



Bryant University

HONORS THESIS

The Effect of Web Usability on Users' Web Experience

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Submitted in partial fulfillment of the requirements for graduation
with honors in the Bryant University Honors Program
April 2012

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ABSTRACT

The ease with which a website visitor can find what they need is positively correlated with visitor satisfaction (Institute for Dynamic Educational Advancement, 2008). Web usability is a field that studies what factors affect the visitor's ability to navigate through a website. Although there are publications outlining specific usability guidelines, many of them have little or no academic research to support the claim. HHS developed a list of 209 guidelines and rated each according to their strength of evidence (research-based support, 5 – high, 1 – low). Using heuristic evaluation and usability testing, this study provides additional research-based knowledge for those guidelines rated with a low strength of evidence. Results indicate that users desire printer-friendly webpages, require feedback on their location within the website, find linking to related content helpful, and expect a search option to be provided on every page. Additional research is necessary to determine if providing descriptive page titles or labeling pushbuttons clearly is important to web usability.

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INTRODUCTION

As the internet continues to expand exponentially, there are those who believe specific standards are necessary to provide valid and valuable information in a guest-friendly manner. This is the field of web usability, whose main goal is to design and develop websites easy to understand and intuitively navigable. Web usability is an entirely outward facing, user-driven experience and forces companies and website owners to completely understand the goals, needs, and mindset of their visitors. Companies are beginning to understand that to ensure customer loyalty and return, they must cater their sites to their users' needs, as well as making sure they portray all the necessary information. As with many disciplines, the company must understand that their target audience does not have the same understanding of their services and needs to be convinced during the first impression – often within the first 10 seconds of visiting the page – that this website has the information they are seeking. Creating a bad first impression online can be more damaging than in person as it is more difficult to reach out to the customer; rather, they must accomplish the more difficult task of drawing the audience member to them.

Web usability is a relatively new field but has found stalwart support in numerous locations, including Jakob Nielsen, Ph.D., the International Standard of Organization (through the ISO 9241-151:2008 standard) and the Department of Health and Human Services (HHS). HHS conducted a study on what website features contributed to a visitor's ease of use when navigating through a website. These features became guidelines for the design of all sites within their Health and Human Services network. In addition to publishing the list of guidelines, they also rated each according to its relative importance (RI) and strength of evidence (SE). RI is scored 1-5 where 1 is of little importance to usable web design and a 5 is of most importance. SE is scored according to the amount of research performed in support of the guideline's inclusion on the list. HHS explicitly states that a low SE score is meant to encourage other researchers to perform their own studies to contribute to the body of knowledge.

Contribution

I will contribute to the web usability field by running a study using HHS guidelines that have a relative importance of 4 or 5 and strength of evidence rating of 1 or 2. This combination of scales results in those guidelines rated highly important to web usability but have little or no

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academic research and evidence to support that claim. This will benefit the knowledgebase by providing further evidence for or against the inclusion of the guidelines in the HHS's publication. My work is similar to other studies (ISO 9241-151:2008) in that I am testing the usability of web elements. However, my work differs as each guideline I am focusing on has not yet been studied conclusively. I hypothesize that my results will support the original decision to include these guidelines in the HHS publication.

LITERATURE REVIEW

Jakob Nielsen introduces the inherent conflict and purpose behind the field of web usability. It is often a debate between art and engineering, where the developer must balance the desire to create an aesthetically pleasing site while also ensuring a visitor's needs are easily met. A website must not only visually attract the user but also provide enough utility that they are able to complete their intended tasks. As evident with his personal website, <http://useit.com>, Nielsen greatly prefers ensuring utility over providing frivolous design for the purpose of appearance only. Furthermore, he notes that web usability changes less rapidly than web technology, transforming this into a discussion of psychology and behavior versus technology evolution. As he states:

“In product design and software design, customers pay first and experience usability later. On the Web, users experience usability first and pay later. Very clear why usability is more important than web design.” (Nielsen, *Designing Web Usability*, 1999)

Web Development: A Visual-Spatial Approach by Craig M. Baehr(2007) discusses the importance of usability in the effective design and development of a website. Because the development process is iterative (a version is delivered, tested, feedback is given and changes are made) the testing process is repeated numerous times before the official release. Therefore, usability testing needs to occur not only once, but be integrated throughout the entire process. Baehr presents three different processes for testing that target different aspects of the site. Technical usability testing assesses the website's functionality across a variety of platforms and browsers. A usability worksheet can aid in organizing data and provide side-by-side comparisons of a site's output on different platforms. Visual-spatial usability testing focuses on

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how the user traverses the site, assuring that one can navigate through easily. Testing can be task-based – asking the user to perform a specific task and see how they do so – and evaluation-based where the tester examines the usefulness and flexibility of the tool. The third test assesses accessibility measures, ensuring that the site can reach the largest audience possible, including those with disabilities. For all of these measures, the same process can be followed: 1) establish goals, 2) develop testing instruments, 3) conduct the test, and 4) analyze the results.

The Health and Human Services guidelines are continually assessed and revised to “enable organizations to make more effective design decisions” (U.S. Department of Health and Human Services, 2006, p. xvi). Originally developed for the effective dissemination of information on Health and Human Services websites, the guidelines are useful for improving usability on all sites. There are currently 209 guidelines that, by the author’s suggestion, can be used in numerous ways: a designer may follow the guidelines while creating a webpage, usability specialists can create a checklist when reviewing a site, or researchers can determine which guidelines require additional evidence and perform studies to acquire more. The guidelines have also been rated according to level of importance and strength of evidence. Level of importance describes which guidelines will aid in usability the most and should be first considered while designing a website. Strength of evidence relates to the amount of research performed about a particular guideline. Both research and expert opinion were considered during the development of the guidelines, but low strength of evidence is meant to encourage further research. Please see Appendix A for an explanation of the strength of evidence scale. HHS does not provide an explicit definition for relative importance beyond except that a “5” is the most important element to consider including and “1” is the least.

