

Undergraduate Students' Evaluation Criteria When Using Web Resources for Class Papers

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Abstract

The growth in popularity of the World Wide Web has dramatically changed the way undergraduate students conduct information searches. The purpose of this study is to investigate what core quality criteria undergraduate students use to evaluate Web resources for their class papers and to what extent they evaluate the Web resources. This study reports on five Web page evaluations and a questionnaire survey of thirty-five undergraduate students in the Information Technology and Informatics Program at Rutgers University. Results show that undergraduate students have become increasingly sophisticated about using Web resources, but not yet sophisticated about searching them. Undergraduate students only used one or two surface quality criteria to evaluate Web resources. They made immediate judgments about the surface features of Web pages and ignored the content of the documents themselves. This research suggests that undergraduate instructors should take the responsibility for instructing students on basic Web use knowledge or work with librarians to develop undergraduate students' information literacy skills.

Keywords : World Wide Web; Quality criteria; Undergraduate students

Introduction

Due to the wealth of information available, the World Wide Web is becoming a widely used research tool. However, one major problem associated with Web-based research is how to determine the quality of information found on the Web. Much of the information available on the Web has not received the rigorous editing and verification of facts through which traditional print or even commercial electronic information sources must go; for instance, traditional newspapers rely on editors to determine the accuracy and overall quality of their articles and journals rely on the peer review process. Because there is no point of control, anyone can put up a Web site

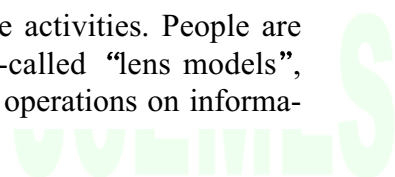
and publish anything. Without editorial control, documents may contain flaws due to bias, mistakes, lies, scholarly misconduct, and so on.¹ The Web may become a powerful source for disinformation. Therefore, it is crucial that Web users are able to evaluate the information on the Web for its quality.

With the ease of use and accessibility of Web resources, the World Wide Web is changing the way undergraduate students conduct information searches. Many undergraduate students frequently use the World Wide Web in their class assignments. In a study showing how students using the Web, McBride and Dickstein² mentioned that students no longer get most of their information for class assignments from print sources in libraries. He and Jacobson³ randomly surveyed 96 Internet users at the State University of New York, Albany library. The survey shows that 76 percent of users were using the Internet mainly for searching documents. In another study, it was found that students who imagine that the Internet is the only source worthy of searching and may accept whatever results they finally retrieve.⁴

However, while there is some excellent information to be found on the Web, there is also a great deal of information that would not be suitable as sources for a college paper. Much information on the Internet is not reliable and students should be cautious when using the resources found on the Web. Some educators feel that the Web has lowered the quality of student research papers by making the process appear too simple. In his article "How the Web destroys the quality of students' papers", Rothenberg⁵ complained that his class had fallen victim to the latest, easy way of writing a paper—that is, doing their research on the World Wide Web by cutting and pasting from openly available Web sites. Undergraduate students had difficulties in finding creditable information and in evaluating the range of quality in the Web.⁶ These concerns raise a question of how undergraduate students use and value Web resources. Various studies have focused on the general use of the Internet by both scholars and students, but few have focused on how they evaluate the Web resources for class papers. To gather data, these previous studies have most used quantitative method such as online surveys. This study used both qualitative and quantitative methods to investigate students' main quality criteria and their ability to identify creditable resources on the Web.

Conceptual Framework

Judgment and choice are essential and pervasive activities. People are making judgments and choices everyday. In his so-called "lens models", Brunswik argued that judgment results from a serial operations on informa-



tion.⁷ He also stressed that judgment will be accurate to the extent that the individual's picture of reality and judgment rules match those of reality, thus judgmental accuracy is a function of both individual characteristics and the structure of the task environment. In the Web environment, people are more engaged in interaction with diverse information than ever before. It is not only essential but also very critical that people have to make judgments on information quality from the Web.

Olaisen⁸ raised the question that "we can store, organize and distribute electronic information in a completely different way than we organized printed information, and then do we give a different credibility to electronic information?"(p.92). His answer was that our location in time and space and in the network of social relationships will greatly influence quality factors like credibility, relevance and perceived value of information. According to Olaisen's statement, the Web has certainly changed our perception of quality factors of information.

