Can the WWW provide better answers than the textbook?

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ABSTRACT

People search the WWW every second for information. In academia, students frustrate professors by using the WWW to answer homework questions and take home exams instead of textbooks. Anecdotally, colleagues report that students provide inaccurate and superficial information when they confine their answers to information found on the WWW. Students, however, find the ease of a Google search more expedient than reading the text or searching peer reviewed literature. In this study, students were asked to answer five questions from a typical college text in Criminal Justice by locating a document that looked like it would contain the answers to those questions. How well did the students do in this exercise in locating the right information and how well did the faculty succeed when using the same web sites is the basis for this study. The accuracy of the answers found by the students is compared to five measures of the student’s perception of the quality of the information found. This paper is part of a larger research project to study the success measures related to information use of the WWW. It is a first step in determining the value of information found on the WWW and how well it compares to the information that is available in a college text book.

Keywords

Information quality, literacy, Web success

INTRODUCTION

The focus for this study is the use of information found on the WWW. Kallehauge (2010) found that information seeking problem resolution does not proceed in stages to reduce uncertainty or increase value. He found no change from the initial search to the conclusion. Problems in locating the right information have a long history. In their review of the history of information, Bawden and Robinson (2009) found that complaints about information overload did not start with the WWW but rather with the invention of the printing press; and questions of authenticity date back to the Bible. They referred to this as the “dark side of information.” Information “pathologies” are not new, but could be exacerbated by the new technology of the Internet. Research is needed to determine if the pathologies are real. The library science literature has found many problems with how students use the web. Bawden and Robinson (2009) caution, however, that efforts by librarians, especially academic librarians, to improve information literacy may not be verifiable or accepted by other disciplines, but the librarians’ complaints may be the result of over-enthusiasm.

Thompson (2003) reviewed studies on student usage of the Internet and found that students do not see a difference between reliability of web sites based on whether or not they have advertising. There should be a question of bias if the information is funded by a partisan sponsor. However, Thompson’s (2003) conclusion is that more research needs to be conducted on how students use the web and an assessment needs to be made of the quality of students’ search skills and ability to select appropriate resources. Narrowing the focus to student use of the Internet to answer course-related questions will provide a more manageable scope for this study.

Students come to college with the firm belief that they know everything they need to know about how to use the WWW (Borzo, 2005). However, teenagers are only able to complete 55% of a wide range of tasks including finding free documents and resizing windows so they can read the text more easily using web pages. They tend to either give up or get incorrect information (Borzo, 2005). Eighty-eight (88%) of college students use the WWW to find information for their studies (Grimes & Boening, 2001). The problem described in the library science literature is that students use information from the Internet if it appears useful without an assessment of the accuracy and completeness of the information (Borzo, 2005).

In a large study of student use of e-textbooks, Nicholas et al (2010) found the use of e-textbooks was extremely popular and widely used for obtaining snippets of information and for fact finding. Ease of access and convenience because they could search the text were the primary reasons for their popularity.

Sources used by students can be uncorroborated or may be created by other students (Levin & Arafeh, 2002). Many students use keyword searches and do not have any familiarity with other search techniques. The chief complaint about the Web by students was that there was too much information, not whether the information was accurate. Forty percent (40%) of the students agreed that the information on the web was just as good as printed books and journals (Grimes & Boening, 2001). Grimes and Boening (2001) found that the majority of the students felt that they would use a piece of information as long as it fit their needs, whether it was accurate or not. Bawden and Robinson (2009) describe this phenomenon as “satisficing”. Satisficing is an outcome of a theory of bounded rational choice first developed by Simon (1955). Application of the theory implies that people assess how much information is adequate to meet their information needs. Because of the volume of information, people use “satisficing” when searching. They select the first satisfactory alternative or risk a fruitless
and exhausting search for a better answer. Bawden and Robinson (2009) consider it a new pathology. However, it is actually an old pathology manifested in a new technology, related to the use of the WWW.

The advent of Web 2.0—a phrase first coined by O’Reilly (2005) on www.oreillynet.com, consisting of Blogs, Gmail, Wikipedia, Google Adsense, BitTorrent, Facebook, MySpace, Twitter—and other user supplied content has added to the “satisficing” phenomenon because of the following problems (Bawden & Robinson, 2009):

- The content can be changed quickly by anyone
- Quality control is almost non-existent
- There is often unacceptable content
- Authors are anonymous
- Information is impermanent
- It promotes “shallow novelty.”