HHS first began researching usability elements in 2004, compiling various guidelines from numerous different sources, including informal web usability websites, peer-reviewed research, and in-house standards and studies. The list totaled 500 originally but was reduced to 398 after the team took a first pass and combined or removed contradictory guidelines. Relative importance was decided among a group of 16 external reviewers consisting of eight web designers and eight usability experts. Guidelines that were determined to have little or no impact

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on the success of a site were removed, shrinking the list to 287. Eight usability researchers, practitioners and authors, all published and experienced in the field, created their own set of criteria for determining the strength of evidence for each guideline. More guidelines were removed as designers located graphical examples to be used in the published version. Twenty web designers partook in a card-sorting exercise to place guidelines into chapters and name them appropriately. These categories were then tested for usability. The final 2004 version had 187 guidelines; updates and revisions are made upon evaluating new research. The 2006 version updated 21 guidelines and added 22 more and the relative importance was revised based on a survey of 36 web professionals. These were edited by three independent groups of web professionals before publication.

ISO 9241-151, “Ergonomics of human-system interaction – Guidance on World Wide Web user interfaces,” became an international standard in 2008 and promotes making websites “accessible to the widest possible range of users” (p. vi). While this includes those with disabilities, the standard does not specifically discuss or target factors unique to that audience. While the entirety of ISO-9241 discusses usability of various agents, Part 151 focuses on the presentation of web content and a user’s ability to navigate through a website. The World Wide Web creates unique usability issues because public websites are viewable by a wide range of audiences resulting in a variety of user capabilities, knowledge, and goals. Furthermore, there are numerous ways to access the internet, including multiple browsers and mobile agents that render pages differently. These guidelines can be applied to the internet, intranets, and extranets, but should not be applied indiscriminately to mobile devices. Similar to the HHS guidelines, this standard’s target audience includes web professionals, developers, content providers, usability experts and other users who are impacted by or interested in web usability. As such, the standard provides a sample procedure and checklist for assessing a website’s usability.

Not only are various usability guidelines occasionally contradictory with each other, but they may contradict other web standards. Visser and Weideman explore this idea in “An empirical study on website usability elements and how they affect search engine optimization,” targeting web elements that play a role in both usability and search engine optimization (SEO). Both

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concepts are important to consider when designing and developing a website, but they target two different audiences: the former process aids search engine spiders in locating and indexing websites while the latter instead targets a human audience, whose goals upon visiting the site are often many and varied. For example, a search engine spider does not consider the aesthetic value of the page, while the human user may be more attracted to those sites that contain professional graphics and evocative imagery and colors. The authors note that research suggests adding a page for a site's privacy policy, about us, and testimonials to increase the credibility of the site and encourage the user's trust. However, these pages do not directly relate to the topic of the website and therefore are considered extraneous to SEO.

Visser and Weideman chose four website attributes that were a source of contradiction between usability and SEO: trust and credibility, single page view and content, keywords, and use of images. A control site was created by a web designer with little knowledge of usability and SEO guidelines and an experimental site was developed according to usability attributes, without any consideration for SEO. The study measured the level of traffic each site received, how many pages each visitor viewed, and how many visitors actually purchased the product that was being sold. From the results, Visser and Weidemann concluded that "usability is a prerequisite for effective website design" (p. 1) because a higher percentage of visitors to the experimental site submitted a contact form ('conversions') than the control site. Further research would include a second experimental website that focuses on SEO elements and ignores usability guidelines.

METHODOLOGY

Using the standards published by HHS, I created a preliminary list of all guidelines rated by HHS with a "1" or "2" in their strength of evidence (SE) scale that were also rated "4" or "5" in their relative importance (RI) scale. I chose 6 specific guidelines to test in an effort to provide additional strength of evidence. The traditional usability testing methods work with a developed site or site currently in development and test whether or not the site meets a set of heuristics and needs of the users. For this study, I am instead testing a set of standards used to develop a usable website. I have chosen travel industry websites Travelocity.com and Expedia.com to use for a heuristic evaluation, which will locate how the sites operate in accordance with the 6 guidelines I

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have chosen to test. Usability testing with human subjects will then determine how much effect these guidelines play on the usability of the website and how important the user rates the standards.

Guidelines

There are 60 guidelines that were given a 1 or 2 rating on the SE scale (please see Appendix B for this list). Of these, five had a 5 RI rating. Twenty-one guidelines were rated a 4 and the remaining 34 scored 3 or below. I have chosen 6 guidelines that can readily be tested by currently existing websites, without the need for developing an experimental website. Below are the six chosen guidelines, as well as a summary of HHS's current findings:

- Develop Pages that Will Print Properly: a website should be able to print onto the standard 8.5 x 11" piece of paper without cutting off any of the content.
- Provide Feedback on User's Locations: provide visual cues as to where the user currently is in the hierarchy of the website. This may include breadcrumb navigation or colored tab structure.
- Provide Descriptive Page Titles: search engines use page titles to index sites so using descriptive, clear titles will help the user determine if this is a useful website to visit.
- Link to Related Content: the related content may be useful to the user.
- Label Pushbuttons Clearly: a user should know exactly what will happen when they click on a pushbutton.
- Provide a Search Option on Each Page: while a site's search engine shouldn't be relied upon too heavily, a user should not always have to manually scrounge around the site to find what they need.(U.S. Department of Health and Human Services, 2006)

This list is also located in Appendix C.

Heuristic Evaluation

In order to minimize bias in usability testing, two sites were chosen from an industry that is unlikely to be frequently visited by the average Bryant University student. Travelocity.com and Expedia.com are known travel industry websites used to locate and book flights, hotels, and other related travel necessities. The travel industry was chosen because while it is likely that

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many of the test subjects will have heard about or infrequently used these sites, they will not be experts.