Several experimental studies observing real users suggest that topicality is not the only factor to make relevance judgments. Other factors also lie behind users' relevance judgments. For example, in her study, Schamber⁹ found users' various criteria for evaluation in multimedia information seeking and use situations. Bateman¹⁰ also pointed out that information quality with other factors such as information credibility and information completeness explained 48% of the respondents' relevance judgments. The information retrieval environment of these experimental studies was different from that of the Web. In the Web, there is no overall quality control mechanism. It is interesting and relatively new to examine how people apply quality factors in the Web environment.

Related Literature

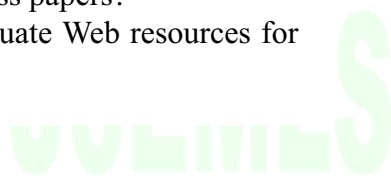
Since its development in 1991, the Web has become a pervasive research source for both students and faculty. Several authors have looked at problems facing faculty and students using the Internet as an educational tool. Marxen¹¹ surveyed 289 students at a state university to obtain student Internet usage information. Results indicate that students are using the Internet for class assignments and research, in addition to e-mail and other activities, but many are not aware of potential information reliability problems. Gillette and Videon¹² examined 47 students' Web citations. The findings show that 36 sites which were cited were connected to other student papers. Of 48 sites, 75% did not connect when typed exactly as shown on bibliographies. The researchers claimed that it is clear that quality issues can be problematic in Web research. Scholz-Crane¹³ examined the evaluation

practices of two groups of college composition students. One group used a checklist provided by the author, and the other group developed its own criteria to evaluate two Web documents. Comparing criteria from both groups to standard evaluation criteria, the author found that college students used a variety of criteria, and a checklist alone was insufficient to help students evaluate Web sites. Klein¹⁴ examined students' perceptions of the quality of information found on the Internet and in traditional text sources using an instrument that builds on prior research identifying fifteen dimensions of data quality. Users rated the timeliness and amount of information of Internet sources higher than traditional text sources. Grimes & Boening¹⁵ interviewed instructors and students and then analyzed Web resources cited in students' papers. The findings show that students are using unevaluated resources and that there is a gap between the quality of resources expected by instructors and the quality of resources used by students.

Many researchers have focused on questions of the accuracy and reliability of Web sites. Connell and Tipple¹⁶ tested a study of accuracy of information on the Web using the Alta Vista search engine to search a sample of 60 reference questions. The results show that 27% of the pages provided correct answers and 64% of the pages gave no answers to the questions. Hernon and Altman¹⁷ conducted interviews with librarians, and found that these librarians perceived networked information systems as a potential source of misinformation due to the nature of electronic media. Herring¹⁸ surveyed full-time faculty members at 30 post-secondary institutions in the state of Alabama. The results indicate that although faculty members are generally satisfied with the Web, they question the accuracy and reliability of Web-based information, and indicate concern about students' ability to evaluate effectively Web information. Rieh and Belkin¹⁹ looked at academic use of the Web and they identified the major criteria affecting judgments regarding information quality as source credibility and truthfulness, content, presentation, currency, and accuracy. Faculty members participating in this study have accepted the Web as a research tool suitable for their own use. At the same time, the results indicate that faculty members question both the accuracy and reliability of much information found on the Web and do not consider the Web to be sufficient as a sole source to deliver the type or quantity of research information they need.

Research questions:

1. What core quality criteria and features do undergraduate students employ when evaluating Web resources for class papers?
2. To what extent do undergraduate students evaluate Web resources for class papers?



Methodology

In user-centered studies, qualitative methodology is commonly applied to collect data. Users are not given a predefined set of criteria to perform judgment or document selection. This study used a qualitative method to investigate users' evaluation criteria. Users' criteria were derived directly from content analyses of their written reports. Additionally, descriptive statistics were used to compare results.

The researcher recruited thirty-five undergraduate students from the department of Information Technology and Informatics (ITI) at Rutgers University who volunteered to participate in this study. In this study, each participant was asked to evaluate five Web pages assigned by the researcher. The topic of the Web pages was "digital divide", which was one of the topics discussed in a prerequisite course titled "Information Technology and Informatics," which is a required course for all ITI students.