Some go as far as referring to Web 2.0 as pervasive invalid and perhaps causing the destruction of Western civilization and culture (Bawden & Robinson, 2009) since traditional methods for information verification developed for print literature, including the editorial function by publishers and the peer-review process in academia, are not used. However, the presence of multiple editors and viewers with feedback capabilities have been offered as a viable alternative to the “expert” model found in traditional print literature (Shadbolt et al. 2006). The fast feedback loop can promote new questions and answers and thereby stimulate scientific research.

Students are very excited about the Web 2.0, because it is a user developed platform; it is the buzz among college students. Whether it is their desire to have control over the World Wide Web (WWW) or seeing their own documents in print, Web 2.0 has captured the enthusiasm of students. Students prefer Wikipedia to resources created by experts; it is the resource of choice for almost any question. Research on how students actually use the WWW to do their homework, answer questions, and conduct research is limited. With the extensive use of Web 2.0 by students, issues related to the successful use of the web to find quality information need to be examined.

**Literature Review**

“Human-computer interaction is a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.”\(^1\) The field of study known as HCI has traditionally been involved with the design of computer systems and application development to make sure the system is usable. The explosive growth of the WWW has taken this field in a new and much broader application. Many individuals and organizations with or without expertise in the design or specific domain expertise create web pages. It is a wholly unregulated system of information. HCI as it relates to web pages is a relatively uncharted area of research. Zhang and Li (2005) found that less than 8% of the current HCI literature in the premier IS journals relates to the Web.

Some of the HCI issues related to WWW include design (Palmer 2002, Agarwal & Venkatesh 2002, Everard & Galletta 2006), ease of use (Davis 1989, Koufaris 2002, Bhattacherjee 2001, Venkatesh 2000, Venkatesh & Morris 2000), usefulness (Davis 1989, Koufaris 2002, Bhattacherjee 2001, Venkatesh 2000, Venkatesh & Morris 2000), and information quality (Klein 2001, 2002, 2003). What helps users decide which web site to use? Do they look at only the design elements of spatial use, color, and navigation; or are they more interested in the quality of the content of the site? If the site is not easy to use, will they continue to use it or go to the next site that may be easy to use, but not have the best information? These questions are of interest and need further investigation. This study will be limited to determining how successful students can be in finding information on the WWW and whether there is a relationship between that success measure and the user’s perception of the information quality of the web site. Two major fields, information science and information systems are closely tied to HCI and contribute to this research.

The study of the information sciences has changed radically because of the Internet. People no longer use the building called the library, but may use the library resources extensively without ever stepping foot inside the building. In that process, they may never access the valuable assistance of a librarian. Unfortunately, many students do not learn how to use these library resources well. Internet usage exacerbates the problem that students find information in a haphazard manner and use whatever they find without critically evaluating that information (Bodi 2002). In a study of the differences in how library resources are used between first year and final year students, Callinan (2005) found students used Journal articles 1% of the time in their first year and 48% in their final year. However, freshman used Web sites 77% and seniors used them 91%. Clearly, other web sources are used much more frequently.

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\(^1\) [http://sigchi.org/cdg/cdg2.html#2_1](http://sigchi.org/cdg/cdg2.html#2_1), 2.1 Definition of HCI {p. 5}
To be information fluent includes the ability to ask the right question, find the best resources, successfully evaluate those resources, and finally to present the information. The fear among educators is that students will be unable to accomplish these tasks. Research in the information sciences and library sciences lends credibility to that fear. Students today focus on getting an answer as expeditiously as possible without evaluating its worth. It is a common practice for students to look up information on the WWW rather than use the recommended textbooks for their courses. When engaging in research for term papers, students use other web resources instead of the purchased databases that include scientific journals and peer reviewed publications. The result is what some people have referred to as the “dumbing down” of a college education (Kryzanek, 2006). This research is an effort to explore the problem that is known to exist, but has yet to be studied. What is the result of using the web to find answers to questions that normally are found in textbooks?