A heuristic evaluation was then used to judge the compliance of a site to the 6 guidelines in question. All the pushbuttons were located and then analyzed for their clarity. It was noted that both sites adequately located the pushbutton next to the form it was submitting and was labeled in a manner that clearly denoted its action. Both sites were similarly structured and executed and displayed flight searches in a comparable manner, with minor differences. In the future, it would also be useful to choose two sites that fall on opposite ends of the usability spectrum. If a user is able to more easily navigate through a site that follows the heuristics instead of one that does not, it will provide credence to the HHS's standards.

Appendix D includes the raw results of the heuristic evaluation.

Usability Testing

Usability testing involves requesting users to perform specific tasks on the located websites. Prior to the session, I created a document outlining each action the user is meant to take. Some tasks were purposefully vague, forcing the user to interact with the site and locate the necessary page or information themselves. During these sessions, I targeted the user's ability to complete the task, the length of time it took them to do so, and their level of frustration in performing the task. I performed an exit interview to acquire any information that could not be gathered by observing the user performing the task. I asked their opinion of the task, their perception of how easy or difficult it was to complete, and if they believed inability or difficulty completing the task would force visitors away from the site. This outline is included in Appendix E.

The results from this study will be aggregated in order to locate trends among the data. These trends will be analyzed to draw conclusions regarding whether or not the guidelines are truly important aspects of web usability. In addition, if any interesting questions are raised or the data is inconclusive, this will influence the usability survey created as a follow-up tool to the usability study.

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Usability Survey

The usability survey was built off the results of the usability study. Questions were created targeting specific areas of interest in order to gather information regarding user's perceptions about the guidelines I had chosen to study. The Survey was built using SNAP Surveys, a tool provided by the Office of Planning and Institutional Research at Bryant University. The survey was hosted online and responses were gathered and imported into the software. Responses were then aggregated and analyzed to determine majority opinion. The survey incorporated multiple choice, likert scales, and free-response questions. The format was meant to simulate web browsing by including full screenshots of the page in question; this was done to encourage candid responses from the respondent as face to face follow-up is not an available option with surveys. The survey is included in Appendix F.

RESULTS

Usability Study

Respondent Demographics

There were a total of 15 participants in the study, with the following demographics:

- 8 Female / 7 Male
- 7 Freshmen / 6 Sophomore / 2 Junior
- 13 New England / 2 International / 1 NJ
- 11 Business / 3 Liberal Arts / 1 Undeclared Major

The results were used to influence the creation of the usability survey by first gathering a preliminary understanding of how people view web usability or understand usability issues.

Therefore, the results are anecdotal in nature and specific trends will be discussed.

Three out of the ten students asked to identify a page title were able to correctly provide the title. They were shown the Membership page at Travelocity.com, which displays login information or the opportunity to sign up for an account. The actual page title is "Travelocity: Membership" but many of the participants identified the page as the Login page. When asked to how they knew the page was a login page, one participant responded, "The words and page layout gave it away."

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Other respondents pointed out the username and password fields, as well as the page header that read "Login."

Participants were asked if they wanted to see related information when performing their searches. Twelve of the fifteen respondents responded that they would not want to see any information except what they searched for. One participant believed it would add "too much clutter," while another stated, "If I wanted to see both, I would search for both." One respondent did say that seeing related information (both flight and hotel information after searching for a flight), would be "more convenient."

The usability study participants were not guided through the navigation of the website. During the exit interview, they were asked how simple or difficult it was to find their way around Travelocity. All respondents stated that the site was easy to navigate; four respondents specifically mentioned the tab structure Travelocity uses for navigation while three also explicitly stated it was "very straightforward."

After completing the usability worksheet, respondents were asked to identify a pushbutton on the current page they were viewing. Only one of the respondents could do so. Once they were provided with an example, participants were also asked if they could remember the text on the pushbutton following the search form on Travelocity's home page. Nine out of fourteen participants could not provide adequate text, but suggested similar wording, such as "Search" or "Go."

One of the tasks on the worksheet asked the participants to locate Travelocity's Return Policy. There actually is no page explicitly titled Return Policy on Travelocity.com; it was my goal to see how they would search for hard to find information. This task was produced in response to the guideline that stated each page on a website should provide a search box. Five of the fourteen respondents first went to the Customer Service or Help page and then used the search box provided there. Seven of the respondent's first actions were to use the "Search Travelocity"

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search box located on each page of the website. Two users also first thought to check the links in the footer of the page before they used the search box.

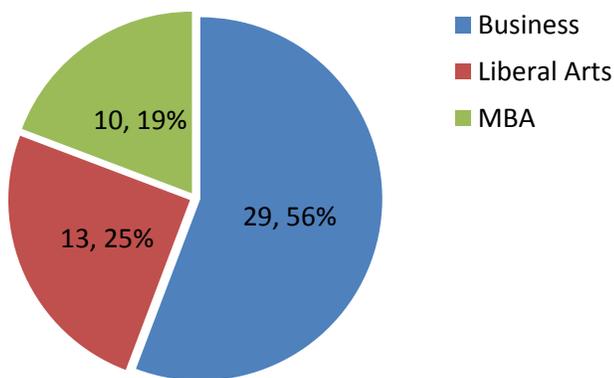
Usability Survey

Respondent Demographics

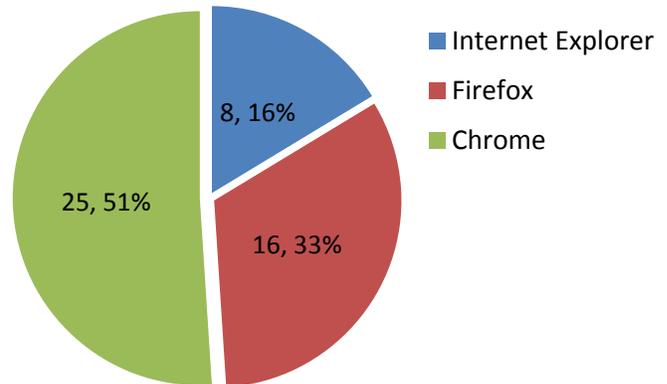
There were a total of 52 respondents for the survey, with the following demographics:

- 26 Female / 26 Male
- 10 Freshmen / 16 Sophomores / 3 Juniors / 13 Seniors / 10 MBA

RESPONDENTS BY MAJOR



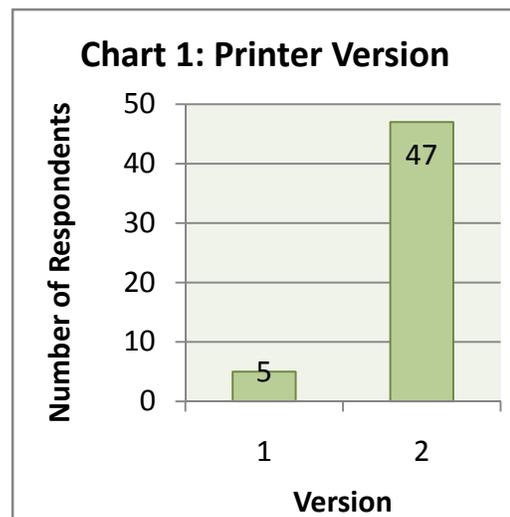
INTERNET BROWSER



I included the question about what browser the student's use in order to determine, for future research, the appropriate browser to use for screenshots in order to reduce any potential familiarity bias. As of February 2012, Firefox and Chrome were competing for the majority of web users: Firefox had 36.6% of users while Chrome had 36.3% (W3Schools, 2012). I would recommend that future research using the same body of respondents use Google Chrome for screenshots.

Question 1: Which version would you prefer?

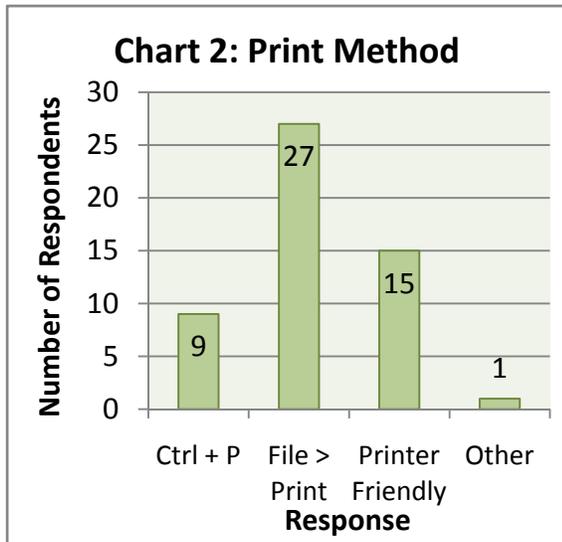
I began with questions targeting the printer friendly guideline I had chosen to study. The respondents were provided with screenshots of two different printed versions of the same article. The first version was created using File > Print and any default printer



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settings in the dialog box. The second version was created using the printer-friendly icon located on the page.



Question 2: When you print a webpage, what do you usually do?

I followed the previous question by asking what the respondent typically did to print a page. I provided 3 options (Ctrl+P, File>Print, Look for “Printer Friendly” Icon) and then provided them with an ‘Other’ option. 51.9% of respondents stated they used File > Print. The single ‘Other’ response clarified, “Copy and paste article into Word.”

Question 3: In the screenshot below, what is the page title?

I then began focusing on the descriptive page title guideline I had chosen to research. I provided respondents with a screenshot from Reuters.com and asked them to provide the page title. In this example, the page title did not happen to also be within the content of the webpage. 36.5% respondents correctly answered, “Business & Financial News, Breaking US & International News” for the page title. Typical incorrect responses included “Reuters” or “Euro zone unemployment...”

Question 4: In the screenshot below, what is the page title?

I asked the same question again, but provided a different screenshot. This time, similar text existed in the content of the page (Politics News) that was also in the page title (Politics & Political News). 32.7% of the respondents provided the correct page title; 5 respondents who correctly answered the previous question answered this question incorrectly. Three respondents who answered the previous question incorrectly answered this question correctly. A potential assumption regarding this information is that getting the page title correct was a “lucky guess” and perhaps the respondent did not truly know where to look for the actual page title.

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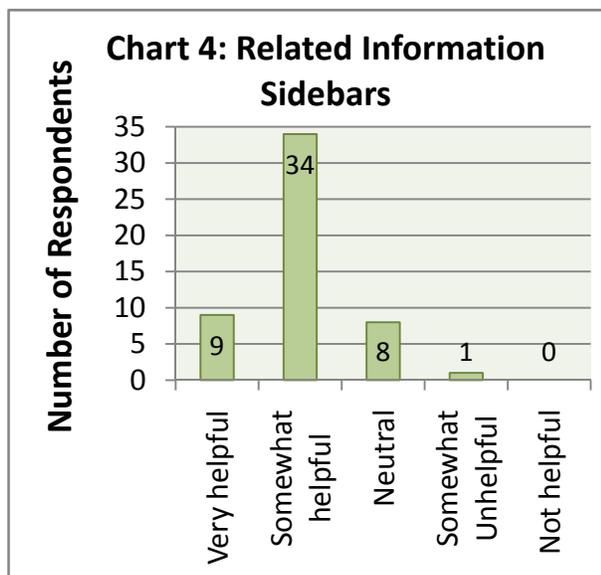
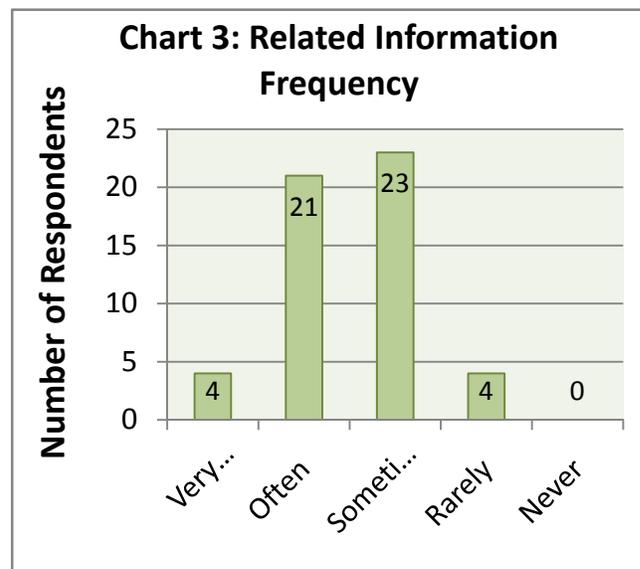
Question 5: Suppose you've finished reading an article. How might you find related articles?

