Understanding How Internet Users Make Sense of Credibility:

A Review of the State of Our Knowledge and Recommendations for Theory, Policy, and

Practice

Miriam J. Metzger

University of California, Santa Barbara

Department of Communication

Ellison Hall

Santa Barbara, CA 93106-4020

(805) 898-4421

Introduction

In just two decades, the Internet has integrated itself into our lives as an important, if not indispensable, tool for information and communication. Millions of people perform searches each day looking for a wide variety of information, including medical and health information, product and commercial information, political and news information, as well as entertainment, travel, and many other kinds of information (Fallows, 2005). The plethora of information available online, coupled with the heavy reliance on the Web by information-seekers (Fallows, 2005), raises the issue of the credibility or quality of information found online.[1]

The concern about credibility stems from the fact that Internet and digitization technologies lowered the cost of information dissemination while increasing accessibility to that information. The result is that much more information is available, and more easily accessible, now than ever before. Problems arise because many sites operate without much oversight or editorial review. Unlike most traditional (print) publishing, information posted on the Web may not be subject to filtering through professional gatekeepers, and it often lacks traditional authority indicators such as author identity or established reputation. Additionally, there are no universal standards for posting information online and digital information may be easily altered, plagiarized, misrepresented, or created anonymously under false pretenses (Fritch & Cromwell, 2001, 2002; Johnson & Kaye, 2000; Metzger, Flanagin, Eyal, Lemus, & McCann, 2003; Rieh, 2002). Burbules (1998) further suggests that because information is presented in a similar format online (i.e., Web sites), this creates a kind of 'leveling effect,' putting all information on the same level of accessibility and, thus, all authors on the same level of credibility.

The culmination of this is that the Internet has made the need to critically evaluate information more important than ever before while, at the same time, it has shifted the burden of

credibility assessment and quality control off of professional gatekeepers and onto individual information seekers. Developing the skills to evaluate Web-based information, then, is crucial for Internet users. That said, there is evidence that many people are unprepared for this responsibility, and may have trouble determining how and when to assess the credibility of online information (Amsbary & Powell, 2003; Meola, 2004; Metzger et al., 2003; Scholz-Crane, 1998).

Critical Evaluation Skills: Training Users to Evaluate Online Information

Shortly after the problem of establishing credibility in the online environment was recognized, efforts to educate and train users were underway. Many of these efforts were couched within the 'digital literacy' movement, and were lead by such groups as the American Library Association, the National Institute for Literacy (Kapoun, 1998; Rosen, 1998; Smith, 1997), as well as various healthcare agencies and consumer groups (Freeman & Spyridakis, 2004). A common aim of these groups was to assist Internet users in developing the skills needed to critically evaluate the information they find online.

A key starting point for the digital literacy movement was the understanding that the skills needed to determine the quality or credibility of online information are largely the same as for evaluating information found in other channels of communication (Alexander & Tate, 1999; Brandt, 1996; Fritch & Cromwell, 2001). Based on that, the literature identifies five criteria that users should employ in their assessments of Internet-based information: accuracy, authority, objectivity, currency, and coverage or scope (see Alexander & Tate, 1999; Brandt, 1996; Fritch & Cromwell, 2001; Kapoun, 1998; Meola, 2004; Scholz-Crane, 1998; Smith, 1997).[2] *Accuracy* refers to the degree to which a Web site is free from errors, whether the information can be verified offline, and the reliability of the information on the site. The *authority* of a Web site may

be assessed by noting who authored the site and whether contact information is provided for that person or organization, what the author's credentials, qualifications, and affiliations are, and whether the Web site is recommended by a trusted source. *Objectivity* involves identifying the purpose of the site and whether the information provided is fact or opinion. *Currency* refers to whether the information is up-to-date. *Coverage* refers to the comprehensiveness or depth of the information provided on the site. These recommendations require a range of activities on the part of users, from simple visual inspection of a Web site to more laborious information verification and triangulation efforts.

Training programs based on these evaluative criteria typically develop checklists to guide users through the evaluation process. Specifically, users are taught to ask and answer a list of questions designed to cover each criterion; for example, for currency users are supposed to look to see if there is a date stamp ("Does the site provide information about when the information was posted or updated?") or under accuracy, they are to check if the author provides contact information ("Does the web site list contact information such as a phone number or address?"). One problem with this kind of "checklist approach" is that it is rather time consuming and labor-intensive for Internet users to perform (Meola, 2004).

Indeed, studies have found that users are not always diligent in checking the accuracy of the information they obtain online (Flanagin & Metzger, 2000; Scholz-Crane, 1998). In a series of studies, Metzger and Flanagin examined the degree to which Internet consumers use each of the recommended criteria (i.e., accuracy, authority, objectivity, currency, and coverage) to gauge the credibility of the information they find online. Survey data were collected across three years (1999-2001) from five different samples (3 samples consisted of college students, 2 samples were of general adult Internet users; sample sizes ranged from 274-718). Respondents were

asked to indicate how often they performed nine behaviors when visiting Web sites. Specifically, they were asked how often they check to see if the information is up-to-date (currency), consider whether the views represented on a site are facts or opinions (objectivity), consider the author's goals/objectives for posting the information (objectivity), check to see that the information is complete and comprehensive (coverage), seek out other sources to validate the information on a site (accuracy), check to see who the author of the web site is (authority), verify the author's qualifications or credentials (authority), check to see whether the contact information for the author or organization is provided on the site (authority), and look for an official "stamp of approval" or a recommendation from someone they know (authority).