The information systems research deals with the development, design, implementation, and need for software solutions. Within the research agenda for the WWW, interactive web sites, usually in the form of e-commerce, are the information technology (IT) artifacts studied. In the current study, the information systems under study are non-interactive aspects of the WWW. As an information repository, the Internet probably includes more information than all the books and journals printed. According to anecdotal reports of college professors, the Internet has become the primary source for all assignments, term papers, and study materials. In this research, the Internet will be the IT artifact and the users’ perceptions and success with that artifact will be studied.

Within the Information Systems literature, one area that has major significance to the current study is Information Quality. Information quality is defined as: Users find the information on the site is sufficient and appropriate to answer all the questions (Wand and Wang 1996, Strong et al 1997, Phipno et al 2002, Klein 2001, 2002, 2003). In the development of the field of Information Quality, it was determined there are multiple dimensions that make up the user’s perceptions of quality. Wang & Strong (1996) identified these dimensions as accuracy, believability, reputation, objectivity, concise, easy to understand, consistent, has value, easy to comprehend, complete, current, and sufficient. Five of the previously mentioned dimensions were used in this study; accurate, believable, adds value, concise and relevant. These were chosen on the basis of their apparent face validity.

Barbara Klein is the author of a series of articles studying data quality on the WWW. The first in 2001 is a comparison of data quality perceptions using Internet resources and traditional text sources. Klein analyzed 15 propositions, each one based on one of the quality dimensions. For example, the first proposition states: “There will be no difference in user perceptions of the believability of information available from the Internet and information available from traditional text sources.” The methodology used was a survey administered to graduate students. Students were asked to describe information used in a course project. Each statement was administered substituting the words “Internet sources” for “traditional text sources” as appropriate. The findings indicate that there are six dimensions of data quality that were found to be statistically significantly different between Internet and traditional text sources. Traditional text sources were rated better on accuracy, objectivity, reputation, and representation of consistency. Internet sources rated better on timeliness and appropriate amount.

Issues related to this study (Klein 2001) include the fact that these were graduate students with a high level of expertise in both web usage, search techniques on the Internet, and analysis of textbook quality. It would therefore be hard to generalize these results, as they do not represent the general population. In addition, the questionnaires were administered following the project, asking subjects to recall their perceptions. Another issue is the absence of discussion about the domain of the exercise. Depending upon the domain under study, results could be expected to change. For example, information on the Internet regarding business data communications is extensive and in sufficient or better detail than what can be found in some textbooks.

In an extension of this study, Klein (2002) compares the results between graduates and undergraduates. Graduate students and undergraduate students were asked to rate what dimensions of Internet data quality are highest and lowest. There was a significant difference between ratings in four dimensions: accuracy, representational consistency, concise representation, and access security. Graduate students rated the four dimensions as statistically significantly more important. The majority of the dimensions however were not found to have any statistically significant differences. Klein also notes that there were a few limitations to this study, first that the subjects were MIS students, who are expected to have expertise in understanding the value of web resources. A second limitation was that the sample was small, and a final limitation was that respondents were asked questions about the quality of Internet based information used in a class project in general rather than about specific Internet sites. The current study allowed subjects to self-select web sites that will later be evaluated by faculty for comparison purposes of successful use.

In 2003, Klein presented a third study at AMCIS (Americas Conference of Information Systems). In this study, subjects were asked to do a general task or a specific task. In addition, an independent variable of training was added to each group. Students who were trained on how to assess information quality judged the quality of the web site in a task specific exercise to be better than students who were not trained. General tasks also were rated as having less quality of information.

The questions to be answered by this study are:
Does the perceived information quality of a web site positively correlate to the successful use of that web site?

Can students use the WWW to successfully answer questions from a college textbook?

**METHOD**

Designing a research study of the WWW is problematic. The WWW is a very large, quickly changing environment. What you find today may move tomorrow and surface in another location on the following day with changed data. Methods to study this amorphous accumulation of information need to be expanded. Much of the current research on e-commerce measures the subjects’ stated intention to buy from a web site. Research by Lowry et al. (2008) and Everard and Galletta (2006) found that if users perceived a site as having good quality it was a significant predictor of their intention to purchase from the site. The data on how many people went to the site and actually purchased an item is not available. Previous research indicates that users make almost instantaneous decisions (Tractinsky, et al 2004) about whether or not to use a web site based on the look of the site. In the framework of this research, students will be asked to accomplish certain tasks using self-selected web sites. Subjects will be asked to assess the perceived information quality in addition to the use testing. The methodology for the current study will be quantitative, as the goal is not to improve the web site but to determine the relationship of successful use and the HCI factor previously described.