I shifted my focus to the guideline regarding linking to related content on the webpage. 65.4% of the respondents specifically mentioned looking at the Related Topics or Related News portion of the webpage to find related content. 19.2% suggested searching Google or another search engine with keywords from the topic or the article name to find additional resources. 17.3% mentioned looking for links around the article that led to similar topics, but didn't specifically mention the sidebar seen within the screenshot.

Question 6: When performing a search, how often do you look for related information?

Results:

- Very often (7.8%)
- Often (40.4%)
- Sometimes (44.2%)
- Rarely (7.8%)
- Never (0%)



Question 7: Do you find seeing "related information" sidebars on websites helpful?

Results:

- Very helpful (17.3%)
- Somewhat helpful (65.4%)
- Neutral (15.4%)
- Somewhat unhelpful (1.9%)
- Not helpful (0%)

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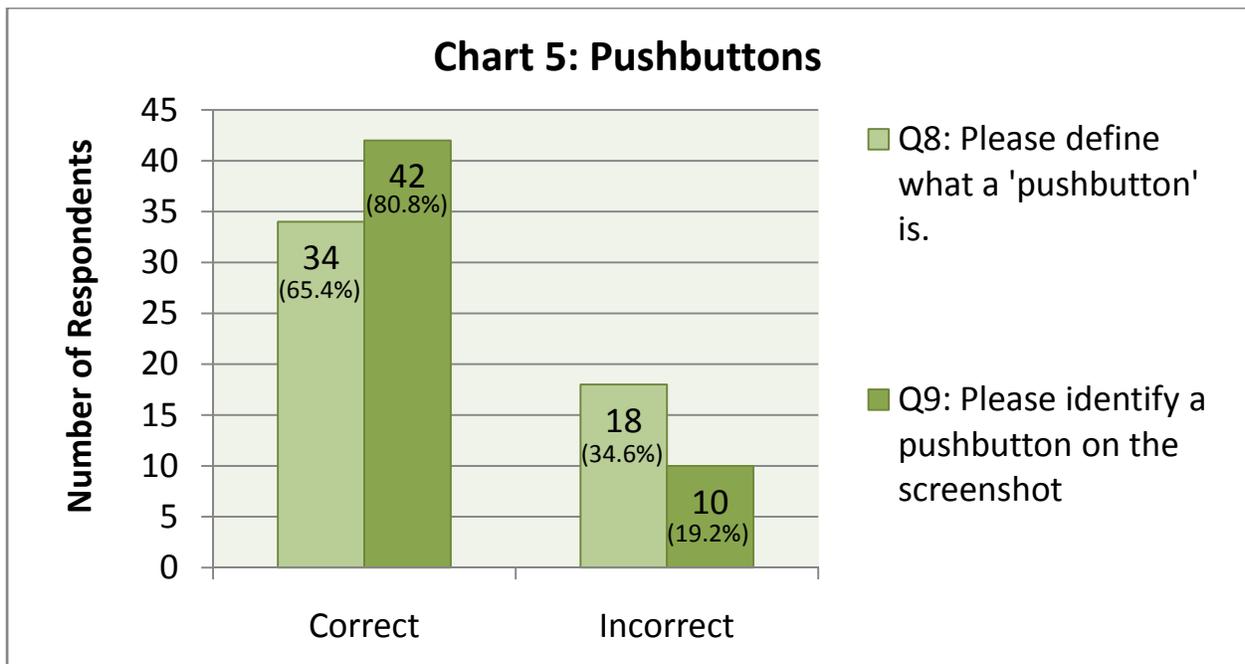
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Question 8: Please define what a 'pushbutton' is.

The next set of questions focused on the pushbutton guideline that stated pushbutton text should be clearly labeled. A correct answer is defined as any response that described a button that “links somewhere,” “is pushable,” etc. The majority of incorrect responses consisted of some variation of “I don't know.”

Question 9: Please identify a pushbutton

I provided the respondents with a screenshot of the Google splash page, which consists of the Google logo, search box, and two pushbuttons – “Google Search” and “I'm feeling lucky.” I asked the respondents to identify a pushbutton on that page. Approximately 81% correctly identified a pushbutton; this is interesting given that this percentage is greater than the percentage of respondents able to define 'pushbutton.' The majority of incorrect responses were “I don't know,” although one respondent responded, “the Google logo.”



Question 10: How confident are you in your selection of the previous question?

The results of the usability study indicated that not many people knew what the term “pushbutton” meant, so I wanted to determine the confidence level of their selection in the previous question. The average confidence level was 2.56.

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Very confident	Confident	Neutral	Unconfident	Very unconfident
1, 1.9%	10, 19.2%	17, 32.7%	13, 35%	11, 21.2%

Table 1: Responses to Question 10

I then looked at only those respondents that correctly identified a pushbutton. The average confidence level was only slightly higher at 2.64 and it is interesting to note that the respondent who was very confident in his selection was apparently incorrect. Looking at his response (“??”), it may be he was confident in his lack of knowledge rather than confident his response was correct.

