

Establishing and Evaluating Digital Ethos and Online Credibility

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Chapter 2

No Shortcuts to Credibility Evaluation: The Importance of Expertise and Information Literacy

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ABSTRACT

This chapter argues that as the online informational landscape continues to expand, shortcuts to source credibility evaluation, in particular the revered checklist approach, falls short of its intended goal, and this method cannot replace the acquisition of a more formally acquired and comprehensive information literacy skill set. By examining the current standard of checklist criteria, the authors identify problems with this approach. Such shortcuts are not necessarily effective for online source credibility assessment, and the authors contend that in cases of high-stakes informational needs, they cannot adequately replace the expertise of information professionals, nor displace the need for proper and continuous information literacy education.

INTRODUCTION

While even Aristotle recognized the value of credible information and the problem of source credibility evaluation, the Internet era has made possible an information revolution that brings new urgency to the question of how to promote information literacy. Living in a world as digital citizens, there is no choice but to navigate and reevaluate this ever growing information landscape; however, as predatory sources set informational snares, the navigation of our vast informational world is becoming increasingly difficult without a robust credibility assessment toolkit at our disposal.

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No Shortcuts to Credibility Evaluation

This chapter argues that as the informational landscape continues to expand, shortcuts to source credibility assessment designed to aid information seekers in dependably judging the credibility of a source or the content of a website cannot replace the acquisition of a more comprehensive set of information literacy competencies, especially since source credibility evaluation is just one of the several interrelated components of information literacy. Not all content requires thorough evaluation; in fact, research shows that information seekers do not assess source credibility for all content equally, and source credibility evaluation is most crucial during searches for high-stakes information, where misinformation can be most damaging, as, for example, when sifting through sources offering health-related content. The authors contend that shortcuts are not effective for online source credibility assessment, and shortcuts such as checklists cannot adequately replace the expertise of information professionals, nor displace the need for comprehensive lifelong information literacy education.

BACKGROUND: CONCEPTUALIZING CREDIBILITY

In the context of information quality, credibility is often understood in terms of the believability of some information in virtue of the perceived trustworthiness of its source (Hovland, Janis, & Kelley, 1963). Miriam J. Metzger (2007) argued that credibility is “a multifaceted concept with two primary dimensions: expertise and trustworthiness” (p. 2078).

Source trustworthiness, however, when not conjoined with expertise (see Ericsson et al. [1993] for an account of expertise acquisition), need not be a necessary component of credibility. From an epistemological perspective:

One need not demonstrate trustworthiness to secure credibility. One can, for example, secure it externally, by providing evidence that one has reason for being truthful even though the reason functions independently of one's goodwill. One can say to another: “I know that you don't trust me, but you nonetheless have reason to believe what I say; if what I say is false, I will suffer the consequences. (Strudler, 2009, p. 142)

What this suggests is that, logically speaking, the relation between Metzger's two primary dimensions of credibility places expertise at the center of the concept of credibility, with trustworthiness as an emergent property realized in the presence of expertise. Unfortunately, research has shown that credibility is not always evaluated in this manner, which is part of the bigger problem. In fact, studies have found that people are rarely conscientious enough to expend the required energy to evaluate the source credibility of the information they find online (Flanagin & Metzger, 2000; Scholz-Crane, 1998).

Such things as website design and the perceived character, rather than expertise, of the source play into the trust and persuasion of the average information seeker. Although such studies have been conducted in the context of online credibility, this is not a new phenomenon by any means. The ancient Greek philosopher Aristotle, for example, in his *Rhetoric*, pointed to three means of persuasion, *ethos*, *pathos*, and *logos* (McKeon, 1941, p. I.3, 1358a1337ff), which, in our context, can be understood as three sources of credibility evaluation. *Ethos* pertains to the perceived character of the speaker, *pathos* to the emotional state of the receiver, and *logos* to the logical organization of the content or the argument itself.

The first form of persuasion is accomplished merely “whenever the speech is held in such a way as to render the speaker worthy of credence. If the speaker appears to be credible, the audience will form the second-order judgment that propositions put forward by the credible speaker are true or acceptable” (Rapp, 2010, Section 5). It is worth noting that this has nothing to do with the content of the information being conveyed, and some propose that information receivers are more likely to be persuaded when the source merely presents itself as credible (Hovland et al., 1963).

In our contemporary context, this is the kind of persuasion one might expect individuals with the appropriate credentials to wield. Unfortunately, that is not always the way information seekers evaluate source credibility. Source familiarity appears to have a similar, and in some cases an even greater, epistemic pull as credentials and expertise. This source familiarity phenomenon is exemplified by the persuasive power famous public figures can often brandish when they voice opinions or make pronouncements on matters that lie beyond their own expertise, such as, for example, aligning themselves with scientific stances on such issues as climate change or commenting on political debates. Perhaps even more disturbingly, as Wathen and Burkell (2002) pointed out, good web design can have a similar persuasive effect on the information seeker.

Aristotle’s second means of persuasion focuses on the information receiver’s inner states during the course of acquiring information, and “[t]he success of the persuasive efforts depends on the emotional dispositions of the audience; for we do not judge in the same way when we grieve and rejoice or when we are friendly and hostile. Thus, the orator has to arouse emotions exactly because emotions have the power to modify our judgments” (Rapp, 2010, Section 5). Wathen and Burkell’s (2002) model of user online information credibility evaluation, for example, factored in the user’s cognitive states at the time of information retrieval.

Aristotle’s third means of persuasion is arguably the best strategy for ascertaining the credibility of a source. The evaluation of the argument itself is often a good way of judging whether the information being acquired is persuasive; thus, “[w]e persuade by the argument itself when we demonstrate or seem to demonstrate that something is the case” (Rapp, 2010, Section 5). The evaluation of the content of information requires the greatest amount of effort because it will often include cross-referencing and fact-checking. The third mode of credibility evaluation is most reliant on the expertise dimension of Metzger’s definition of credibility, and plays a central role in the recommendations at the end of this chapter. This chapter’s recommendations will also incorporate Wathen and Burkell’s (2002) three-pronged model of credibility assessment:

1. Surface characteristics and appearance of a website,
2. Usability and interface design, and
3. Cognitive states of the user (including prior knowledge).

Parts (1) and (2) correspond to Aristotle’s notion of *ethos* as a tool of persuasion while (3) touches on both *pathos* and *logos* insofar as the cognitive states of the information seeker include prior knowledge, which is linked to his or her level of expertise or familiarity with the subject matter being searched and evaluated for validity, soundness, and consistency (Wathen & Burkell, 2002). Unfortunately, most common user practices reveal that information seekers seldom engage in the latter form of evaluation. Regardless of how in-depth (or not) the average user assesses information, it is important to note that “the environment may have changed the ways in which users create ethos and identity, but what readers look for in a credible source has remained essentially the same since ancient times” (Frobish, 2013, p. 18).