The goal of the design for this study is to replicate how a student would actually work in the field; it is not an experimental design with controls. An assumption was made that students would use a search engine to find a document that appears to have the information they need. Because of the desire to include an independent evaluation of the web sites used, students were restricted to using only one web site as per the directions found in Appendix A. Faculty members and librarians were asked to answer the same questions that the students answered using the same web sites that the students selected. This feature was added in order to provide a comparative analysis between student success as compared to faculty success.

The metric for behavior usage is the success rate of the task, i.e., how many questions had correct answers. This is an objective measure of web use as the answers that students give to the questions on this part of the task have correct answers. Participants will be asked to find the answers to the following questions:

1. The fingerprint pattern accounting for only 5 percent of all known patterns is the:
   a. Whorl
   b. Radial loop
   c. Arch
   d. Ulnar loop
   e. None of the above

2. The AFIS _______ _______ determines the degree of _______ between the location and relationship of the minutiae between the questioned fingerprint and those in the database.
   a. software configurations, difference
   b. identification system, minutiae
   c. search algorithm, correlation
   d. relative position, orientation
   e. law enforcement community, cooperation

3. The first systematic system of individual classification and identification was introduced by:
   a. Richard Henry.
   b. William Herschel.
   c. Alphonse Bertillon.
   d. Francis Galton.
   e. None of the above

4. The pores of the sweat glands are located in the:
   a. friction grooves.
   b. skin ridges.
c. dermis.
d. knuckles.
e. dermal papillae.

5. Fingerprints are formed:
   a. by the time a child is two years old.
   b. during first six months after birth.
   c. at birth.
   d. during fetal development.
   e. at conception

The following are the questions to measure the subjects’ perception of information quality:

Information Quality statements:
1. I believe the information on this web page is accurate.
2. I believe the information on this web page is believable.
3. I believe that using the information on this web page increases the value of my work.
4. I believe the information on this web page is concise.
5. I believe the information on this web page is relevant to the topic.

Confounding variables that may influence the outcome of the study include gender, expertise in finding answers to general interest questions, and field of study will be examined as they relate to the objective measure of success. In order to assess subjects’ level of expertise, subjects were asked to find the answers to the following questions:
1. Find the current temperature for Poughkeepsie, using any web source that you are familiar with.
2. Find the author of this quote: “Do all men kill the things they do not love?”
3. Find yesterday’s closing price for Dell stock.
4. In what year did Warren and Brandeis write “The Right to Privacy”?
5. Find the phone number for Coyote Grill Restaurant, Poughkeepsie.

Subjects were asked to record their start and stop time in this assessment; assuming that if they could find the correct answers in the shortest amount of time, then their expertise was higher. The average score was .65, the best score was 1.6 and the worst score was .18. This score was found by taking the number of correct answers and dividing it by the number of minutes it took to complete the task. The score is a ratio of correct answers divided by the time required to find those answers. The study results could be influenced by this level of expertise, therefore the data will be analyzed to see if this expertise rating influences usage success. In an effort to address some of the potential moderating variables, college students from all years and majors were recruited to participate in the full study. The participants were undergraduate students in a mid-size private college in the northeast United States. Participants (demographics are found in Appendix B) were eligible for a drawing of significant prize, an iPod or a Wii.

Survey Instrument

The survey instrument contains the following items:

- Informed consent
- General directions (Appendix A)
- Directions to complete the tasks along with each of the following tasks
- Content questions of use test
- Information quality perceptions (a 7 point Likert scale was used)
- Demographic data
- Web expertise test