Very confident	Confident	Neutral	Unconfident	Very unconfident
0, 0%	9, 17.3%	15, 28.8%	12, 23.1%	6, 11.5%

Table 2: Responses to Question 10 for those who responded correctly to Question 9

Question 11: What would you expect the pushbutton below to say?

The respondents were asked to “fill in the blank” for a pushbutton on a Travelocity form. I did not edit the form in any way except to blank out the text that was already on the pushbutton.

Results:

- 31 (59.6%) responded generic “Search/Submit/Go”
- 12 (23.1%) specifically mentioned flights
- 6 (11.5%) included terms such as “trip,” “vacation,” or “adventure”

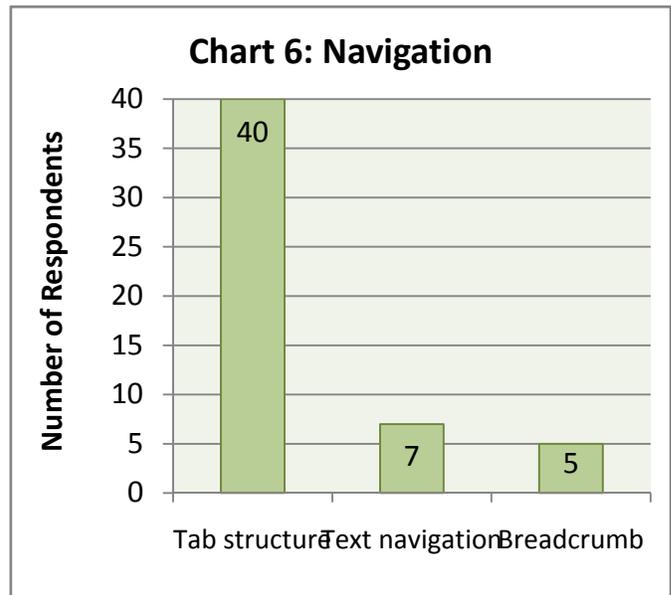
Despite respondent’s low level of confidence for the previous questions, 71.1% (56.6% + 11.5%) of the respondents provided an adequate response for this question. “Adequate” is defined as any response that suits the purpose of the button. In this case, “Search flights” would not be appropriate because the same form could be used to search for hotels only. Therefore, respondents generally seemed able to provide text for a pushbutton even if they weren’t sure of what a pushbutton was.

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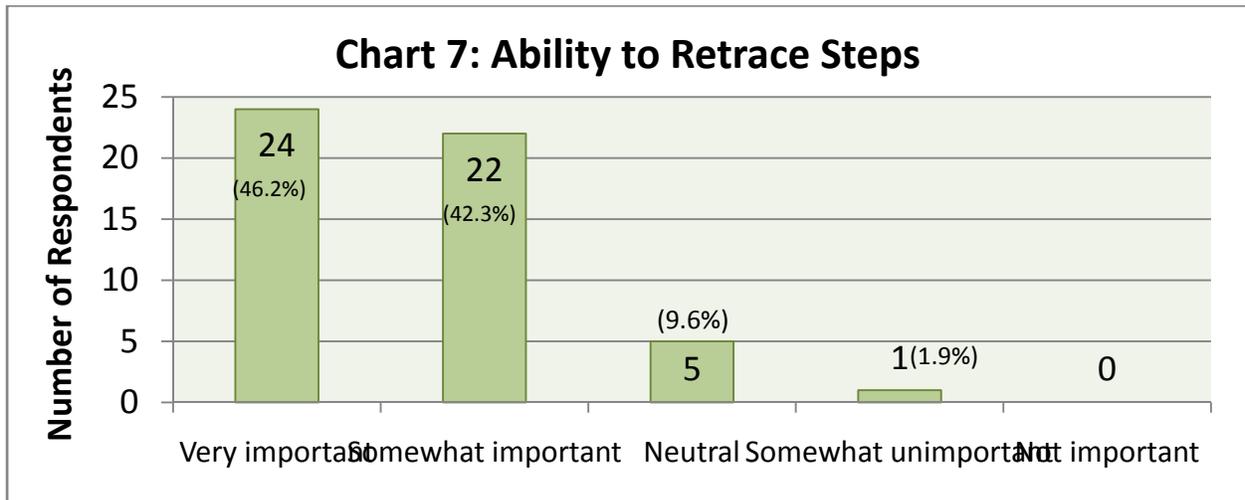
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Question 12: Which method of navigation do you prefer?

The next two questions focused on the guideline stating users should be able to know where they are in the hierarchy of the website. I provided three common navigation options and examples to the respondents: tab structure, text navigation, and breadcrumb navigation. 76.9% of respondents indicated that they preferred using a tab structure to navigate around a site.



Question 13: How important is it to you that you are able to retrace your steps?



ANALYSIS OF RESULTS

Guideline: Develop pages that will print properly

While 90.4% of the respondents preferred the printer friendly version, only 28.8% of respondents specifically look for a printer friendly icon. What can a company do to make sure their website satisfies the desires of their users? One easy way is to create a specific style sheet for print media. When the page first loads, the browser will render the page according to a specific style

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sheet. However, when the page is printed, the page will be restyled according to the printer specific style sheet. This is one aspect of web usability that would be easy to implement and will also satisfy the needs of the user. I believe that the data conclusively states that this guideline is important to web usability.

Guideline: Provide descriptive page titles

Only 36.5% of respondents correctly identified a page title, but I believe this may be the result of unclear terminology. Many respondents provided the content header rather than the page title which may mean they didn't understand what they were supposed to be looking for. As described by the HHS, providing a descriptive page title is used by search engines to display in search results. In that context, when this page title is displayed in a series of search results, it is more obviously a title describing the page. I would suggest further research into this guideline to determine if descriptive page titles truly are a web usability issue, or a search engine optimization factor. The results do not conclusively state whether or not this guideline is important to web usability.