Data analysis revealed striking similarity in both the frequency and nature of respondents' evaluation behaviors across all samples (see Table 1). Overall, respondents in every study reported performing each of the nine evaluation behaviors only "rarely" to "occasionally." Users evaluated Web sites' currency, comprehensiveness, and objectivity most often (although still only occasionally), whereas checking the author's identity, qualifications, and contact information were evaluated least often by the respondents across samples. Looking for other sources or recommendations, and considering the goals of the author of the information fell in the middle. In general, Internet users scored highest on the actions that are easiest to perform and that require their opinion (e.g., considering whether a site's information is current and complete) and lowest on the recommendations that are more time consuming and that require effort to perform (e.g., verifying the qualifications or credentials of the author), even if the effort is fairly minimal (i.e., checking to see if contact information is provided). These data are interesting in many ways, but the most worrisome finding is that the strategy least practiced (i.e., verifying the author's qualifications) is perhaps the most important for establishing credibility.[3]

Another study using different research methodology similarly found that Internet users do not vigorously apply the five criteria in their judgments of information quality (Scholz-Crane, 1998). In this study, 21 college student participants evaluated two Web sites. Participants were asked to write in an essay format "how they would evaluate the quality of each site including specific criteria used to assess this quality" (p. 55). Content analyses revealed that of the five criteria, most students used only two in their evaluations of information quality. The two criteria were scope (e.g., the site provides detailed information) and accuracy (e.g., the site contained statistics, cited sources, was clearly written and well organized). Only six students assessed objectivity by considering whether there was evidence of bias on the sites, and an even smaller number considered authority (by looking at the author identity or site sponsor) or contact information. In many cases, students used a single criterion in their final decision about the quality of the Web sites. A clear conclusion from both the Metzger and Flanagin studies and the Scholz-Crane data is that few users are rigorously evaluating the quality of the information they obtain via the Internet (see also Wilder, 2005).

Other Models of Web Information Evaluation

The checklist approach to credibility assessment is the most popular among educators, although other models have been proposed. For example, Fritch and Cromwell (2001, 2002) present a model for ascribing cognitive authority to Internet information. Cognitive authority is a term they use to incorporate both the notions of credibility and quality; it is what people evaluate "to know what credence and impact to impart to any specific body of information" (2002, p. 243). Fritch and Cromwell propose an iterative model whereby assessments of authority and credibility are made at the levels of author, document, institution, and affiliations, which are then integrated into a global judgment of online information credibility. In this model, verifying the

author and/or institutional identity of a Web site through reputation or stated qualifications, considering the factual accuracy of the Web document and its presentation and format, and examining both overt and covert affiliations of the Web site are recommended strategies that, when combined, contribute to an overall impression of its cognitive authority. This model is similar to the previously-described 'checklist model' in that it provides a "to do" list for Internet users, but differs from that model in that it places more emphasis on the technological tools available to users for making these assessments. For example, to help establish author identity and site affiliations, Fritch and Cromwell recommend using tools such as Whois, Traceroute, and Nslookup/Dig. These technologies can assist users in finding the identity of the owner of a particular Web site, and can reveal affiliations between organizations or Web sites that are not immediately apparent.

Walthen and Burkell (2002) also propose an iterative model for how users judge the credibility of online information based on a review of literature in psychology and communication. They propose that credibility assessment takes place in three stages. First, users form an impression of the overall site credibility by examining its surface characteristics, including, for example, its appearance and presentation (e.g., colors, graphics, typographical errors), usability and interface design (e.g., navigability), and organization of information. Next, the information or site content is evaluated for its credibility by looking at characteristics of the source (e.g., expertise, trustworthiness, credentials) and message (e.g., its currency, accuracy, relevance to the user). The third stage involves factoring in the user's cognitive state at time of evaluation. In other words, assessments of the message presentation and content will differ depending upon the users' purpose for seeking the information, prior knowledge of the topic, time available for information retrieval and processing, and other situational and individual-level

factors. This model resembles Fritch and Cromwell's model for ascribing cognitive authority in that it suggests there are different levels of credibility assessment that are combined to form a final judgment. It is also similar to the checklist model in that it provides evaluative criteria that users are supposed to consider in their credibility assessments. The model differs from the others, however, in that it incorporates aspects of the information receiver as being important to the evaluation process, highlighting the fact that credibility judgments are situational and dependent upon individual-level factors.

Factors Important to Users of Web-Based Information

One problem with the foregoing models of credibility evaluation is that none have been tested using actual Internet users as they seek information online. Another problem, related to the first, is that these models have not been directly connected to studies examining what factors people *really do* use to determine credibility online. Researchers have suggested myriad factors that may play into credibility assessments, but only a few studies have examined what criteria people actually employ (see Table 2 for a list of suggested factors). These studies are reviewed next.

In a small study involving 21 participants, Eysenbach and Kohler (2002) examined how consumers appraise the quality of online health information. The research was conducted in three stages, beginning with focus groups to identify the criteria participants say they use in deciding whether Internet information is credible. The second stage involved observing a subsample of the focus group participants as they sought health information online that they "felt confident about," and the third stage consisted of the researchers interviewing them about their searches in order to understand participants' decision making processes and criteria for selecting particular Web sites. Interestingly, what focus group participants said they looked for in assessing credibility

was not what the researchers found they actually looked at during the observational portion of the study. A content analysis of the focus group discussions revealed that participants' main criteria for assigning credibility rested on whether the source was an official authority, whether the page cited scientific references, whether the site was professionally designed and easy to use, and whether it was written in language that they could understand. However, despite placing emphasis on the identity of the source and quality of the data presented on a Web site, the observational portion of the study revealed that although most participants used sites they were unfamiliar with, none looked at information about who the source was or how data on the sites were compiled. Perhaps most distressing, the post-search interviews revealed that "few participants took notice and later remembered from which websites they retrieved information or who stood behind the sites" (p. 576).