Participants

Participants were 226 individuals. The planned population for the current study was a typical undergraduate college population. Through e-mail and a global invitation in Facebook, the research assistants invited students to participate in the study. Participants were eligible to win an iPod Nano or a Wii. The first session netted ninety (90) subjects, and subsequent sessions brought the n to one hundred (100) which was thought to be insufficient to examine the number of variables in the study successfully. Various faculty members were approached to allow the investigator to conduct the surveys during class
time and the remaining surveys were completed in 7 class sessions. Students were asked to volunteer and were given the option to work on other tasks rather than participate in the study. The demographics (Appendix B) correspond to the statistical breakdown of the student body in terms of gender, age, major, but not year in college. Only 11% of the participants were seniors, which could be due to one or more of the following reasons. First, the research assistants were sophomores and their social network may not have extended to the senior class; second, very few of the students in the classroom sessions were seniors as the courses that were volunteered were for Freshmen, Sophomores and Juniors; and finally it is possible that seniors already owned the raffle items and were unmotivated to participate. There are more freshmen in this sample than upperclassmen, (45% were freshmen), due to the fact that the faculty who volunteered their classes taught freshman courses. Successful use testing is the measurement of benefits in the current study. Subjects were asked to select web sites that could be used to answer questions from a typical college course and locate the answers to five questions. In terms of a research agenda, it is important that the subjects be in some way motivated to use the web sites under investigation. The tasks in the current study were taken from a typical college course in an effort to simulate a valid context, and subjects were eligible for significant prizes if they participated in the study.

RESULTS

The results indicate that there is not a significant relationship between any of the possible confounding variables and the dependent variable. Gender, neither year in college, major, nor the users level of expertise predict the level of success in using the WWW in this study.

<table>
<thead>
<tr>
<th>Regression weight</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage_Score &lt;-- Gender</td>
<td>.200</td>
<td>.151</td>
<td>1.325</td>
</tr>
<tr>
<td>Usage_Score &lt;-- Year_College</td>
<td>-.013</td>
<td>.069</td>
<td>-.190</td>
</tr>
<tr>
<td>Usage_Score &lt;-- Major</td>
<td>.001</td>
<td>.009</td>
<td>.116</td>
</tr>
<tr>
<td>Usage_Score &lt;-- Expertise</td>
<td>-.076</td>
<td>.126</td>
<td>-.603</td>
</tr>
</tbody>
</table>

Table 2. Regression analysis of possible confounding variables

Further analysis using the correlation coefficients reveals no significant relationships between any of the variables. The hypothesized relationship between users’ perception of information quality and their level of success in answering specific content questions is .111, a very low correlation. Students perceived the web sites they chose as having good information quality although the same web sites did not have the information that was required to answer the content questions.

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>Usage Score</th>
<th>College Year</th>
<th>Major</th>
<th>Expertise</th>
<th>IQ Total</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage Score</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Year</td>
<td>.005</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>.006</td>
<td>-.112</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expertise</td>
<td>-.037</td>
<td>.140</td>
<td>-.065</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ Total</td>
<td>.111</td>
<td>.033</td>
<td>.030</td>
<td>.023</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.081</td>
<td>.275</td>
<td>-.070</td>
<td>.066</td>
<td>.032</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table 3. Correlation Coefficients of all variables

An examination of the means of the scores (Table 4) finds a slightly significant difference (p < .05) between the mean of the students’ successful use of a web site and the faculty members’ success score. Although this difference was not hypothesized, it is an interesting finding. Students found more answers than the faculty/librarians did who examined the web sites.
## URLs selected by students