THE EVALUATION CHECKLIST AS A COMMON SHORTCUT TO DETERMINING ONLINE CREDIBILITY

Contemporary scholars and information professionals have struggled with the question of online credibility evaluation for years, as illustrated in research such as Miriam J. Metzger's (2007) seminal review of online credibility; Thomas J. Johnson and Barbara K. Kaye's (1998) early work comparing the perception of credibility in online versus print sources; Sarah Blakeslee's (2004) use of an innovative acronym for the CRAAP test; and B.J. Fogg's (Fogg et al., 2001) work with the Stanford Persuasive Tech Lab determining what aspects of websites lend themselves to more credibility. A common thread running through all of the aforementioned research is the fact that the use of the checklist approach remains a constant shortcut in the determination of credibility (although the checklist has had its detractors; see Meola 2004; Apostel & Folk, 2005). The checklist approach can be traced back to Jim Kapoun (1998), who proposed to base web evaluation on five criteria used for print evaluation. The purpose of developing a checklist, according to Kapoun, was to accommodate student proclivity for speed rather than accuracy when evaluating sources. He wrote:

To develop this model I had to first acknowledge that most students today tend to conduct research with speed rather than accuracy and rarely evaluate resources. So the criteria I present must be digestible and almost transparent to the student. In other words, the student must be trained to evaluate a Web document like second nature. (Kapoun, 1998, p. 522)

The typical credibility checklist provides researchers with a list of questions they should ask about their online source. Kapoun listed five generally accepted criteria that should appear on a credibility checklist: accuracy, authority, objectivity, currency, and coverage. Many versions of Kapoun's credibility checklist exist in abundance online because many university libraries, writing centers, and individual departments provide variations of the checklist, encouraging researchers to tally whether their source meets enough of the so-called desirable criteria and creating scoring systems to help information seekers evaluate a website quickly and easily. Unfortunately, just as this approach to credibility evaluation persists, so do the problems with each of the accepted checklist criteria.

Accuracy

Accuracy is "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" (Metzger, 2007, p. 2079). Kapoun cautioned about being aware of the purpose of the document and understanding the distinction between author and Webmaster (p. 522). According to the University of Pittsburgh's (2015) *Evaluating Web Resources* checklist (itself adapted from Kapoun's original criteria), researchers should ask some of the following questions:

- Is this information coming from an educational institution (.edu), a company (.com), the government (.gov), or an organization (.org)?
- Is the information free from error?
- Is it purposely misleading?

Many evaluation checklists encourage researchers to determine accuracy based on a website's URL, often emphasizing the website's top-level domain (such as whether the website ends in a .edu, .com, or .gov). This rule persists from the relatively early days of the Internet, when initially only seven top-level domains (TLDs) existed. As domain names become scarcer due to the continual amounts of information being posted online, the concept of determining a website's accuracy by its TLD is becoming antiquated. According to the Internet Assigned Numbers Authority, there are over 1000 TLDs as of 2015—many of which remain unknown to the general public (Internet Corporation for Assigned Names and Numbers (ICANN), 2015). Scholars may view websites ending in uncommon TLDs with a more skeptical eye and discredit them without fairly reviewing the content, thereby disqualifying potentially credible and salient information.

One telling example of unfounded mistrust of a website's credibility as a result of an unusual URL is the Center on Media and Child Health (CMCH). CMCH is an evidence-based research group at Boston Children's Hospital, which provides a myriad of tools, tip sheets, advice, and other resources on the Center's website, <http://cmch.tv>. By the time the Center was established in 2003, many of the desired domain names were already claimed, and the team made the decision to use cmch.tv as their primary URL. Since then, the Center has had many inquiries into why the .tv TLD was chosen, especially since .tv is typically used for video content sites. If the Center had been able to choose .org, like its parent organization Boston Children's Hospital, it would have perhaps been given more credence. Conversely, relying on a more recognized TLD does not always meet the presumption of accuracy. For example, many university students, staff, and faculty can share information on university-hosted web space, providing the illusion that if the resource exists on a site ending in .edu, it is automatically accurate.

Another one of the major issues with questioning the accuracy of a website, such as whether it is free from error or provides misleading content, is whether it is possible for burgeoning researchers to truly comprehend the level of accuracy provided. The Dunning-Kruger effect (Kruger & Dunning, 1999) is a cognitive bias that can be applied to evaluating accuracy: unskilled individuals may remain unaware that they are unskilled, and those with a higher level of skill may underrate their own knowledge. From an information literacy perspective (Gross, Latham, & Armstrong, 2012), the Dunning-Kruger effect can contribute to the inability of individuals to accurately evaluate and assess the need, value, and relevance of information. More importantly, it suggests that less-skilled individuals are likely to be unaware of the degree to which they are accurately assessing the quality of the information they collect, while those with higher levels of information literacy are likely to underestimate their ability to determine the credibility of a source. As a result, determining the accuracy of a website may not always be a simple task due to our own biases and knowledge levels.

Authority

Authority is determined “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” (Metzger, 2007, p. 2079). According to the University of California at Berkeley Library (UC Berkeley, 2012), questions researchers should ask in regard to authority include:

- Who wrote the page?
- What are the author's credentials on this subject?

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The idea of being able to identify the author is deemed a necessity in many credibility checklists, but it raises the issue as to whether anonymity can be credible. Social networking sites are often some of the most difficult sources to assess for credibility because many individuals using these outlets are doing so anonymously. One study (Thomson et al., 2012) found that over 70% of tweets using the #fukushima hashtag during the Fukushima Daiichi nuclear power plant disaster in Japan were citing highly credible sources, despite the anonymity of many of the Twitter accounts. During the Arab Spring revolution, anonymous social media accounts on Twitter, Facebook, and YouTube were essential to distributing information and staging demonstrations (Howard et al., 2011; Gamie, 2013). As a result, discrediting certain online sources due to a lack of clear authorship requires more critical thinking about the context in which the anonymous sources provide the information, as well as reasons for the anonymity itself.