Rieh (2002) similarly studied people evaluating the quality of information as they performed a variety of search tasks. Using think-aloud and interviewing procedures, he followed 15 academics as they searched for information online regarding four topics: academic research, health, travel, and product (ecommerce) information. Each participant was instructed to find information on Web sites that they considered to be high quality. Rieh found that, in making evaluations, participants' judgments were based on two basic criteria: the characteristics of the information 'objects' that they found online and the characteristics of the source of online information. The characteristics of the information objects that participants were concerned about included the type of information object (e.g., journal article versus chat forum), its content (how detailed, comprehensive, and technical the information provided is), its presentation (graphics), and its structure (how well organized the information is). Source characteristics that

participants looked to were reputation and type of source (e.g., commercial versus noncommercial source, .com versus .edu, etc.).

A problem with each of these studies is that they rely on small, specialized user populations and/or search tasks. As a result, it may be difficult to generalize findings to other users. By contrast, Fogg, Soohoo, Danielson, Marable, Stanford, & Trauber (2003) conducted a large-scale study of a variety of user populations. In an online experiment, 2,648 people evaluated the credibility of two real Web sites that ranged in their informational content (e.g., news sites, ecommerce sites, nonprofit sites, health sites, travel sites, etc.). User comments were analyzed "to find out what features of a Web site get noticed when people evaluate credibility" (p. 1). Not surprisingly, results varied by the type of Web site evaluated (e.g., ecommerce sites versus news sites, etc.) and most respondents mentioned many features. Summarizing the findings, people seemed to consider four broad categories of elements. The first was *site presentation*. This included visual design elements such as the graphics and readability of the site, as well as the site's navigability and functionality (e.g., broken links, presence of a search feature). Interestingly, site design/presentational elements were the most frequently used criterion by far, with 46% of the comments including this feature. A second consideration related to the *information* on the page, including its organization, breadth/depth, accuracy, bias, usefulness, and the tone and clarity of writing. Third, the site operator's or source's *motives* were a factor. This includes selling intent, presence of advertising, clear identification of the site sponsor, and treatment of customers. Finally, the source's *reputation* played into users' credibility judgments, including name recognition, their past experience with the site, presence of seals of approval, or affiliations with reputable organizations.

To summarize, the results of the Fogg et al. (2003) study are similar to Rieh (2002) and

Eysenbach and Kohler (2002) in that features of both the information itself (e.g., its organization,

level of detail, etc.) and the source (e.g., commercial intent) matter in Internet users' credibility

assessments. Results also reflect Scholz-Crane's (1998) finding described earlier that not all five

of the critical evaluation skills criteria are used. Indeed, the data from Fogg et al.'s study show

that people only used four of the five criteria: authority (through source reputation, for example),

accuracy of information, comprehensiveness of information, and objectivity (in evaluations of

information bias and source motive, for example). Together, this collection of studies indicates

that people do not seem to take the currency of the information they find online into account

when making credibility judgments. This is somewhat surprising, given that many Web pages

include a clearly visible date stamp indicating when the information was last updated.[4] Also, and

perhaps most interesting, the review of research reveals that people rely most heavily on a

criterion that is not among the five critical evaluation skills recommended to judge credibility.

That is, design/presentational elements appear to be the primary factor in users' credibility and

information quality assessments. The implications of this finding are ominous in that they

suggest Internet users may be easily duped by slick Web design. Taken together, these studies

speak to a need to think beyond the checklist model to get people to critically evaluate the

information they find online.

A Contextual Approach to Credibility Assessment

A very different approach to the checklist model and other models offering evaluative

criteria lists is Meola's (2004) contextual model of Web site evaluation. Meola critiques the idea

of using checklists to evaluate online information because he believes they are unwieldy for

users to perform (e.g., one checklist requires Internet users to answer over 112 questions), and

thus he believes they are an unrealistic approach to teaching critical evaluation. The aforementioned research showing people's reluctance to exert much effort to verify online information supports his view. He also challenges the notion that all online information needs to be verified to the same degree, by pointing out that more Web-based information these days has been professionally vetted. In fact, he makes a useful and important distinction between the "free Web" and the "fee-based Web" when it comes to credibility assessment. Although much of what is available on the free Web may not have been subjected to peer or editorial review, the situation is very different for the fee-based Web which includes subscription databases, prestigious journals, or national newspapers offering full-text access to their contents.

In contrast to the checklist model with its emphasis on evaluating the internal characteristics of Web sites (e.g., identifying the author, checking to see when the information was last updated, etc.), the contextual model focuses on information external to a particular site. By using external information to establish credibility, Meola contends that online information "is located within its wider social context, facilitating reasoned judgments of information quality" (p. 338). Meola's approach uses three techniques to determine the quality of online information. This includes, first, *promoting peer- and editorially-reviewed resources* that are available online. Internet users should be informed of high-quality, vetted resources that are searchable through universities, schools, public libraries, by subscribing to national newspapers online, or through other (largely fee-based) portals. Meola points out that the time currently taken by teaching Internet users a checklist of questions is better spent teaching people what high-quality resources are available and how to use them. The second technique is *comparing* information found on a Web site to other Web sites and/or to offline sources such as, for example, newspapers or magazines, peer-reviewed journal articles, or books. This is a more practical strategy for the 'free

Web' and, as Meola writes: "Comparing Web sites to each other and to reviewed sources provides an understanding of the depth of information available, reveals the controversial areas of a topic that need special attention, and gives…a feel for the different kinds of information available across formats" (p. 341). The final technique is *corroboration.* Similar to comparison, corroboration involves seeking out more than one source to verify information on a given topic. Internet users may assess the accuracy and reliability of information through corroboration, as a convergence of facts and/or opinions from a variety of sources is (or is not) found. In the end, Meola argues that the contextual approach to online information evaluation is more practical than checklist approaches, and thus will be used by online information seekers with greater frequency.