<table>
<thead>
<tr>
<th>URL</th>
<th>Faculty Score</th>
<th>Student Mean</th>
<th>Student N</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.essortment.com/all/fingerprintssec_rwkx.htm">http://www.essortment.com/all/fingerprintssec_rwkx.htm</a></td>
<td>1</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://exploreforensics.co.uk/">http://exploreforensics.co.uk/</a></td>
<td>1</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://forensic-evidence.com/site/ID/ID00004_2.html">http://forensic-evidence.com/site/ID/ID00004_2.html</a></td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><a href="http://ridgesandfurrows.homestead.com/">http://ridgesandfurrows.homestead.com/</a></td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://onin.com/fp/fphistory.html">http://onin.com/fp/fphistory.html</a></td>
<td>2</td>
<td>1.73</td>
<td>22</td>
</tr>
<tr>
<td><a href="http://science.howstuffworks.com/fingerprinting1.htm">http://science.howstuffworks.com/fingerprinting1.htm</a></td>
<td>3</td>
<td>1.33</td>
<td>6</td>
</tr>
<tr>
<td><a href="http://www.fbi.gov/hq/cjis/cjis.htm">http://www.fbi.gov/hq/cjis/cjis.htm</a></td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><a href="http://www.east-shore.com/cjsys.html">http://www.east-shore.com/cjsys.html</a></td>
<td>0</td>
<td>1.5</td>
<td>14</td>
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<td><a href="http://fingerprinting.com/">http://fingerprinting.com/</a></td>
<td>0</td>
<td>1.01</td>
<td>76</td>
</tr>
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<td>2</td>
<td>1.23</td>
<td>30</td>
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<td><a href="http://www.liebertonline.com/doi/abs/10.1089/dna.2006.25.181">http://www.liebertonline.com/doi/abs/10.1089/dna.2006.25.181</a></td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://ag.ca.gov/fingerprints/">http://ag.ca.gov/fingerprints/</a></td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td><a href="http://cyberbee.com/whodunnit/fp.html">http://cyberbee.com/whodunnit/fp.html</a></td>
<td>0</td>
<td>2.6</td>
<td>5</td>
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<td><a href="http://www.texasandi.unt.edu/curriculum/lessons/criminal_justice_05">http://www.texasandi.unt.edu/curriculum/lessons/criminal_justice_05</a> /fingerprinting_history/fingerprinting_historyplan.pdf</td>
<td>0</td>
<td>0.8</td>
<td>5</td>
</tr>
<tr>
<td><a href="http://engr.nmsu.edu/~etti/summer97/security/finger.html">http://engr.nmsu.edu/~etti/summer97/security/finger.html</a></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://www.safety-identification-products.com/fingerprint-information.html">http://www.safety-identification-products.com/fingerprint-information.html</a></td>
<td>0</td>
<td>0.43</td>
<td>7</td>
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<td><a href="http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/prints.html">http://www.reachoutmichigan.org/funexperiments/agesubject/lessons/prints.html</a></td>
<td>1</td>
<td>1.67</td>
<td>3</td>
</tr>
<tr>
<td><a href="http://www.virtualsciencefair.org/2004/fren4j0/public_html/history_off_fingerprinting.htm">http://www.virtualsciencefair.org/2004/fren4j0/public_html/history_off_fingerprinting.htm</a></td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
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<td><a href="http://library.thinkquest.org/04oct/00206/io_nts_fingerprinting.htm">http://library.thinkquest.org/04oct/00206/io_nts_fingerprinting.htm</a></td>
<td>0</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td><a href="http://www.customessaymeister.com/customessays/Computers/1702.htm">http://www.customessaymeister.com/customessays/Computers/1702.htm</a></td>
<td>2</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<td>4</td>
<td>3</td>
<td>1</td>
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</table>
DISCUSSION

It was the intent of this research to gain a better understanding of how students use the Web and look at the relationship between their perception of the information quality and their successful use of the web. In a departure from most of the literature on the WWW, this study was concerned with how individuals use the WWW to find needed information. Also, in order to account for the possibility of confounding variables that may influence the outcome of the study demographic characteristics were collected and tested for their impact on the outcome measure.

Developing a methodology to study the use of the WWW is an important step in the study of the Internet. Since most of the Web research has been confined to e-commerce, emphasis on the informational aspects of the Web have been limited. This study used an objective measure of Web success; this adds to the value of this study. In addition, and of significance to the study of the WWW, is the fact that most students chose web sites that did not have sufficient information to answer basic questions on fingerprinting. The students showed determination in searching for a good web site. They found over 30 that had useful information. The research design did not allow for continued search if the answers were not found. The design constrained the ability of the subjects to find the answers. The resulting usage scores are perhaps lower than could be expected. What is the implication of this on the findings? It is hard to assess that without further study. Future research should include the option of continued search.

Table 4 lists the web sites used by students; there were a total of 33 different web sites found. The average success score was 1.5 correct answers. Faculty and librarians were asked to find the answers to the same questions using the same web sites and had a lower average of correct answers of < 1. Several points are of interest, the first is the large number of possible web sites found, and more interesting is the fact that the sites had not have the information that was needed to answer these questions. Students were diligent in attempting to find a web site that would have the information to answer the questions and performed better than the faculty in finding the correct answers. However, none of those websites had all of the information that was needed. Based on this one exercise related to a criminal justice course, it cannot be concluded that useful information does not exist on the web. Does the WWW have adequate information to meet student needs; has not been answered. In this instance, students found minimal information, an average of 1.5 correct answers out of a possible 5. The concern that reliance on the Web will result in lowered performance by students in their course work has legitimacy. It is possible that if students substitute research on the web for textbooks; they will not be successful in their course work.