Another persistent problem is the notion of authority itself, and how that authority can be abused. In some research, it may be difficult to determine who should be listed as an author, depending on the type of expertise that author lends to the project, and in larger research projects, it becomes more difficult to identify fair attribution (Smith & Williams-Jones, 2012). Related to this issue is the problem known as *guested* authorship (sometimes referred to as *gifted* authorship), which occurs when an individual who did not contribute to the article in a meaningful way is listed as an author (Schofferman, Wetzel, & Bono, 2015). Conversely, *ghosted* authorship occurs when an individual contributes significantly to the article, but is not listed as an author (Schofferman et al., 2015). The practice of gifting or guesing hurts the integrity of rigorous scientific research, but as research shows, it is a common convention (Street, Rogers, Israel, & Braunack-Mayer, 2010). While publishers, journal editors, and even governing authorities have their own policies for attributing authorship in scholarly works, research shows that the field is far from regulated. For example, while the International Committee of Medical Journal Editors (ICMJE) recommendations exist in order to standardize authorship guidelines in the area of biomedical journals, research shows that many journals are in fact not adhering to the ICMJE requirements (Bosch, Pericas, Hernandez, & Torrents, 2012).

Objectivity

Objectivity “involves identifying the purpose of the site and whether the information provided is fact or opinion, which also includes understanding whether there might be commercial intent [see Kapoun 1998] or a conflict of interest on the part of the source, as well as the nature of relationships between linked information sources” (Metzger, 2007, p. 2079). According to Cornell University’s (2015) *Evaluating Web Pages: Questions to Consider*, questions related to objectivity include:

- What goals/objectives does this page meet?
- How detailed is the information?
- What opinions (if any) are expressed by the author?

Identifying objectivity and bias is another area that may not be easily discerned from a checklist of questions. Many online resources claim to provide information that is grounded in science; however, these claims require substantiation. One study found that not all research methodologies are considered equal, and terms like research-based, evidence-based, and recommended practice are not necessarily standardized (Test, Kemp-Inman, Diegelmann, Hitt, & Bethune, 2015).

The question of credibility is also important when considering the establishment of foundations for the evaluation of more innovative and less established sources, especially with the dramatic and continual shift in available technologies and sources of information. YouTube, for example, has emerged as a source of information utilized by reputable organizations. Unfortunately, health-related organizations that release educational videos do not, in fact, see a higher engagement, despite their high level of credibility (Desai et al., 2013).

Moreover, user biases will undoubtedly impact the user's ability to critically examine an online source with an objective eye; individuals are twice as likely to select information that is already in line with their preexisting beliefs (Hart et al., 2009). This lack of objectivity can be particularly dangerous in the health sciences realm, where websites with strong agendas attempt to prove their validity. A recent example is the anti-vaccination debate; one study found that when individuals were provided with statistical information about vaccine-adverse events, their opinions were swayed by reading less credible narratives online (Haase, Betsch, & Renkewitz, 2015).

Currency

Currency is one of the more straightforward criteria on many website evaluation checklists, and refers to “whether the information is up to date” (Metzger, 2007, p. 2079). According to the Queen's University (2001) *Evaluating Web Sources* checklist, researchers should ask:

- Is there a date of publication or last update?
- Is the page maintained on a regular basis?
- Is the information considered current for your topic/research?

While a website's currency can often be determined simply by looking for a publication date, this checklist criterion lacks the integration of critical thinking skills except in specific circumstances. The problem of article retraction can affect how credible the information may be, even if the website has been recently updated. Research from as early as 1990 identified that retracted journal articles often continue to be cited (Pfeifer & Snodgrass, 1990), and more recent research shows that article retractions have increased (Wager & Williams, 2011). If an author of a website is unaware that an article has been retracted, they may be inadvertently sharing outdated information on their recently updated websites. As “authors, editors, reviewers, and librarians are all involved, a multi-faceted approach will be required to address the problem of continued use of invalid data and ideas” (Pfeifer & Snodgrass, 1990, p. 1422).

Coverage

Coverage is “the comprehensiveness or depth of the information provided on the site” (Metzger, 2007, p. 2079). According to the *6 Criteria for Websites* checklist provided by Dalhousie University (2015), questions should include:

- Does the site claim to be selective or comprehensive?
- Are the topics explored in depth?

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One problem with the idea of coverage is that a lack of time may prevent a researcher from exploring a resource in greater depth. In particular, research has established that in the field of medicine, health sciences professionals often rely solely on a journal article's abstract instead of the full text in order to make decisions, mostly due to a lack of time and a need for a concise summary (Saint et al., 2000). While structured abstracts can be useful, they are not always available, and research shows that quality issues continue to exist in certain types of article abstracts (Mbuagbaw et al., 2014). Time, especially in medical research, is always going to be of the essence. As a result, instructing researchers to use in-depth online resources such as full journal articles as opposed to abstracts may not be a practical or useful criterion for determining credibility.

Notes on the Peer Review Process

Another major component of the checklist approach, which may be interwoven into any one of the five previously discussed criteria, is whether the article has been peer reviewed. The peer-reviewed journal article is often seen as the gold standard for credibility; however, issues with the peer-review process (as with the checklist approach) persist.

To begin, there has been an increase in predatory open access publishers offering journals with lax publishing guidelines, and differentiating between legitimate and non-legitimate journals is becoming increasingly difficult. While Beall's List of Potential, Possible, or Probable Predatory Scholarly Open-Access Publishers attempts to curate a list of publishers to avoid (Beall, 2015), this is still a relatively new domain for researchers outside of the information sciences realm, although awareness is growing, especially as well-publicized hoax papers continue to pass the peer review process (Gasparyan, Yesirkepov, Diyanova, & Kitas, 2015).

Moreover, different methods of the peer-review process may in fact diminish an article's credibility. In particular, the single-blind peer review, where reviewers are made aware of the identities of the authors whose work they are reviewing, is still unfortunately prevalent in academic journals. The single-blind peer review is seen by some as the worst type of review (Manchikanti, Kaye, Boswell, & Hirsch, 2015) because reviewers required to use these less-than-optimal peer review methods must ensure that they provide honest critiques, regardless of whether the author is well-established or a junior investigator (Bickham, Kavanaugh, & Rich, In press).

Additionally, some disciplines place a high value on non-peer reviewed resources, whereas others do not. For example, systematic reviews, where all clinical evidence (relevant to the review question) is appraised and synthesized, are considered to be examples of some of the highest levels of evidence; the Cochrane Handbook for Systematic Reviews of Interventions (2011) emphasizes the importance of the inclusion of grey literature such as research reports, white papers, and other documents typically not published through traditional avenues into its methodology—and grey literature does not often go through the peer review process. Many existing credibility checklists continue to eschew any research that is not peer reviewed, without taking into consideration the importance of this type of work, especially in quickly evolving fields such as media and technology. The University of British Columbia's *Evaluating Information Sources* site (2015) strongly emphasizes the importance of using peer-reviewed sources, which may lead some researchers to avoid using grey literature; however, research suggests that grey literature adds to the credibility of systematic reviews (Mahood, Van Eerd, & Irvin, 2014). Many reputable organizations, such as the Pew Research Center and the Henry J. Kaiser Family Foundation, self-publish, and several databases exist for the purpose of locating grey literature.