This study has two phases — pretest questionnaire and Web resource evaluation. In the pretest questionnaire, participants were asked to answer five questions regarding their Web experience, such as the frequency of Web searches everyday and Web search skills. In the Web resource evaluation stage, participants were assigned to evaluate five Web pages and allowed to browse them freely. During the reading and evaluation sections, participants could link to other Web sites for additional information. No limits were placed on the amount of time participants could spend reading each Web page. At the end of the evaluation, participants were asked to write down at least four sentences explaining why or why not the resources on the five Web pages were valid for their class papers. Participants formed their own opinions on quality of the Web resources.

Five evaluation criteria — coverage, accuracy, authority, objectivity, and currency (Table 1) — which are traditionally used to evaluate print resources, were adopted to select these five Web pages. Each of these five Web pages contains or lacks at least one or more of these criteria. The researcher identified all the strengths and weaknesses of the five Web pages based on the five standard criteria and confirmed them with the instructor who teaches the Information Technology and Informatics course. Participants' comments and characteristics of each Web page mentioned in the written form were content-analyzed and compared them with those identified by the researcher and instructor to see what criteria had emerged as core criteria that participants commonly used for evaluating Web resources for class papers and what criteria the participants had missed.

Table 1 Criteria Template Used by the Researcher & Instructor

Coverage
<ul style="list-style-type: none">• Is the scope of the topic clearly stated?• Are supporting materials (charts, statistics, graphics, etc.) given?• Are there links to additional resources on the topic?
Accuracy
<ul style="list-style-type: none">• Is the information reliable and free from errors?• Is a bibliography included to verify the information?• Are there links to other reliable sources?• If statistical material is included, are the sources for these materials clearly stated?
Authority
<ul style="list-style-type: none">• Is the author’s name listed?• What are the author’s credentials? Do these identify the author as an authority in the field?• Is the author’s institutional affiliation listed and linked to the home page of that institution?• Does the author list an address, e-mail, or phone number for contact?• Is there a link to the author’s biographical information?
Objectivity
<ul style="list-style-type: none">• Is the information presented with the least possible bias?• Is the site factual, or does the author try to change the user’s mind?• Are graphics or imagery used to sway the opinion of the user?
Currency
<ul style="list-style-type: none">• Is the date of the latest revision of the site clearly stated?• Is the page kept current?• Are the links current?• Is this truly the latest information on the topic?

(Adopted from Gardner, Benham, & Newell, 1999²⁰)

Results and Discussion

The results of the study indicate that undergraduate students evaluate Web resources commonly using a cluster of quality criteria. The top five criteria of the cluster are source coverage, accuracy, authority, document presentation and objectivity (Table 2). The results also show that participants usually employed one or two certain criteria and repeatedly used them to evaluate the five Web pages. Among the thirty-five participants, only one participant used four different criteria to evaluate the five Web pages. This reveals that undergraduate students did not evaluate the Web resources extensively.

Table 2 Core Quality Criteria and Features Identified by Undergraduate Participants

Coverage
• Are statistical data / graphics given?
• Are there links to additional resources?
• Does the page provide a lot of information?
Accuracy
• Are there references included to verify the information? Are they good sources?
• Is the website from a reliable domain? (i.e. gov, edu, org)
Authority
• What are the author's credentials?
• Is the author's name listed?
Presentation
• Is the web page appealing? Good format?
• Is the web page organized?
• Are graphics included?
Objectivity
• Is the information presented with bias?

Table 3 Percent Importance of Criteria Applied to Web Pages

Web page	Coverage	Accuracy	Authority	Presentation	Objectivity	Currency	Others
I	27.66%	21.27%	23.40%	12.76%	6.38%	2.13%	6.38%
II	45.00%	25.00%	7.50%	7.50%	10.00%	5.00%	0%
III	36.36%	20.45%	9.09%	18.18%	4.54%	6.81%	4.54%
IV	35.71%	23.21%	12.50%	16.07%	7.14%	1.79%	3.57%
V	33.93%	19.64%	25.00%	8.93%	5.36%	0%	7.14%
Average	35.39%	21.81%	16.05%	12.76%	6.58%	2.88%	4.53%

Table 3 shows the percent importance of each criterion applied to the five Web pages. Coverage is the most frequently used criterion (35.39%). In this criterion, participants were not as concerned about the scope of the topic, which was one of the important features when evaluating traditional print material, but whether there were links to back track to locate additional information or other websites/pages, and graphical statistical data. If Web pages have these latter features, most participants would identify these as appropriate Web pages to use in papers. In the Web page II and IV, the graphical statistical data caught participants' attentions. Seventeen participants mentioned that these two Web pages were good resources for their papers because these Web pages contained some statistical data and graphics. Both Web pages account for 45% and 35.71% respectively among criteria identified to be important.

