover.html	6/2/99
Dept. of Education	http://www.ed.gov	5/15/99
Federal Judiciary	http://www.uscourts.gov	6/3/99
Fedworld	http://www.fedworld.gov	5/12/99
House of Rep.	http://www.house.gov	5/13/99
Library of Congress	http://www.loc.gov	6/1/99
NASA	http://www.nasa.gov	5/14/99
Navy	http://www.navy.mil	5/15/99
NIH	http://www.nih.gov	5/14/99
NOAA	http://www.www.noaa.gov	5/14/99
Thomas	http://thomas.loc.gov	6/3/99
US Postal Service	http://www.usps.gov	5/14/99
US Treasury	http://www.ustreas.gov	4/14/99
White House	http://www.whitehouse.gov	6/3/99
Shopping		
3D-Greetings	http://www.3dgreetings.com	5/22/99
Amazon	http://www.amazon.com	5/17/99
Beyond	http://www.beyond.com	5/30/99
CD Now	http://www.cdnow.com	5/18/99

Classifieds 2000	http://www.classifieds2000.com	5/18/99
E-Bay	http://www.ebay.com	5/17/99
Egghead	http://www.egghead.com	5/20/99
E-Greetings	http://www.egreetings.com	5/21/99
iMall	http://www.imall.com	5/30/99
Levis Store	http://store.us.levi.com:80/store/home.asp	5/30/99
Macy's	http://www.macys.com	5/22/99
Moviephone	http://www.moviephone.com	5/22/99
On Sale-At Cost	http://www.onsale.com/atcost/atcost.htm	5/22/99
PC Mall	http://www.cc-inc.com/home.asp?store=pcmall&catalog_id=2	5/29/99
Ticketmaster	http://www.ticketmaster.com	5/29/99

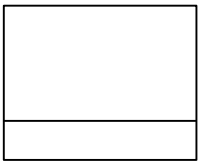
Appendix C



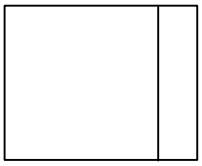
L-1



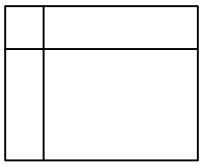
L-2



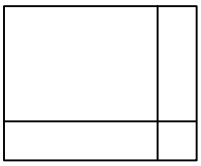
L-3



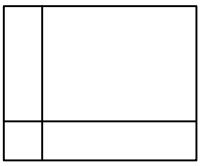
L-4



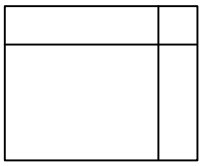
L-5



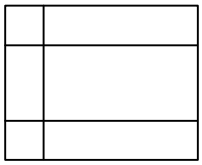
L-6



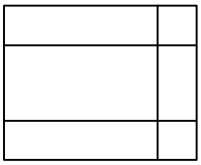
L-7



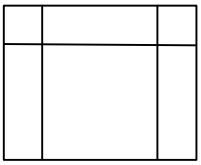
L-8



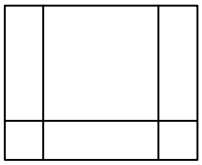
L-9



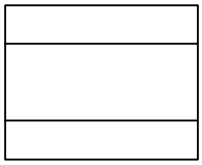
L-10



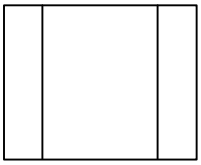
L-11



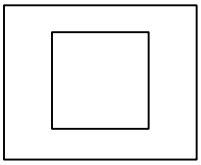
L-12



L-13



L-14



L-15

Appendix D

Criteria	Education	Government	Shopping	Statistic
Homepage Links				
Links - total	Mean = 33.20 SD = 14.32	Mean = 34.60 SD = 15.98	Mean = 83.93 SD = 48.21	Sig = 0.00
Links - unique	Mean = 28.47 SD = 13.07	Mean = 28.13 SD = 15.94	Mean = 73.87 SD = 41.47	Sig = 0.00
Site links - total	Mean = 32.93 SD = 13.98	Mean = 34.60 SD = 15.98	Mean = 81.40 SD = 48.49	Sig = 0.00
Site links - unique	Mean = 28.20 SD = 12.70	Mean = 28.13 SD = 15.94	Mean = 71.53 SD = 41.76	Sig = 0.00
Ad links - total	Mean = 0.27 SD = 0.59	none	Mean = 2.53 SD = 2.80	Sig = 0.00
Ad links - unique	Mean = 0.27 SD = 0.59	none	Mean = 2.33 SD = 2.53	Sig = 0.00
Advertisements (see ad link data above as well)				
Ads (y/n)	33.3%	none	73.3%	Sig = 0.00
Ads - total	Mean = 0.27 SD = 0.59	Mean = 0.00 SD = 0.00	Mean = 2.53 SD = 2.80	Sig = 0.00
Ads - active	Mean = 0.33 SD = 0.58 25.0%	NA	Mean = 1.00 SD = 1.00 29.0%	Sig = 0.002
Ads - static	Mean = 1.00 SD = 0.00 75.0%	NA	Mean = 2.45 SD = 2.07 71.1%	Sig = 0.001
Navigation Features				
Site map	H = 0.0% L = 26.7% NP = 73.3%	H = 0.0% L = 26.7% NP = 73.3%	H = 0.0% L = 26.7% NP = 73.3%	Sig = 1.00
Table of contents	H = 80.0% L = 20.0% NP = 0.0%	H = 60.0% L = 26.7% NP = 13.3%	H = 86.7% L = 6.7% NP = 6.7%	Sig = 0.341

Index	H = 6.7% L = 46.7% NP = 46.7%	H = 0.0% L = 73.3% NP = 26.7%	H = 26.7% L = 33.3% NP = 40.0%	Sig = 0.076
Text search	H = 40.0% L = 60.0% NP = 0.0%	H = 20.0% L = 80.0% NP = 0.0%	H = 66.7% L = 6.7% NP = 26.7%	Sig = 0.00
Other interaction	H = 13.3% L = 6.7% NP = 80.0%	H = 13.3% L = 26.7% NP = 60.0%	H = 80.0% L = 20.0% NP = 0.0%	Sig = 0.00
Universal Access and User Support Features				
Homepage Size (Kb)	Mean = 55.00 SD = 28.99	Mean = 70.20 SD = 34.47	Mean = 74.47 SD = 27.26	Sig = 0.195
Text only	20.0%	40.0%	6.7%	Sig = 0.087
Low bandwidth	0.0%	6.7%	0.0%	Sig = 0.360
Help	60.0%	20.0%	86.7%	Sig = 0.001
Feedback	100.0%	100.0%	100.0%	NA
FAQ	66.7%	60.0%	80.0%	Sig = 0.484
Tutorial	6.7%	0.0%	26.7%	Sig = 0.054
Bobby approved	46.7%	53.3%	0.0%	Sig = 0.003
Advanced Technology Features				
Java	0.0%	0.0%	0.0%	NA
JavaScript	26.7%	33.3%	46.7%	Sig = 0.507
Plug-ins	0.0%	6.7%	0.0%	Sig = 0.360
Audio	0.0%	6.7%	0.0%	Sig = 0.360
Video	0.0%	0.0%	0.0%	NA
Animated GIF	26.7%	26.7%	60.0%	Sig = 0.094