The first problem with the checklist approach, then, is that it is designed by information professionals as a conceptual crutch for the informationally uninitiated (see Kapoun 1998); nevertheless, in order to offer the evaluative support such aids promise, the knowledge and experience of the information experts who design these devices must somehow be distilled into a list or whatever simplified evaluative tool is produced. Unfortunately for the informationally uninitiated user, the simplified and distilled advice, which, as is the case with checklists, often comes in the form of rules of thumb, and is therefore devoid of the contextual nuances to be effectively utilized across the expanse of web-based sources. While checklists are designed to be used independently by the average user, they can never fully address the complex problem of determining credibility, and, as is evidenced by research, users unsurprisingly utilize them inefficiently (see Flanagin & Metzger, 2000; Gunther, 1992; Meola, 2004).

The second problem with such evaluative devices is that although the rules of thumb do contain sound advice, they are merely rules of thumb, which cannot generate the kind of confidence in one's source credibility evaluation as one ought to expect. The worry here is twofold. First, not all highly credible sources will necessarily be current, have a listed author, or be peer reviewed. In cases where author anonymity is imperative due to a hostile political climate, for instance, all three signs of credibility may well be missing as the author will choose to remain unlisted, no peer review process will likely occur, and the release of information may well be considerably delayed. For example, Samaa Gamie (2013) argued that anonymity played a powerful role in activist digital discourses during the youth movement that initiated the Egyptian Revolution because anonymity was necessary for credibility in that context. The second worry with such evaluative devices is that fraudulent and predatory information disseminators can camouflage their content with the aid of those devices themselves by ensuring that the manner in which information is presented passes as credible by following the very rules of thumb meant to help make the credibility evaluation.

Fraudulent sites do not even have to engage in original research in order to reap the benefits of copying successful strategies because such research is regularly conducted and published. For example, Knight, et al. (2013) provided guidelines for using social networking to build online credibility by engaging in audience analysis, maintaining a continual online presence, building immediacy or close relationships, etc.; Tai and Zhang (2013) examined the key defining features of the most successful blog sites and bloggers in China; while Wichowski and Kohl (2013) discussed the CRAAP test in relation to the establishment of online credibility of blogs and microblogs. In fact, a web search for tips on how to make one's website more credible opens a floodgate to opinions and self-published blogs, articles, and books drawing on the massive efforts of researchers discussing the evaluation of online credibility. Every piece of advice that occurs on most evaluation checklists, then, is also being absorbed and utilized by those who aim to build online credibility, whether for noble or malicious reasons, meaning that important research into source credibility evaluation is itself being utilized by some in a manner that perpetuates the problem.

SOURCE CREDIBILITY EVALUATION

The evaluation of source credibility is a complicated psychological process, which, as extensive research indicates, people are generally not very diligent in executing even with the aid of a checklist (see Eysenbach & Köhler, 2002; Flanagin & Metzger, 2000; Gunther, 1992; Lucassen & Maarten-Schraagen, 2012; Meola, 2004; Metzger, Flanagin, & Medders, 2010; Scholz-Crane, 1998; Taylor & Dalal, 2014; Taylor 2015), arguably due to the inadequacy inherent in the checklist approach. One salient question

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that needs addressing pertains to the factors that make a source credible. This is often the starting point for the development of the various techniques of credibility assessment published by university libraries or writing centers. There are, however, two problems with many of these techniques:

1. People seldom use them effectively and diligently, and
2. As we have already explored above, none of them is adequate at properly judging the credibility of the source or content.

Regarding the first problem, one study of American undergraduate students asked them about their personal web-surfing habits and found that

Respondents reported verifying the information they obtained via the Internet only “rarely” to “occasionally”...People scored highest on those verification behaviors that are easy to perform and require their opinion (e.g., considering whether information is current and complete) and lowest on the verification behaviors that are difficult to perform and require their action (e.g., verifying the qualifications or credentials of the author). (Flanagin & Metzger, 2000, p. 531)

Of course, not every user query merits the same scrutiny, nor the same amount of time and energy expended on source credibility evaluation. Information seekers need not be very diligent at evaluating content when the informational stakes are low, such as, for example, when sifting through gossip columns or other low stakes entertainment news. Source credibility evaluation, however, plays a much more salient role when stakes are high. Unsurprisingly, Flanagin and Metzger (2000) found that

... verification behaviors varied depending on the type of information sought. Reference information was verified more rigorously than either commercial or entertainment information and news information was verified more stringently than entertainment information as well. However, reference and news information were verified equally rigorously. The same held true for news and commercial information and for commercial and entertainment information. Overall, these findings indicate that when misinformation is least damaging (e.g., entertainment) it is verified least rigorously, and information where accuracy may be more important (e.g., reference and news information) is verified significantly more. (pp. 531-532)

Flanagin and Metzger's findings support Albert C. Gunther's (1992) theory that more salient information is verified more rigorously while less vital information is less diligently assessed. Gunther wrote: "The findings are consistent with the prediction that high involvement prompts not only more scrutiny but more biased scrutiny of media content and therefore increases likelihood that a person will take a skeptical view of the source of that content" (p. 161). Gunther continued by pointing toward the notion of expertise already mentioned above: "Of course, high-involvement people often do know more about an issue or group than their less involved counterparts, and therefore some portion of perceived distortion in news coverage may consist of the real errors or omissions that people with such expertise accurately discern" (p. 161).

Credibility evaluation is a complex process, which, as research has shown, is quite easily manipulated, especially with the onset of digitization and the ready availability of information online. While credible sources can utilize various methods of persuasion, including the establishment of proper credentials by emphasizing their expertise in a certain field or noting their affiliation with credible institutions, the

information seeker is also exposed to less credible, and even fraudulent, sources that can also exert an epistemic pull on their audience in various ways, such as, among others:

1. Affiliating themselves with credible institutional authorities such as universities or government agencies;
2. Presenting trusted credentials such as academic ranks or other professional titles;
3. Utilizing familiar public personalities in the delivery of content;
4. Mimicking professional web design or incorporating professional jargon with the hopes of legitimizing otherwise unverified information; or
5. Targeting individuals who are epistemically predisposed to accepting some information at face value due to certain emotional states by taking advantage of the motivational dimension of relevance, which may resonate with a targeted group of information seekers (see Cosijn & Ingwersen, 2000; Saracevic, 1975; 1996 for discussions of affective/motivational relevance in the context of information retrieval).