<div align="center">

Conclusions and Recommendations

</div>

The foregoing review leads to a number of conclusions and recommendations about Internet credibility and the user. In particular, it suggests a new research agenda, new strategies for practice and/or for curriculum development, and new approaches to helping users develop the skills to assess the credibility of the information they find on the Internet.

Research Agenda

A clear conclusion from the review of literature is that there is much more work to be done to formulate effective strategies for building Internet users' skills to critically evaluate online information. That said, a research agenda for the issue of Internet credibility must include studies of information evaluation using a greater variety of research methods, on a greater variety of Internet users, performing a greater variety of search tasks than has been done to date. The body of findings from this research agenda should be used to develop and shape practical guidelines for Internet users, creating a strong linkage between research and practice. As part of

this, the research agenda must also include evaluative studies of the usability and effectiveness of any practical guidelines developed to help Internet users discern credible information online.

An area of immediate concern for scholars studying Internet credibility is the need for more research on what users actually do to assess credibility. This is true not simply because there are very few studies to date that have examined large populations of Internet users, but also because there is evidence that those studies may already be out of date. Specifically, existing research finds that more experienced Internet users may act differently than less experienced users when it comes to credibility assessment (Metzger & Flanagin, in press; Freeman & Spyridakis, 2004; Johnson & Kaye, 2000, 2002). This suggests that as users gain experience with this relatively young medium, perceptions of the credibility of information found online, as well as the ways in which users make their credibility assessments, may change. As an example of this, Metzger and Flanagin found that although more experienced Web users *said* they evaluated information online more than less experienced users in the study, they *actually* evaluated information less.

The discrepancy in Metzger and Flanagin's self-reported versus actual evaluation behavior raises an important point with regard to the study of credibility online: the method of study may, by itself, influence the results obtained (see also Eysenbach & Kohler, 2002). Credibility research has the potential for response bias problems, as people know they 'should' critically analyze the information they obtain online, yet rarely have the time or energy to do it. Given this situation, researchers must look to other methods besides survey questionnaires to understand actual online behavior. Research methods for future online credibility research should be as anthropological, naturalistic, and unobtrusive as possible.

Perhaps the most pressing item on the agenda for online credibility research is the need to study the role of user *motivation* in the credibility assessment process. There is much evidence that user motivation, stemming in part from the information search task, moderates the degree to which users will critically evaluate online information. Surprisingly, however, user motivation is missing from most existing models of credibility assessment. The basis for this recommendation is the observation that not all Web sites need vigorous examination (Fritch & Cromwell, 2001, 2002; Meola, 2004), and research finding that different evaluative processes are used for different search tasks (Fogg et al., 2003; Rieh, 2002). As Fritch and Cromwell (2002) write: "Sometimes the significance of the information under scrutiny does not warrant extensive research and analysis, while in other instances extensive research and analysis may be crucial; it ultimately depends upon the purposes and intent of the user(s) of the information" (p. 251). This further suggests that credibility assessment should not be conceptualized as a single evaluative process. Instead, different users may use different processes at different times in order to evaluate the credibility of online information.

Dual processing models from persuasion, such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1981; see also Chaiken, 1980) may be a helpful guide in formulating a model of credibility assessment that takes motivation into account. Indeed, the ELM has been discussed recently with regard to online credibility processes, albeit in a somewhat different way than what is proposed here (see Fogg et al., 2003; Freeman & Spyridakis, 2004; Walthen & Burkell, 2002). In brief, the ELM theorizes that people will process or scrutinize messages in more or less depth depending upon the receiver's motivation and ability. In other words, when people are motivated due to personal or situational factors such as having a high need for accurate information or having a personal stake in understanding some issue, they are likely to

pay more attention to the message, think about the arguments presented, and exert more effort in evaluating the information. They call this the "central route" to persuasion because it involves more systematic cognitive processing of the message. When motivation is low, however, the theory predicts that information will be evaluated based on more superficial and less thoughtful criteria. This is termed the "peripheral route" to persuasion and it relies on more heuristic judgments of the message or its source. Ability to process a message hinges on many factors, including, for example, sufficient time, prior knowledge of the topic, message comprehensibility, and other factors.

Aspects of the ELM provide a good basis for a new model of Web credibility assessment that prioritizes user motivation and ability and accounts for the situational nature of credibility assessment (i.e., that it will not be important for all Internet users at all times). Like the ELM, this new model proposes that motivation and ability are keys to whether and to what degree users will critically evaluate Web information. In this context, ability may be linked to users' knowledge about how to evaluate online information, which could involve teaching users the critical evaluation skills employed by the checklist or contextual models of credibility, for example. Motivation in this instance stems from the consequentiality of receiving low quality, unreliable, or inaccurate information online. Simply put, the degree to which online messages will be scrutinized for their credibility depends on individual users' ability to evaluate the message and their motivation or purpose for seeking the information in the first place.