Limitations of this research and future research

The use of the Internet as the IT artifact in this study presented some problems in terms of its complexity and unruliness. Allowing subjects to choose their own sources of information introduced a question of the accuracy of the source documents. An attempt was made to verify the accuracy of each site by having faculty use the same sites to answer the questions in the usage task. Contrary to the effort to verify accuracy, the student subjects performed better than the faculty did in finding the answers to the usage questions. The design constraint in not allowing subjects to continue to search out other sites for the answers but use only the one site decreased the likelihood of success on this task. However, the fact that students found more than 30 web sites indicates a serious effort on the part of the subjects to locate the best possible site and not accept the highest ranked site retrieved by the search engine used. Future research could address the design constraint issue by allowing subjects to select as many sites as necessary and add an important dimension to this stream of research by adding a search and retrieval construct.
CONCLUSION

This study was motivated by an interest in the IT artifact itself, the WWW, and the importance of understanding how people can successfully use it. The complexity of the WWW has made it difficult to study; limiting the focus limits the reach of the study, but can contribute to further study. It is also important to conduct research in an ecologically valid environment where the protocol is a close approximation to actual use. The rapid evolution in Internet browsers, web design, server technologies, etc. has not facilitated research in this area. This study uses an objective measure of Web success. Previous research (Davis 1989, DeLone & McLean 1992, Seddon 1997, McKnight, et al 2002) used, as the outcome measure, the intention to use a web site or a self report of use. In this study the objective measure of successful use was the subjects’ answers to questions that are found in a college course.

Confounding variables, including major, year in college, and level of expertise were tested and did not influence the outcome of the study.

REFERENCES


Appendix A

Survey Instrument

Directions:
Welcome to this study on conducting research online. As a college student no matter what discipline you are in, you will have to know how to use the WWW to find information relevant to your courses. You have been asked to participate voluntarily in this study to further the science of the web.

There are TWO topics to research. The only requirement for selecting a topic is that you have not taken the course it is related to. The goal is for you to conduct research on this topic for the first time that is, on a topic that you are not familiar with. If you are a Criminal Justice major, you must select the other topic.

Topics:
Criminal Justice - Fingerprinting
Biology - Photosynthesis

Based on this topic, locate a source on the web that you think will have college level material that you might use for research purposes. Give yourself approximately 10 minutes to find the best web site. You must use only the site you have selected to answer the questions. Even if you cannot answer all the questions, DO NOT search for another web page, but use the one you have already selected and do the best you can to answer the questions.
Appendix B

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Sample (N = 226)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>140 (61.9%)</td>
</tr>
<tr>
<td>Male</td>
<td>86 (38.1%)</td>
</tr>
<tr>
<td>Freshman</td>
<td>104 (46.0%)</td>
</tr>
<tr>
<td>Sophomore</td>
<td>46 (20.4%)</td>
</tr>
<tr>
<td>Junior</td>
<td>49 (21.7%)</td>
</tr>
<tr>
<td>Senior</td>
<td>27 (11.9%)</td>
</tr>
<tr>
<td>Less than 18</td>
<td>8 (3.5%)</td>
</tr>
<tr>
<td>18 – 25</td>
<td>215 (95.1%)</td>
</tr>
<tr>
<td>&gt;26</td>
<td>3 (1.3%)</td>
</tr>
<tr>
<td>History</td>
<td>15 (6.7%)</td>
</tr>
<tr>
<td>Sciences</td>
<td>45 (19%)</td>
</tr>
<tr>
<td>Business</td>
<td>63 (27.9%)</td>
</tr>
<tr>
<td>Communications</td>
<td>30 (13.3%)</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>20 (8.8%)</td>
</tr>
<tr>
<td>Fashion</td>
<td>45 (19.9%)</td>
</tr>
<tr>
<td>Other (or not reported)</td>
<td>10(4.4%)</td>
</tr>
</tbody>
</table>