Guideline: Provide feedback on user's location

88.5% stated that being able to retrace their steps to the current page was "very / somewhat important." Thus, it can be said that the navigation method is very important because it has the ability to tell the user exactly where they are. 79.6% respondents stated they preferred the tab structure. Why is this? Further research could elucidate why they chose that option, but here are some potential reasons: tabs are graphical so one does not need to read the text on each tab to know it is a method of navigation and not part of the body of the page. Tab structure is also relatively common and in many ways has become a website norm. Users expect to see a tab structure and already know how they work. If I were to redesign the survey, I would ask a follow-up question about why tab structure was preferred and to distinguish between various methods of tab structure implementation. I believe the data conclusively supports the decision to include this guideline as an important web usability factor.

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Guideline: Link to related content

The HHS stated that this guideline was rated 4/5 on the Relative Importance scale. However, the respondents to my usability study indicated that they did not want to see related information when performing their flight search. In contrast, 48.1% of survey respondents stated they often or very often view related information and 82.7% found it to be very helpful. I believe the contradiction between results is due to the industry being studied in each usability method. When visiting Travelocity.com, a user has the option to narrow their search from the beginning by choosing “flight,” “hotel,” or “flight and hotel.” If the user chooses flight only, they would likely not want to then see information about a hotel. However, it is different when searching for an article. There is an abundance of information available online about any specific topic, but a user can only read an article at a time. One may want to expand their search and find additional articles after reading the first. Based on the results, I suggest that HHS should clarify that there may be differences among industries for how and what related content to link to.

Guideline: Provide a search option on each page

The usability study clearly indicated that having a search option on each page was expected when searching for information on a website. In addition, 19.2% of the respondents did specifically mention searching (either using Google or the site's search box) to find additional information. I believe the data conclusively supports the inclusion of a search box on each page of a website.

Guideline: Label pushbuttons clearly

Only 17.3% of those who were able to identify a pushbutton were confident in their choice. However, 71.2% of respondents provided adequate examples for what text could be placed on the button. Therefore, whether or not the respondent was aware of it, they understood the use of the pushbutton and how they are typically used across the internet. It may have simply been that “pushbutton” was the agreed upon term used by the HHS in their publication for consistency, while the average user would not use the same name while discussing this web element. I suggest that future research add an additional question displaying a pushbutton and asking the respondent to provide a name for that element. I believe the results imply that labeling

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pushbuttons clearly is important given that users are subconsciously aware of the text, but I suggest further research is needed to find conclusive data.

CONCLUSION

Unfortunately, I was never able to get in touch with a representative from HHS to discuss their research or the potential impact of my research on their project. However, I believe that this research does give further insight into their guidelines that, in some cases, provides evidence supporting their inclusion in the publication.

If I were to perform this research again, there are changes I would make to the methodology. I outline them here to provide future researchers suggestions for their own work in this field. Administering the survey prior to the usability study would have aided in developing follow-up questions for the study. A survey provides a general opinion and I would have been able to delve deeper during the study by asking targeted follow-up questions based on the respondent's specific actions. Furthermore, I believe that the tools used in this study could be further developed to remove any of the terminology issues (page title, pushbutton) discussed previously. These tools could be refined and administered again to a different population of participants. Finally, the larger the sample size, the easier it is to state with confidence that results will remain valid for the general population.

I also believe studying a pool of participants with a wider range of ages would be very interesting. The population used for this study is considered "tech-savvy" and are generally expected to know more than an elder population. Is this true? Should specific web usability guidelines target one specific audience over another, or do they apply cross generationally?

APPENDICES

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Appendix A – HHS Strength of Evidence Scale

5 – Strong Research Support 12345

- Cumulative and compelling, supporting research-based evidence
- At least one formal, rigorous study with contextual validity
- No known conflicting research-based findings
- Expert opinion agrees with the research

4 – Moderate Research Support 1234○

- Cumulative research-based evidence
- There may or may not be conflicting research-based findings
- Expert opinion
 - Tends to agree with the research, and
 - A consensus seems to be building

3 – Weak Research Support 123○○

- Limited research-based evidence
- Conflicting research-based findings may exist
 - and/or -
- There is mixed agreement of expert opinions

2 – Strong Expert Opinion Support 12○○○

- No research-based evidence
- Experts tend to agree, although there may not be a consensus
- Multiple supporting expert opinions in textbooks, style guides, etc.
- Generally accepted as a 'best practice' or reflects 'state of practice'

1 – Weak Expert Opinion Support 1○○○○

- No research-based evidence
- Limited or conflicting expert opinion

(U.S. Department of Health and Human Services, 2006, p. xxii)

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Appendix B – Preliminary List of Guidelines

#	Title	Relative Importance	Strength of Evidence
1:5	Set and State Goals	4	2
2:12	Develop Pages that Will Print Properly	4	2
3:1	Comply with Section 508	5	2
3:2	Design Forms for Users Using Assistive Technologies	5	2
3:4	Enable Users to Skip Repetitive Navigation Links	4	2
3:5	Provide Text Equivalents for Non-Text Elements	4	2
3:6	Test Plug-Ins and Applets for Accessibility	4	2
4:1	Design for Common Browsers	4	2
4:2	Account for Browser Differences	4	2
4:3	Design for Population Operating Systems	4	2
4:4	Design for User's Typical Connection Speed	4	2
5:2	Show All Major Options on the Homepages	5	2
7:1	Provide Navigational Options	4	2
7:4	Provide Feedback on User's Location	4	2
9:2	Provide Descriptive Page Titles	4	2
10:2	Link to Related Content	4	2
10:4	Avoid Misleading Cues to Click	4	2
10:7	Designate Used Links	4	2
11:2	Format Common Items Consistently	4	2
13:2	Label Pushbuttons Clearly	5	2
13:4	Do Not Make User-Entered Codes Case Sensitive	4	2
15:4	Define Acronyms and Abbreviations	4	2
15:5	Use Abbreviations Sparingly	4	2
16:3	Ensure that Necessary Information is Displayed	5	2
17:3	Make Upper- and Lowercase Search Terms Equivalent	4	2
17:4	Provide a Search Option on Each Page	4	2