The model is able to predict not only *when* users will or will not make the effort to critically evaluate online information, but is also useful in understanding *how* credibility assessments are made (i.e., what processes are involved in those assessments). Borrowing again from the ELM, the dual processing model of credibility assessment proposes that users may look

to different aspects of Web-based information to assess its credibility depending on their

motivation for seeking information. Users who are less motivated to find high quality credible

information, for example, a person biding some extra time online by looking up information on a

favorite rock band, may not assess credibility at all or do so by simply considering such

"peripheral" characteristics or heuristics as a Web page's design and graphics. On the other hand,

highly motivated users may take a more rigorous, systematic or "central" approach to credibility

assessment. Examples might include a medical patient who has just been diagnosed with a fatal

disease, a student preparing a history paper, or a business owner analyzing the market. In these

cases, users are more likely to go beyond the surface characteristics of a Web site to examine the

information content, its author or source, as well as other factors in determining its credibility

(see Fogg et al., 2003; Walthen & Burkell, 2002 for similar arguments.)

One way to think about this in light of the previous discussion is that the new model can

predict when users are likely to use a relatively more effortful credibility assessment procedure,

such as the checklist approach, versus when they are likely to use the potentially less time-

consuming contextual approach, or perhaps even a very simple heuristic approach (e.g., simply

looking at the site's graphic design) to determine the credibility of some online information.

Another way that this new model of credibility assessment is useful is that it can help to

understand when people might evaluate different types of credibility. Several scholars have

suggested that users assess various types or 'levels' of credibility in their judgments of

information quality and trustworthiness (Fritch & Cromwell, 2001; Metzger et al., 2003).[5] Fogg

(2003), for example, discusses four types of credibility that Internet users assess, including

presumed, surface, reputed, and earned credibility (see Chapter 6 for a definition of each type).

The dual processing model of credibility assessment could help to predict when users are likely

to simply look at the surface credibility of a site and when they are likely to consider the other types of credibility. In sum, a lot more research is needed to understand fully the processes involved in Internet users' credibility decisions and, thus, the skills users need to make those decisions.

Education Efforts

An important conclusion brought into focus by the literature review is that while the checklist approach to critical evaluation has been the most popular among educators, it is perhaps not the most effective. The research clearly indicates that the best strategy for educating Internet users will be one that is easy to use and/or is transparent to them. Indeed, a closer connection between research findings on credibility assessment using actual online information seekers and curriculum development is long overdue. That means if educators continue to teach checklists for Web evaluation, they need to keep them short. In addition, the models of credibility assessment reviewed earlier suggest that the best strategy for practice is perhaps to teach a hybrid approach to credibility assessment that is based on Internet users' motivation and purpose for seeking information online. In other words, a variety of approaches to credibility assessment could be taught to fit the specific search task or situation. Users could be taught to use the checklist and contextual models of credibility assessment in situations in which they need high quality, credible information. For less motivated users or search situations, users could be taught some simple heuristics to consider. Learning when to apply which approach would then need to become part of the educational effort. The advantage of this kind of "sliding scale" approach to teaching critical evaluation skills is that it is more focused and less effortful for users to perform in the majority of their searches, and thus is more realistic for educators to expect of users.

Another conclusion from the review is that digital literacy efforts might be more effective if they are targeted at certain user populations that are particularly vulnerable for receiving low-quality information online, or those whose needs for credible information are very high. Young students using Web-based information to learn or medical patients seeking information about their treatment options are examples. Information about credible sites, how to access high-quality databases residing on either the "free" or "fee" Web would be particularly valuable to these user groups and could be tailored by topic or area (e.g., medical, news, academic, etc.).

Working through schools and libraries is one very useful way to disseminate this kind of information to target user populations. But what about other ways of reaching users? Digital literacy efforts need to be extended outside the classroom and library reference desk. A comprehensive Web site could be developed to serve as a resource for users to understand Internet credibility and how to assess it. The site could have many levels of information and instruction regarding online credibility assessment, and users could go as deeply into the site as they wished depending on their motivation and interest in online credibility. In addition to general information about online credibility, the site could include specialized tips and instructions for seekers of particular kinds of information, such as ways to determine the credibility of medical information, commercial information, political information, etc. It is important to realize, however, that this type of effort would only succeed to the degree that it was well publicized and linked to several "point-of-entry" Web sites, which includes sites that people typically use to launch their online information searches (e.g., popular search engines, medical information clearinghouse sites, government sites, etc.).

Other Approaches to Online Credibility Assessment

A cynical interpretation of the research reviewed in this paper is that credibility

assessments should *not* be left up to users because they are unlikely to exert the effort it takes to

verify the credibility of Internet-based information. This suggests that our energy may be better

spent developing tools or systems to assess credibility for users, and then training users how to

use those tools and systems. Several possibilities exist, some of which are described below (see

Fritch, 2003 for a description of these and other possibilities, along with a discussion of the

problems and challenges associated with each one).

     Credibility seal programs modeled after the TRUSTe or BBB online seal programs could

be set up to assist Internet users in locating Web sites whose content has been approved by a

trusted outside authority. A credibility seal program would capitalize on the fact that many

people assess credibility based on somewhat quick visual inspections of Web sites (Fogg et al.,

2003). Such a "trustmarking" program would require the development of a code of conduct that

sites carrying the seal would be required to adhere to (e.g., seal-bearing sites must provide

authorship and update information). The HONcode program developed by the NGO Health on

the Net Foundation is an example of a credibility seal program within the medical/health field

(Fritch, 2003). According to its mission statement, the HONcode aims to "hold Web site

developers to basic ethical standards in the presentation of information" and "help make sure

readers always know the source and the purpose of the data they are reading" (see

http://www.hon.ch/HONcode/). TRUSTe and HONcode provide viable models for credibility

seal programs that could be extended beyond ecommerce and online health information

relatively easily.