Accuracy is the second highest-identified criterion (21.81%). Most participants considered “reference” to be the most important feature of an accurate web page. In the participants’ evaluative written forms, “reference” was almost the first feature of the accuracy criteria that the participants would mention. Many participants said that they could link to those cited works to verify what the author says. Another commonly mentioned feature in this criterion is the domain of the URL. Several participants said that they would use a source because it is a government or education web page.

Authority is the third highest-identified criterion (16.05%). In this criterion, participants did not pay much attention to whether an author’s name is listed, but did care about “who” wrote the document by judging it from the format of documents. For example, in the Web page I, there was no author’s name. Few participants pointed out the weakness, but many participants mentioned that this document looked like a scholarly article or professional web page, so they would use this document. The Web page V is a conference paper written by a professor. The author’s name, institutional affiliation and e-mail address were listed under the title. There were fourteen participants mentioning the authority criteria (Table 4); however, only one participant pointed out that the author’s name was listed. The rest of the participants identified the criteria by saying either this article was a scholarly paper or formal paper or student paper. Maybe it is because participants do not know who are the authorities in a particular field. Thus authors’ names do not mean much to them. For them, the easiest way to check the “authority” of a document is by looking at its format.

Comparing participants’ main quality criteria to the traditional quality criteria, the criterion of document presentation emerged (12.76%). Participants equated page appearance to source credibility. Features such as, “not appear”, “appearance is not too assuring”, “too plain and boring”, “presentation is not interesting”, “presented in a clear way and easy to understand format”, etc., were commented on by many participants. The data shows that most participants giving negative comments on a Web page’s presentation did not mention other criteria. This indicates that the first impression of a Web page’s presentation can influence participants’ decision on continuing to evaluate or reject a particular Web page.

Twelve participants identified the objectivity criterion sixteen times from the five Web pages. The evidence reveals that not many participants examined the content of the Web pages while evaluating them. Even when they did evaluate the content of the page, most of them just pointed out whether the Web page contained bias or not, but did not further articulate what kind of bias.

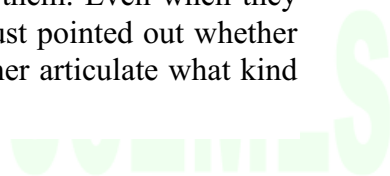


Table 4 Comparison of Quality Criteria Identified by the Researcher & ITI Instructor and Undergraduate Participants

Web page I					
	Coverage	Accuracy	Authority	Objectivity	Currency
	N	Y	N	N	N
Researcher & Instructor	4N	4N	7N	3N	0
Undergraduates	9Y	6Y	4Y	0	1Y
Web page II					
	Coverage	Accuracy	Authority	Objectivity	Currency
	N	N	Y	N	N
Researcher & Instructor	6N	7N	2N	2N	2N
Under-graduates	12Y	3Y	1Y	2Y	0
Web page III					
	Coverage	Accuracy	Authority	Objectivity	Currency
	Y	Y	Y	Y	N
Researcher & Instructor	0	4N	1N	2N	2N
Undergraduates	16Y	5Y	3Y	0	1Y
Web page IV					
	Coverage	Accuracy	Authority	Objectivity	Currency
	N	Y	N	Y	Y
Researcher & Instructor	7N	6N	4N	3N	0
Undergraduates	13Y	7Y	3Y	1Y	1Y
Web page V					
	Coverage	Accuracy	Authority	Objectivity	Currency
	Y	Y	Y	Y	N
Researcher & Instructor	2N	7N	7N	0	0
Undergraduates	17Y	4Y	7Y	3Y	0

(Y=contains feature, N=does not contain feature)

Currency (2.88%) was the least frequently used criterion and was not included in the five core criteria. Most participants ignored this criterion. In this study, four Web pages had no date or updated information at all, but most participants did not mention this weakness. No participant identified

the currency problem in the fifth Web page (Table 4). It could be that participants assumed that Web resources are often current and up-to-date simply because it is online or on the Web; however, this would need further study to confirm this assumption.