EXPERTISE AND INFORMATION LITERACY

Carol Kuhlthau's (1987, 2004) insightful consideration of the information seeker's emotional dichotomy between uncertainty and control of information seeking behavior is closely related to Aristotle's notion of *pathos*, which is the information seeker's inner experience during the course of information acquisition. Kuhlthau argued that information seekers face an inherent uncertainty in the information seeking process. Part of becoming an information literate user, then, involves the mastery of this inherent uncertainty. Credibility evaluation, which is inseparably entangled with information literacy, cannot rely on the checklist approach to information literacy, but must involve a certain level of proficiency in critical thinking and problem solving skills. Christina Doyle (1994) wrote:

Research into cognitive processes has shown clearly that personal experience, the discovery of meaning, and the discerning of connections, are necessary conditions for successful learning. Students learn best when they connect new experiences with older ones, and then extend the connection to new possibilities. This requires thinking! As students prepare for the 21st century, the traditional basic courses in reading, mathematics, and writing need to be coupled with communication, critical thinking, and problem solving skills. (Costa, 1985). Information literacy is the platform upon which these skills can stand, consisting as it does of knowledge of resources and tools of access, skillful search strategies, and appropriate techniques of processing information (Kuhlthau, 1987). (p. 45)

Information literacy education is the best tool for proper source credibility evaluation since one's capacity to evaluate source credibility proficiently is proportionally related to one's information literacy skills, which involve, as Doyle (1994) argued, communication, critical thinking, and problem solving skills. Proficiency in information literacy, however, is a process that cannot be distilled into a credibility evaluation shortcut, such as a checklist, because it takes time to form the expertise that is the result of the interaction between theoretical knowledge and practice (or experience).

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This does not entail that all information seekers should become information professionals or information literacy experts. The employment of search strategies like the list approach, however, is also not the answer, especially since research has consistently shown that information seekers do not properly utilize such devices. Nevertheless, the problem is not insoluble, as there already are information professionals at hand to help guide users in their searches, as well as provide users with information literacy education (where more of the latter is always a good thing). Librarians, then, provide an invaluable service, both in helping information seekers search for credible information, as well as educating users on how to become more critical information seekers, thereby increasing their proficiency in source credibility evaluation.

SOLUTIONS AND RECOMMENDATIONS

Although, as is evidenced by the vast amount of literature on the issue of credibility, information professionals are diligently working to help prepare information seekers for the complexity of today's information-driven world, no dependable shortcut to source credibility evaluation has been proposed. The most dependable means of credibility evaluation will always be grounded in expertise, both in the form of subject matter knowledge and information literacy more generally. Of course, not every person can be an expert on every subject, but every person should have access to an authoritative, credible source when browsing through a vast amount of content—information literacy is the necessary skill required for discerning that source. Therefore, the authors contend that the Internet age demands that digital citizens acquire an adequate, though not necessarily an expert, level of proficiency in navigating the plethora of sources disseminating information. There will be circumstances in which information literacy cannot be acquired, whether due to time or budgetary constraints; in such cases, the best solution is to either embed an expert into an organization (if possible), or to make use of those experts available to the general public.

Recommendation 1: Embedded Librarianship

Even experts in their respective fields find it difficult to keep up with the rapid changes in their own fields, apart from their particular specializations, thus necessitating the employment of the skill sets possessed by information professionals in order to help them navigate the ever-expanding informational landscape. The authors offer an example, as a case in point, of The Center on Media and Child Health, and argue that the Center's information organizational structure can serve as a model of the kind of social collaboration of experts and information seekers (who may well be experts in some fields, but novices or amateurs in others) that the rapidly expanding—and continuously changing—information landscape demands of the digital citizens who inhabit it and depend on it for social, economic, and civic reasons.

The Center on Media and Child Health (CMCH) is a grant-funded research center within the Division of Adolescent and Young Adult Medicine at Boston Children's Hospital. The mission of CMCH is to educate and empower children and those who care for them to create and consume media in ways that optimize children's health and development. The Center fulfills this mission through three distinct, yet interconnected realms:

1. Investigation, in which the team conducts original research to understand the positive and negative effects of media on health;
2. Translation, which involves synthesizing and disseminating research as useful and practical tools for parents and other stakeholders; and
3. Innovation, which involves using media to develop creative interventions for health.

This small interdisciplinary research team consists of a pediatrician, social scientist, content strategist, program coordinators, and other associated personnel, all of whom collaborate using their specific expertise and their diverse backgrounds, which cultivates ingenuity, innovation, and creativity—all salient factors in conducting and publishing research.

Since the Center's inception in 2003, the founder has employed a full-time embedded librarian, a position held by three different individuals over the past 12 years (and currently held by one of the co-authors). Shumaker (2012) outlined the roles of the embedded librarian as follows:

Embedded librarianship is a distinctive innovation that moves the librarians out of libraries and creates a new model of library and information work. It emphasizes the importance of forming a strong working relationship between the librarian and a group or team of people who need the librarian's information expertise. As the relationship develops, the librarian's knowledge and understanding of the group's work and objectives grow, which leads in turn to greater alertness to the information and knowledge needs of the group. (p. 4)

The Librarian assists with every project at the Center, providing a myriad of support, including performing literature searches, providing citation management services, monitoring emerging research, and co-writing content for research papers and other resources. The CMCH team, although small, produces a vast amount of informational resources and other products, and each team member is engrossed in several concurrent projects. As a result of high demand and low time availability, each team member relies on the embedded librarian to use her expertise as an information professional in order to assist the team in any way possible. The embedded librarian is thus more involved in the research process, having a deeper impact on the research and stronger relationships with the team than traditional, non-embedded librarians (Carlson & Kneale, 2011).

As the organizational structure of CMCH suggests, nothing can actually replace the value of highly trained professionals, and only information literacy and the acquisition of expertise are truly dependable enablers of the most effective credibility evaluation strategies. Lifelong learning is no longer merely a professional requirement; the average information seekers, in virtue of their digital citizenship, must engage in constant and progressive acquisition of an ever-growing information literacy skill set.

With the abundance of literature and resources being published on a daily basis, it is impractical to carry the burden of source credibility evaluation for all, and especially the vitally important information queries. Thus, where the acquisition of expertise is impossible and the process of information literacy education incomplete or insufficient given the gravity of the information seeker's query, consultation with information professionals is a strategy to which information seekers should have access. As the Center on Media and Child Health example indicates, even experts in their field employ the services of information professionals.