     Credibility rating systems could be instituted to help establish the credibility of Web-

based information. Such systems could be controlled by an institution (such as the American

Library Association, for example) or could be based on a peer rating system. In any case, rating

systems could be created that would allow Web sites to be assessed systematically along several

quality standards (e.g., authority, currency, objectivity, disclosure, etc.). Peer rating systems

could be developed using interactive software that forces Web users to answer a series of

questions about sites they visit, and then assigns a rating based on an aggregate of users'

responses. The ratings would be stored in a database, accessible to Internet users at a central

location or ratings could be required by government regulators to be displayed on all sites.

Alternatively, a ratings system could be developed by having a panel or panels of experts rate

various sites. Due to the incredible volume of sites that would need to be evaluated, this may be

easier to do within specific types of online content domains (e.g., medical information).

     Directories, databases, or search engines that carry or display online content that has

been pre-approved or filtered for credibility could be developed. Many such proprietary

databases already exist in the form of Lexis-Nexis, JSTOR, ERIC, and the like. For the so-called

"free Web," it is possible that nonprofit groups or education associations could develop and

implement searchable databases or directories of information from high-quality sources, based

on some agreed-upon and publicized criteria. Regardless of who develops or sponsors these

databases, it is critical that they are easily searchable. High quality databases, such as those

found on the "fee Web" and in libraries should be as easy to search as popular search engines

such as Google. Reducing the effort involved in using high quality, professionally vetted

databases will increase their usage, which could, in turn, ultimately drive down user access and

subscription costs.

     Combining the last two ideas (credibility ratings and vetted databases), some have

proposed using ***PICS labels*** to establish the credibility of Internet information. The existing

PICS platform developed by the World Wide Web consortium could be configured to filter and select information that meets certain credibility standards. PICS enables Web site operators to label their content, and these labels could be used by individual Internet users to find information that meets their minimum criteria for credibility. Alternatively, the labels could be used by third-party content providers to set up databases of pre-approved content. The MedPICS Certification and Rating of Trustworthy Health Information on the Net (medCERTAIN) project is an example of such a system (Eysenbach, 2000; Eysenbach & Diepgen, 1999). The MedPICS system would work by labeling health-related information according to core standards developed by medical societies, associations, and relevant others, and then putting that information into one or more medical label databases that would be searchable by consumers.

Digital signatures could be used to assure the authorship of online information, which is a key aspect of credibility. Fritch and Cromwell (2002) explain that digital signatures are "a cryptographic method that allows a sender to append a small data block, called a 'signature,' that allows the recipient to prove, to some quantifiably high certainty, two things: first, that message contents have not been altered in transit, and second, that the message sender is really who he/she claims to be" (p. 252). Authenticating the identity of the author is an important first step in assessing the credibility of online information, and is particularly important for Internet transactions involving sensitive information such as one's financial or personal data. Ultimately, however, digital signatures still require the recipient of some information to evaluate the quality of the information provided by the author (Fritch & Cromwell, 2002).

Of course, many and even most of these solutions may be infeasible due to their high cost, low profitability, reliance on voluntary compliance, and tremendous implementation effort. In the end, Internet users may be left with no choice but to rely upon themselves. If that is the

case, then extending existing models of ***peer review***, such as those found on epinions.com, BizRate, eBay, or Amazon.com, might be a more practical way for users to discern whether some information they find online is credible. Peer review allows site visitors to provide feedback about the products, information, or source of some information offered on Web sites. It allows users to pool their intellectual and experiential resources when evaluating the trustworthiness, reliability, or quality of a Web site or information residing on a site, making credibility assessment a collective rather than an individual task.

User review and feedback systems were initially developed in the realm of ecommerce, but now exist within other Web content domains (e.g., online recipe sites such as epicurious.com use these systems). Of course, peer review systems are susceptible to biased, uninformed, or inaccurate reviews, as was recently demonstrated by revelations that book authors at Amazon.com were promoting their own work by submitting anonymous reviews. The site Slashdot.org provides an interesting model of user review that tries to overcome the problem of bias in peer review. Slashdot is a large Internet forum in which users summarize information they have found on other Web sites, link to those sites, and provide a place for readers to comment on the information. Contributors and their contributions are then rated by Slashdot users in a very elaborate and sophisticated system that helps to ensure fairness and impartiality. Slashdot's system of peer review covers a huge range of Web content and offers a provocative model that could be used to develop systems of peer review to assist Internet users in assessing the credibility of a wide variety of online information.

Conclusion

This paper has attempted to summarize what is known about the skills Internet users need to assess the credibility of online information. In addition, it describes and evaluates several

recent models of online information evaluation and reviews the empirical research on how users themselves go about the process of determining the credibility of Internet information. Based on this, the paper offers a number of recommendations for online credibility research, theory, and practice, and proposes alternative strategies to assist users in locating credible information on the Internet. Several overarching conclusions emerge from the review, including the fact that Internet users as a group are not willing to exert a great deal of effort in assessing the credibility of the information they find online, and that they place a premium on professional site design in their credibility appraisals. Perhaps the most important conclusion from the review is that any effort to teach Web evaluation must be realistic in its expectations of users by recognizing that motivation is a key ingredient in users' willingness to undertake extensive effort to verify the credibility of information they find online. As Fritch (2003) writes: "We all recognise [sic] that some information is not important enough to require careful evaluation, but each individual must determine when this is true. And when necessary, users need the evaluative skills to make a proper determination about which information is trustworthy, on the Internet and in other venues. This is part of what it means to become a literate citizen in an information-rich, networked world" (p. 327). In sum, the Internet has not so much changed what skills are needed to evaluate the credibility of information as it has changed the need for people to know how and when to exercise those skills.

References

Alexander, J. E., & Tate, M. A. (1999). *Web wisdom: How to evaluate and create information quality on the Web*. Hillsdale, NJ: Lawrence Erlbaum.