Appendix C – Chosen Guidelines

#	Title	Relative Importance	Strength of Evidence
2:12	Develop Pages that Will Print Properly	4	2

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7:4	Provide Feedback on User's Location	4	2
9:2	Provide Descriptive Page Titles	4	2
10:2	Link to Related Content	4	2
13:2	Label Pushbuttons Clearly	5	2
17:4	Provide a Search Option on Each Page	4	2

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Appendix D – Heuristic Evaluation

13:2 – Label Pushbuttons Clearly

Travelocity

- Homepage
 - o 'Search now' below entering all of the flight data
 - o 'Go' by the search bar, upper right hand corner
 - o 'Go' below flight search, for Travel Deals
 - o 'Go' below Travel Deals, for signing up for Deal Alerts
- 'View Flights' after entering flight information
- Flight results
 - o 'Go' by the search bar, upper right hand corner
 - o 'Search' by search more airlines option above flight list
 - o 'Select' by every possible flight option
- After selecting flight
 - o 'Log In and Continue' after displaying all flight info
 - o 'Continue' after displaying all flight info

My opinion: all are clearly labeled because they are placed adjacent to where the information is taken for the button and it is evident what pushing the button will do

Expedia

- Homepage
 - o 'Search for Flights' below entering all of the flight data
 - o 'Search for Flights+Hotel' below entering all of the flight data
 - o 'Sign Up' by getting deals sent to inbox box
- Flight results
 - o 'Search' in New Flight Search box
 - o 'Select' by every possible flight option
 - o 'Go' by the search bar, upper right hand corner
- After selecting a flight
 - o 'See more hotels' near top, where there are hotel choices given
 - o 'Log In and Continue' after displaying all flight info
 - o 'Continue' after displaying all flight info

My opinion: all the buttons are label appropriately and it is evident what pushing the button will do. In comparison, Expedia uses 'Go' less and instead more exactly states when the button does.

7:4 Provide Feedback on User's Location

Travelocity

Navigation tabs at the top of the screen display all the possible locations. The area you are currently visiting is a different color (silver, versus navy blue). On the homepage, the Home tab is activated and when you search for a flight, the Flight tab changes to silver while the Home tab returns to navy blue. URL is also helpful: if you click directly on the Flight tab, the URL reads www.travelocity.com/Flights. After submitting flight info, the path is www.travelocity.com/Flights/InitialSearch.do which does accurately describe the current position. However, continuing the search does create more indistinguishable URLs.

Expedia

Navigation tabs at the top of the screen display all the possible locations. The area you are currently visiting is a different color (white, versus yellow). On the homepage, the Home tab is activated and when you search for a flight, the Flight tab changes to white while the Home tab returns to yellow. URLs make sense if you look closely (<http://www.expedia.com/Flights-Search?trip=roundtrip...>) but are not always helpful at first glance.

17:4 Provide a Search Option on Each Page

Travelocity

There looks to be a search box on the homepage, located in the upper right hand corner. However, there is not text distinguishing what it is. On all other pages, the search box is labeled and sits below the navigation, on the right.

Expedia

Persistent search box in upper right hand corner.

10:2 Link to Related Content

Travelocity

On the main page, below the Search for Travel area, there are links to common destinations to make searching for flights and deals easier. Once you've search for a flight, only flight content is displayed but there is the option for changing your search.

Expedia

On the main page, below the Search for Travel area, there are links to common destinations to make searching for flights and deals easier. Once you've search for a flight, only flight content is displayed but there is the option for changing your search. Once you've selected the flight, they provide hotel options at the top of the screen.

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9:2 Provide Descriptive Page Titles

As in, the titles on the browser title bar. Could also make the title of the page.

Travelocity

On main pages, prior to search, the title reflects where you are. When searching for a flight, it tells you on which portion of the search you are (i.e., Outbound, Inbound, Review Results).

Expedia

On main pages, prior to search, the title reflects where you are. When searching for a flight, it personalizes the title by including the airports you are travelling to and from.

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Appendix E – Usability Session Outline

About You

Gender:

Major:

Age:

Graduation Year:

Home state/country:

How often do you use sites similar to Travelocity, Expedia, Priceline, etc?

Have you ever participated in usability testing before?

What browser do you commonly use?

Scenario

You are a recent Bryant University graduate who has accepted employment in Durham, NC. You need to fly home on September 14th to attend a sibling's wedding. You will be returning September 16th. Find a roundtrip flight from Durham, NC to Bar Harbor, ME for these dates. Find the cheapest flight.

Also, complete these tasks:

- Choose an alternative airport near Bar Harbor, ME (you do not have to find the cheapest flight)
- Locate a hotel in Bar Harbor, ME (you do not have to find the cheapest price)
- Locate the Return Policy, show me, then return to the homepage

Complete each task in a separate tab. Please only use Travelocity.com.

Questions After Testing

1. What did you find difficult, or what did you struggle with, if anything?
2. *Bring them to the login page.*
What page are you currently on? How did you know, what clued you in?
3. What is the page title of the page you are on?
4. How easy did you find the site to navigate? What, if anything, made navigation difficult?
5. What is a pushbutton?
 - a. Answer correct: Can you remember using one? Which one?
 - b. Answer incorrect, show them and then ask: What text was on the pushbutton when you search for a flight?
 - i. If they don't know: What would you expect it to say?
6. If you are searching for a flight, do you want to see hotel information on the same page?

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Appendix F – Usability Survey

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