No Shortcuts to Credibility Evaluation

As the information profession continues to redefine itself in the context of emerging and evolving technologies and information needs, the value of, and the demand for, embedded and subject specialist librarians will increase. This is already evident in the aforementioned organizational structure of CMCH, and this trend can be traced throughout Canada (Dennett et al., 2014) and the United Kingdom (Vassilakaki et al., 2015). One way of ensuring that new professionals and potential employers become aware of this emerging trend is for library schools to offer courses dedicated to embedded librarianship and encourage practicum and internship partnerships in such non-traditional library settings.

While research centers like CMCH employ dedicated librarians, the average user has access to the same professional services through institutions like libraries and other publicly funded agencies. In most cases, this access, though readily available in local libraries and online, is underused, a tendency that can be remedied by more visible advertising of library services in general and implementing information literacy education through primary and secondary schooling. Information literacy education, though it does not offer any shortcuts to source credibility evaluation, is, the authors argue, the best means of ensuring adequate user credibility assessment, but it also requires a shift in how students are introduced to, and encouraged to utilize, the services librarians offer. While many universities do provide an introduction to information literacy as part of a core university course, this is far from sufficient training for students who will be expected to evaluate sources for their own independent research.

There is not, however, a need for librarians to embed more exclusively within classrooms or departments than they already do; subject librarians already liaise with departments and faculty. What is needed is a more consistent and continuous relationship between subject librarians and teaching faculty. One way of achieving this is by collaborating on shared learning outcomes that focus on a department's particular area of study in the context of information literacy skills most pertinent to that particular department. Active recruitment of subject specialists to fill the roles of subject librarians would be tremendously helpful in achieving such collaboration. Moreover, faculty are much more likely to collaborate fruitfully with librarians who share some level of expertise in their subject matter; faculty in the department of philosophy, for example, are much more likely to seek out the services of a librarian who is also a philosopher. Continued collaboration between faculty and subject librarians is not only beneficial to student learning, but is also instrumental to the development of information literacy, which, as the second recommendation suggests, is the key to competent source credibility evaluation.

Recommendation 2: Information Literacy and Source Credibility Evaluation

Information literacy is a difficult term to define, partly because its application is context sensitive and partly because this complex set of competencies is continually adapting to emerging and evolving informational media. Generally speaking, information literacy is a set of competencies that allow individuals to recognize when information is needed and what information is needed, and enables an individual to locate, evaluate, and effectively utilize the required information. Breivik and Jones (1993) explained that information literate individuals “become sophisticated users of [informational] resources and technologies as they:

1. Gather needed information from all sources;
2. Test the validity of information as it remains constant and as it changes from discipline to discipline;
3. Place information into various contexts that ultimately will yield its pertinent meaning;
4. Remain skeptical about information and discriminate fact from truth” (p. 26).

Source credibility evaluation, then, is one of the constitutive competencies of information literacy.

Although the concept of information literacy as a set of fundamental competencies must certainly be applicable to any information context where the seeking, locating, evaluating, and utilizing of information is necessary, the term itself was coined by Paul Zurkowski in 1974 and contextualized within the modern work environment where information has enormous utility. Zurkowski explained that “[p]eople trained in the application of information resources to their work can be called information literates... [having] learned techniques and skills for utilizing the wide range of information tools as well as primary sources in moulding information-solutions to their problems” (p. 6).

The need to introduce the formal concept of information literacy arose within the context of the emergence of a workforce reliant on information, and, with the further evolution of information technologies, the concept inevitably grew in complexity and breadth of applicability. Rather than understanding the term as solely a workplace competency, the emerging technological social infrastructure shifted the understanding of the term from merely being a workplace competency to a much wider context where information literacy serves as the foundation for lifelong learning (Demo, 1986).

Shirley Behrens (1994) stated that in 1982, “*Time* magazine chose the computer as Machine of the Year, and, inspired by the feature, Forest Horton [1983] considered the potential role that computers had as a resource in an information age. [Horton] referred to *Time*’s consciousness-raising of the computer’s problem-solving capabilities as computer literacy...[h]e went on to explain, however, that information literacy extended beyond computer literacy” (p. 317). Behrens adds that “[i]nformation literacy had become a major issue in librarianship, since the profession saw in it a way that its members could make a contribution toward a society of lifelong learners” (Behrens, 1994, p. 317)

As is becoming evident from the history of the term, the concept of information literacy has been evolving in parallel with the emergence of information technologies. Information literacy today, however, bears little resemblance to Zurkowski’s definition of the term or the traditional model utilized within the library context, which concentrated on user education aimed at the acquisition of library skills and bibliographic instruction. The evolution of our understanding of what information literacy entails has also shifted approaches to teaching the complex and continually growing skill set; the approach has been shifting from a focus on instruction pertaining to information seeking tools to teaching information competencies (Špiranec & Zorica, 2010). Kuhlthau (1999) captured the evolving concept of information literacy when she wrote, “Information literacy incorporates both library skills and information skills, but adds the critical component of understanding the process of learning in information-rich environments. Information literacy extends library skills beyond the use of discrete skills and strategies to the ability to use complex information from a variety of sources to develop meaning or solve problems” (p. 11).

Being information literate, then, no longer implies the mere ability to use information tools, but rather entails the competency to critically evaluate information needs, sources, and uses. Critical thinking skills, in turn, ground the various competencies constitutive of information literacy; moreover, critical thinking skills are, in fact, central to Aristotle’s third means of persuasion, *logos* (the evaluation of the argument itself), which, as already argued above, is the best strategy for ascertaining the credibility of a source.

Sadly, students are not leaving school with an adequately developed critical thinking skill set, which, unsurprisingly, results in very low information literacy competencies. Research suggests that post-secondary students are information illiterate upon entry (Gross & Latham, 2007). What this means is that students do not begin to receive information literacy education until their undergraduate studies (and even then, many undergraduates slip through the cracks), and those who do not attend university seldom receive information literacy education at all.

No Shortcuts to Credibility Evaluation

Although some research suggests that the critical thinking skills necessary for information literacy depend on the cognitive development levels of senior undergraduate students (Jackson, 2008), this certainly does not mean that information literacy should be taught only in graduate school. In fact, other research supports the claim that information literacy education benefits junior undergraduate students (see Selegean, Thomas, & Richman, 1983; Ren, 2000; Wang, 2006).