Amsbary, J. H., & Powell, L. (2003). Factors influencing evaluations of web site information. *Psychological Reports, 93*(1), 191-198.

Brandt, D. S. (1996). Evaluating information on the Internet. *Computers in Libraries, 16*, 44-46.

Burbules, N. C. (1998). Rhetorics of the Web: Hyperreading and critical literacy. In I. Snyder (Ed.), *Page to screen: Taking literacy into the electronic era* (pp. 102-122). London: Routledge.

Chaiken, S. (1980). Heuristic versus systematic processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*, 752-766.

Eysenbach, G. (2000). Consumer health informatics. *British Medical Journal, 320*, 1713-1716.

Eysenbach, G., & Diepgen, T. L. (1999). Towards quality management of medical information on the internet: evaluation, labeling, and filtering of information. *British Medical Journal, 317,* 1496-1500.

Eysenbach, G., & Kohler, C. (2002). How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *British Medical Journal, 324*, 573-577.

Fallows, D. (2005). *Search engine users: Internet searchers are confident, satisfied and trusting – but they are also unaware and naïve*. Report for the Pew Internet and American Life Project. Retrieved January 25, 2005, from http://www.pewinternet.org/PPF/r/146/report_display.asp

Flanagin, A. J., & Metzger, M. J. (2000). Perceptions of Internet information credibility.
Journalism & Mass Communication Quarterly, 77(3), 515-540.

Fogg, B. J. (2003). *Persuasive technology: Using computers to change what we think and do*.
San Francisco: Morgan Kaufmann Publishers.

Fogg, B. J., Soohoo, C., Danielson, D. R., Marable, L., Stanford, J., & Trauber, E. R. (2003).
How do users evaluate the credibility of Web sites? A study with over 2,500 participants.
Paper presented at the Proceedings of the 2003 conference on Designing for User
Experiences, San Francisco, CA. Available from the Association of Computing
Machinery's web portal http://portal.acm.org/citation.cfm?doid=997078.997097

Freeman, K. S., & Spyridakis, J. H. (2004). An examination of factors that affect the credibility
of online health information. *Technical Communication, 51*(2), 239-263.

Fritch, J. W. (2003). Heuristics, tools, and systems for evaluating Internet information: Helping
users assess a tangled Web. *Online Information Review, 27*(5), 321-327.

Fritch, J. W., & Cromwell, R. L. (2001). Evaluating Internet resources: Identity, affiliation, and
cognitive authority in a networked world. *Journal of the American Society for
Information Science and Technology, 52*(6), 499-507.

Fritch, J. W., & Cromwell, R. L. (2002). Delving deeper into evaluation: Exploring cognitive
authority on the Internet. *Reference Services Review, 30*(3), 242-254.

Hovland, C. I., Janis, I. L., & Kelley, J. J. (1953). *Communication and persuasion*. New Haven,
CT: Yale University Press.

Johnson, T. J., & Kaye, B. K. (2000). Using is believing: The influence of reliance on the
credibility of online political information among politically interested Internet users.
Journalism & Mass Communication Quarterly, 77, 865-879.

Johnson, T. J., & Kaye, B. K. (2002). Webelievability: A path model examining how

    convenience and reliance predict online credibility. *Journalism & Mass Communication*

    Quarterly, 79, 619-642.

Kapoun, J. (1998). *Teaching undergrads WEB evaluation: A guide for library instruction*.

    Retrieved June 25, 2001 from wysiwyg://14/http://www.ala.org/acrl/undwebev.htm.

Meola, M. (2004). Chucking the checklist: A contextual approach to teaching undergraduates

    Web-site evaluation. *Libraries and the Academy, 4*(3), 331-344.

Metzger, M. J., & Flanagin, A. J. (in press). The role of site features, user attributes, and

    information verification behaviors on the perceived credibility of Web-based information.

    New Media & Society.

Metzger, M. J., Flanagin, A. J., Eyal, K., Lemus, D., & McCann, R. (2003). Bringing the concept

    of credibility into the 21st century: Integrating perspectives on source, message, and

    media credibility in the contemporary media environment. *Communication Yearbook 27,*

    pp. 293-335.

Metzger, M. J., Flanagin, A. J., & Zwarun, L. (2003). Student Internet use, perceptions of

    information credibility, and verification behavior. *Computers & Education, 41*, 271-290.

O'Keefe, D. J. (2002). *Persuasion: Theory and research* (2nd ed.). Thousand Oaks, CA: Sage.

Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary*

    approaches. Dubuque, IA: William C. Brown.

Rieh, S. Y. (2002). Judgment of information quality and cognitive authority in the Web. *Journal*

    of the American Society for Information Science and Technology, 53(2), 145-161.

Rieh, S. Y., & Belkin, N. J. (1998). Understanding judgment of information quality and

    cognitive authority in the WWW. In C. M. Preston (Ed.), *Proceedings of the 61st ASIS*

Annual Meeting (pp. 279-289). Silver Spring, MD: American Society for Information

Science.

Rosen, D. J. (1998, February). *Driver education for the information superhighway: How adult*

learners and practitioners use the Internet. Washington, DC: National Institute for

Literacy, Series title: Literacy leader fellowship program reports; vol. 2, no. 2.

Scholz-Crane, A. (1998). Evaluating the future: A preliminary study of the process of how

undergraduate students evaluate Web sources. *Reference Services Review, 26*(3/4), 53-60.

Smith, A.G. (1997). Testing the surf: Criteria for evaluating Internet information resources. *The*

Public-Access Computer Systems Review, 8. Retrieved April 25, 2001 from

http://www.aut.ac.nz/depts/commstud/theory/smith.htm.