The questionnaire shows that more than 51 percent of the participants used the Web resources for academic purposes frequently. Additionally, 43 percent of them considered their Web skills at an excellent level with 34 percent rating their skills as good. Moreover, 55 percent of the participants claimed that their search patterns were 70% for Web use compared to 30% for library use when seeking information. No relationship was found between participants' Web experience and a person's evaluation skills. The data reveals that undergraduate students have become increasingly sophisticated about using Web resources. However, according to the results mentioned above, they are not yet sophisticated about searching them. They are evaluating Web resources only superficially. Surface features of a Web page take on particular significance. Upon entering a Web site, students make immediate judgments about the surface characteristics of the site and ignore the content of the documents. The consistency of identifying quality criteria between the researcher/instructor and participants, and among participants themselves is low, especially in the accuracy and authority criteria (Table 4). And each criterion is used unevenly (Figure 1). It indicates that participants did not critically evaluate Web resources. In all, this evidence shows that undergraduate students did not learn to evaluate what was and was not a good Web resource.

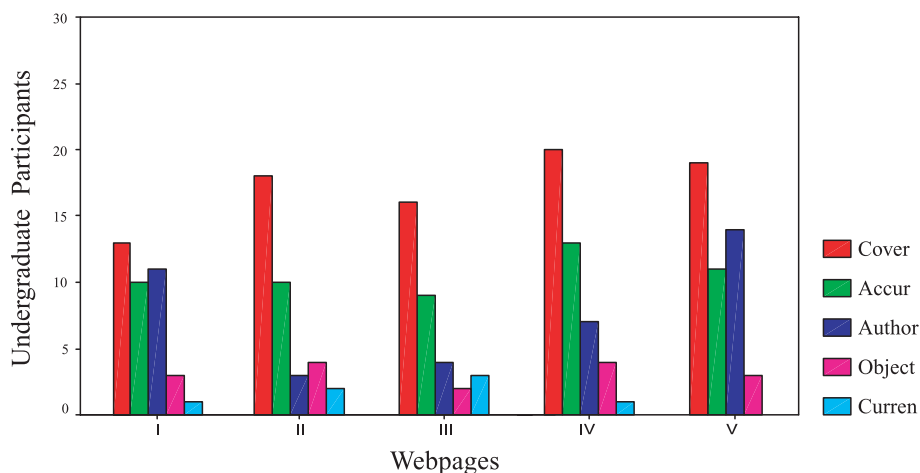


Figure 1 Traditional Quality Criteria Identified by Undergraduate Participants

Conclusions

The WWW offers information from all over the world. So much information is available and can appear to be fairly anonymous. Thus, in the Web environment, a very important issue is how to navigate the sheer quantity of available information to find that which is most reliable, authoritative, and of high quality. The findings of this study reveal that undergraduate students only use one or two surface quality criteria to evaluate Web resources for their class paper, and these surface quality criteria are assigned based on undergraduate student's simple inspection using superficial characteristics. The researcher believes that although undergraduate students have accepted the Web as a research tool and become increasingly sophisticated about using Web resources, they are not yet sophisticated about searching them. They have not developed sufficient skills or knowledge for dealing with the complexity of this research tool and resources. It is necessary for undergraduate students to develop information literacy skills to evaluate what they find from the Web.

As using Web resources for assignments becomes a trend, teaching students how to become more critical and discerning becomes an important educational issue. Each undergraduate instructor should take responsibility for instructing students on basic Web use knowledge or they should work with librarians to integrate Web instructions into curricula to help develop undergraduate students' Web search and evaluation skills. The results of this study shed some light on understanding undergraduate students' evaluation abilities and what important quality criteria they have missed; such findings can be used to design a customized instruction course suitable for undergraduate students.

The numbers of participants and Web pages used in this study were small, which means that results cannot be generalized without caution. The research results described here were limited to undergraduate students in the Information Technology and Informatics Program at Rutgers University. More studies using different groups and different Web tasks are needed. Based on the findings of this study, we already know that undergraduate students verify Web resources for their class papers on a superficial level. For further study, the researcher suggests additional studies that investigate how undergraduate students examine Web resources for other purposes. Such studies might also explore what kind of criteria students use and to what extent are such criteria applied.

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Notes

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