Moreover, the philosopher Matthew Lipman, after leaving his professorship at Columbia University to found the Institute for the Advancement of Philosophy for Children in 1974, developed successful strategies to engage children (from K-12) in critical thinking through classic problems in philosophy. The general consensus in philosophy, going as far back as Plato, was that children were cognitively ill equipped to comprehend philosophical problems, partly due to the lack of critical thinking skills required for the engagement with abstract philosophical concepts. Nevertheless, Lipman's program was successful and subsequently spawned various adaptations (see Wartenberg, 2014; Lewis & Chandley, 2012; Lipman, Sharp, & Oscanyon, 1985) and is currently being introduced into school districts as part of a wider demand for critical thinking initiatives.

Because critical thinking skills are foundational for information literacy competencies, the development of such skills in the general population is instrumental to the development of an information literate society. This sort of training must not be initiated in adulthood, but rather should be integrated into both primary and secondary educational curricula (and beyond) because, as Thomas (2004) argued, "unless youngsters are taught and also expected to appraise critically the resources they find on the Internet and pursue research questions rather than fact-finding tasks, the potential for inspiring the development of higher-order thinking skills represented by the activity of Internet-based searching will remain largely unrealized" (p. 136).

A strong foundation in critical thinking skills is no longer merely useful for some professions, but rather is a necessary competency of every digital citizen. Checklists and other rules of thumb will become obsolete at an increasing rate and "students will need to evaluate information in more nuanced ways than they are currently taught at most colleges and universities. Information literacy needs to be increasingly focused on teaching evaluative skills to students, skills that go well beyond determining whether or not something is peer-reviewed" (Farkas, 2012, p. 90). Critical thinking skills and, by extension, Aristotle's third means of persuasion, are the best strategies for ensuring competent source credibility evaluation that will continue to develop with the emergence of new information technologies and the evolution of the information infrastructure itself.

Source credibility evaluation is a constitutive competency possessed by information literate individuals; just as there are no shortcuts to information literacy education, so there are no shortcuts to source credibility evaluation. A strong grounding in critical thinking skills (including an understanding that there is a difference between various sources of information) starting at a young age and continuing through to adulthood is the best way of ensuring that digital citizens have the tools to navigate a continuously evolving informational landscape.

Information literacy education, then, is perhaps the best means of ensuring consistently dependable source credibility evaluation. While not everyone is, or can be, an expert in a given field of inquiry, just as not everyone is, or can be, an expert in information organization and evaluation, only some need to be experts in order for credible, authoritative information to be available. Fortunately, information professionals, who are in possession of, among other skills, expertise in information literacy, which is essential to dependable source credibility evaluation, are readily available, both in person and online, to help connect information seekers with expert sources and provide information literacy education.

FUTURE RESEARCH DIRECTIONS

One idea only briefly touched upon in this chapter is the effect of visual web design on credibility. Much of the research evaluating the more physical human-computer interaction aspects lags behind what is currently in use. Within the last several years, there has been a massive shift from full browser-based web design to a more mobile-friendly responsive design, leaving little room for aesthetic variations. Some content services have moved strictly to a mobile app interface, and early questions posited regarding web design impact, such as how links were presented, whether ads were present, and how fast a website loads, are no longer valid; however, questions pertaining to responsive design, the overall shift to smaller screens, and how this affects credibility judgments will need to be explored. This shift was further emphasized during Google's 2015 algorithm change (Makino, 2015), which rewarded websites that have fully responsive designs with higher rankings in their results. Websites with non-responsive designs but that possess otherwise credible content will essentially be ignored by the search engine giant, leading to questions regarding the role of advancing technology in credibility evaluations.

Another important area requiring more attention is the role of embedded librarians in research-based organizations. While research exists on embedded librarianship, it often does not pertain to how their expertise is utilized throughout all portions of the research process. As more librarians become subject specialists, the lines between librarian and researcher may blur, and librarians may develop more intricate skills. While outside of the scope of this chapter, librarian advocacy remains an important and controversial topic, one that ought to continue to be addressed in future research.

CONCLUSION

Although this chapter identifies problems with the checklist approach, the authors do so not in an attempt to discredit the rigorous work that has gone into creating such checklists, but more so to highlight the growing need for information literacy education and for expertise in the form of highly trained information professionals. Academic institutions need to emphasize information literacy skills in their curricula, research organizations need to consider employing or consulting information literacy experts, and information seekers in general must continually add to their credibility evaluation toolkits via a lifelong engagement in information literacy education.

Not all sources require the same level of credibility assessment. Where the stakes are low, information seekers need not worry about consulting checklists as they evaluate the credibility of the source. In fact, research suggests (Flanagin & Metzger, 2000; Gunther, 1992) that information seekers do not actually care about credibility where low risk information, such as entertainment, for example, is concerned. Where the stakes are higher, as in reference or news, information literacy education has an immensely greater utility than shortcut strategies can ever have. In cases where the stakes are arguably the highest, such as when seeking health-related information, expertise plays a crucial functional role in credibility evaluation, making expert consultation the best evaluative strategy (whether in the form of a health care practitioner or an information professional capable of navigating health care literature). Where the stakes are high, shortcuts are undesirable; where the stakes are low, shortcuts are unnecessary.

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REFERENCES

- Apostel, S., & Folk, M. (2005). *First phase in-information literacy on a fourth generation Web site: An argument for a new approach to Web site evaluation criteria*. *Computers & Composition Online, Spring 2005*. Retrieved March 10, 2016 from http://www2.bgsu.edu/departments/english/cconline/apostelfolk/c_and_c_online_apostel_folk/
- Beall, J. (2015). *Potential, possible, or probable predatory scholarly open-access publishers*. Retrieved December 1, 2015, from <http://scholarlyoa.com/publishers/>
- Behrens, S. J. (1994). A conceptual analysis and historical overview of Information Literacy. *College & Research Libraries, 55*(4), 309–322. doi:10.5860/crl_55_04_309
- Berkeley, U. C. (2012). *Evaluating web pages: Techniques to apply & questions to ask*. Retrieved December 1, 2015, from <http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html>
- Bickham, D. S., Kavanaugh, J. R., & Rich, M. (2016). Media effects as health research: How pediatricians have changed the study of media and child development. *Journal of Children and Media, 10*(2), 191–199. doi:10.1080/17482798.2015.1127842
- Blakeslee, S. (2004). The CRAAP test. *LOEX Quarterly, 31*(3), 4.
- Bosch, X., Pericas, J. M., Hernandez, C., & Torrents, A. (2012). A comparison of authorship policies at top-ranked peer-reviewed biomedical journals. *Archives of Internal Medicine, 172*(1), 70–72. doi:10.1001/archinternmed.2011.600 PMID:22232152
- Brevik, P. S., & Jones, D. L. (1993). Information Literacy: Liberal education for the Information Age. *Liberal Education, 79*(1), 24–29.
- Carlson, J., & Kneale, R. (2011). Embedded librarianship in the research context: Navigating new waters. *College & Research Libraries News, 72*(3), 167–170.
- Cornell University. (2015). *Evaluating web pages: Questions to consider*. Retrieved December 1, 2015, from http://guides.library.cornell.edu/evaluating_Web_pages
- Cosijn, E., & Ingwersen, P. (2000). Dimensions of relevance. *Information Processing & Management, 36*(4), 533–550. doi:10.1016/S0306-4573(99)00072-2
- Dalhousie University. (2015). *6 criteria for websites*. Retrieved December 1, 2015, from https://libraries.dal.ca/using_the_library/evaluating_web_resources/6_criteria_for_websites.html
- Demo, W. (1986). The idea of “information literacy” in the age of high-tech. Tompkins Cortland Community College. Retrieved from <http://files.eric.ed.gov/fulltext/ED282537.pdf>