Walthen, C. N., & Burkell, J. (2002). Believe it or not: Factors influencing credibility on the

Web. *Journal of the American Society for Information Science and Technology, 53*(2),

134-144.

Wilder, S. (2005, January 7). Information literacy makes all the wrong assumptions. *Chronicle of*

Higher Education, 51(18), B13.

Endnotes

[1] The basic notion behind credibility is believability (Hovland, Janis, & Kelley, 1953). Research finds that credibility consists of two primary dimensions, which include the expertise and trustworthiness of the source of some information. Some secondary factors have also been seen to affect credibility perceptions, including source attractiveness and dynamism, for example (O'Keefe, 2002). Using this definition, the credibility of a source or message is a receiver-based judgment which involves both objective judgments of information quality, as well as subjective perceptions of the source's trustworthiness, expertise, attractiveness, and other qualities.

[2] Most digital literacy efforts have focused on users' assessments of the credibility of Web pages, and this paper will limit its discussion to this form of online information. It is important to note, however, that there are many other types of Internet-based information that have serious credibility implications. Examples include blogs, chat groups, and email, to name just a few. Each of these forms of communication are somewhat unique and carry with them specific credibility concerns. That said, the general principles of critical evaluation should be applicable, albeit to different degrees, across all types of network-based information.

[3] Across all data sets, evaluation behavior was positively related to experience online. At first glance this bodes well for the future, as people gain experience they will be more likely to evaluate online information. However, there is some evidence that people with greater experience exaggerate their critical evaluation behavior on self-report measures (see Metzger & Flanagin, in press). Also, education seems to be a factor, people with more education report evaluating online information more often than those with less education. This speaks to need for digital literacy efforts to target at-risk groups, including younger and less educated populations.

[4]It is also surprising because it contradicts Metzger and Flanagin's finding that checking to see if the information is current is the strategy used most often across their five samples. The discrepancy in results could be due to the methods used by different researchers (e.g., self-report versus direct observation), which underscores this paper's ultimate conclusion that the study of online credibility must be conducted using a variety of research techniques.

[5]Several scholars have pointed out that the credibility of Internet-based information can be evaluated or judged at many different "levels." For example, users may form judgments about the credibility of a Web site as a whole, the credibility of some information presented on a Web page, the credibility of the Web/Internet medium itself, the credibility of a particular email messages or blog, etc. Metzger, Flanagin, Eyal, Lemus, & McCann (2003) present a complete discussion of this issue.

Table 1. Frequency of verification behaviors across each sample and overall

	Data set (means)					
Year data collected:	1999	1999	2000	2001	2001	
Population sampled:	students	nonstudents	students	students	nonstudents	Overall
Sample size:	718	323	485	300	274	Mean
Check to see if the information is current	3.18	3.21	2.68	3.16	3.66	3.18
Consider whether the views represented are facts or opinions	2.88	2.95	3.02	3.10	3.61	3.11
Check to see that the information is complete and comprehensive	3.04	2.91	2.90	3.09	3.26	3.04
Seek out other sources to validate the information	2.57	2.82	2.85	2.79	3.38	2.88
Consider the author's goals/objectives for posting information	2.65	2.69	2.39	3.03	3.15	2.78
Check to see who the author of the web site is	2.25	2.51	1.85	2.43	3.02	2.41
Look for an official "stamp of approval" or a recommendation from someone you know	2.20	2.45	N/A	2.43	2.96	2.51
Check to see whether the contact information for that person or organization is provided on the site	2.09	2.31	2.10	2.27	2.91	2.34
Verify the author's qualifications or credentials	1.97	2.25	1.78	2.09	2.61	2.14

Notes: 1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = all the time
Please see the following citations for detailed information about the sample and questionnaire items (Flanagin & Metzger, 2000; Metzger, Flanagin, & Zwarun, 2003; Metzger & Flanagin, in press)

Table 2. Suggested factors that influence credibility assessments of online information.

Presence of date stamp showing information is current

Source citations

Citations to scientific data or references

Author identification

Author qualifications and credentials

Presence of contact information

Absence of advertising

Presence of privacy and security policies

Certifications or seals from trusted third parties

Professional, attractive, and consistent page design, including graphics, logos, color schemes, etc.

Easy navigation, well organized site

Sponsorship by of external links to reputable organizations

Notification/presence of editorial review process or board

Absence of typographical errors and broken links

Professional-quality and clear writing

Download speed

Message relevance, tailoring

Interactive features (e.g., search capabilities, confirmation messages, quick customer service responses)

Past experience with source/organization (reputation)

Domain name and URL (suffix)

Ability to verify claims elsewhere (e.g., external links)

Comprehensiveness of information provided

Ranking in search engine output

Paid access to information

Plausibility of arguments

Source: Alexander & Tate, 1999; Eysenbach & Kohler, 2002; Fogg et al., 2003; Freeman & Sprydakis, 2004; Metzger, Flanagin, Eyal, Lemus, & McCann, 2003; Reih & Belkin, 1998; Rieh, 2002; Walthen & Burkell, 2002.

Note: Of course, not all of these factors will apply to every web site. Site type (e.g., a commercial versus an individual's Web site), and receiver factors (e.g., purpose and motivation for information search, Internet experience and prior knowledge) will also make a difference in which factors are applicable and which factors are used during the evaluation (Flanagin & Metzger, 2000; Fogg et al., 2003). Also, some factors are more or less helpful at evaluating credibility at different "levels," for example, at the level of the Web site as a whole or at the level of messages residing on Web sites. To illustrate, factors having to do with site design and navigation will be more relevant to judgments of site credibility, whereas factors such as argument plausibility and author credentials will likely be more important in evaluations of the credibility of messages on web sites.