- Dennett, L., Chatterley, T., Greyson, D., & Surette, S. (2014). Research Embedded Health Librarianship: The Canadian Landscape. *Journal of the Canadian Health Libraries Association/Journal de l'Association des bibliothèques de la santé du Canada*, 34(2), 61-68.
- Desai, T., Shariff, A., Dhingra, V., Minhas, D., Eure, M., & Kats, M. (2013). Is content really king? An objective analysis of the public's response to medical videos on Youtube. *PLoS ONE*, 8(12), e82469. doi:10.1371/journal.pone.0082469 PMID:24367517
- Doyle, C. S. (1994). *Information literacy in an information society: A concept for the information age*. Syracuse, NY: ERIC Clearinghouse on Information & Technology.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406. doi:10.1037/0033-295X.100.3.363
- Eysenbach, G., & Köhler, 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. *BMJ (Clinical Research Ed.)*, 324(7337), 573-577. doi:10.1136/bmj.324.7337.573 PMID:11884321
- Farkas, M. (2012). Participatory technologies, pedagogy 2.0 and information literacy. *Library Hi Tech*, 30(1), 82-94. doi:10.1108/07378831211213229
- Flanagin, A. J., & Metzger, M. J. (2000). Perceptions of internet information credibility. *Journalism & Mass Communication Quarterly*, 77(3), 515-540. doi:10.1177/107769900007700304
- Fogg, B., Marshall, J., Laraki, O., Osipovich, A., Varma, C., Fang, N., & Swani, P. et al. (2001). What makes web sites credible?: A report on a large quantitative study. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. doi:10.1145/365024.365037
- Frobish, T. S. (2013). On Pixels, Perceptions, and Personae: Toward a Model of Online Ethos. In M. Folk & S. Apostel (Eds.), *Online Credibility and Digital Ethos: Evaluating Computer-Mediated Communication* (pp. 1-23). Hershey, PA: Information Science Reference; doi:10.4018/978-1-4666-2663-8.ch001
- Gamie, S. (2013). The cyber-propelled Egyptian revolution and the de/construction of ethos. In M. Folk & S. Apostel (Eds.), *Online Credibility and Digital Ethos: Evaluating Computer-Mediated Communication* (pp. 316-330). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2663-8.ch018
- Gasparyan, A. Y., Yessirkepov, M., Diyanova, S. N., & Kitas, G. D. (2015). Publishing ethics and predatory practices: A dilemma for all stakeholders of science communication. *Journal of Korean Medical Science*, 30(8), 1010-1016. doi:10.3346/jkms.2015.30.8.1010 PMID:26240476
- Gross, M., & Latham, D. (2007). Attaining information literacy: An investigation of the relationship between skill level, self-estimates of skill, and library anxiety. *Library & Information Science Research*, 29(3), 332-353. doi:10.1016/j.lisr.2007.04.012
- Gross, M., Latham, D., & Armstrong, B. (2012). Improving below-proficient information literacy skills: Designing an evidence-based educational intervention. *College Teaching*, 60(3), 104-111. doi:10.1080/087567555.2011.645257
- Gunther, A. C. (1992). Biased press or biased public? Attitudes toward media coverage of social groups. *Public Opinion Quarterly*, 56(2), 147-167. doi:10.1086/269308

No Shortcuts to Credibility Evaluation

Haase, N., Betsch, C., & Renkewitz, F. (2015). Source credibility and the biasing effect of narrative information on the perception of vaccination risks. *Journal of Health Communication, 20*(8), 920–929. doi:10.1080/10810730.2015.1018605 PMID:26065492

Hart, W., Albarracín, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin, 135*(4), 555–588. doi:10.1037/a0015701 PMID:19586162

Higgins, J., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions version (5.1.0 ed.)*. The Cochrane Collaboration.

Horton, F. W. (1983). Information literacy vs. computer literacy. *Bulletin of the American Society for Information Science, 9*, 14–18.

Hovland, C. I., Janis, I. L., & Kelley, H. H. (1963). Communication and persuasion. In Psychological studies of opinion change. New Haven, CT: Academic Press.

Howard, P. N., Duffy, A., Freelon, D., Hussain, M. M., Mari, W., & Mazaid, M. (2011). *Opening closed regimes: What was the role of social media during the Arab spring?* Available at SSRN 2595096

Internet Corporation for Assigned Names and Numbers (ICANN). (2015). *IANA - root zone database*. Retrieved December 1, 2015, from <http://www.iana.org/domains/root/db>

Jackson, R. (2008). Information literacy and its relationship to cognitive development and reflective judgment. *New Directions for Teaching and Learning, 114*(114), 47–61. doi:10.1002/tl.316

Johnson, T. J., & Kaye, B. K. (1998). Cruising is believing?: Comparing internet and traditional sources on media credibility measures. *Journalism & Mass Communication Quarterly, 75*(2), 325–340. doi:10.1177/107769909807500208

Kapoun, J. (1998). Teaching undergrads WEB evaluation: A guide for library instruction. *College & Research Libraries News, 59*(7), 522–523.

Knight, M. L., Knight, R. A., Goben, A., & Dobbs, A. W. (2013). Theory and Application: Using social networking to build online credibility. In M. Folk & S. Apostel (Eds.), *Online Credibility and Digital Ethos: Evaluating Computer-Mediated Communication* (pp. 285–301). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2663-8.ch016

Kruger, J., & Dunning, D. (1999). Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality and Social Psychology, 77*(6), 1121–1134. doi:10.1037/0022-3514.77.6.1121 PMID:10626367

Kuhlthau, C. (1987). Information skills: Tools for learning. *School Library Media Quarterly, 16*, 22–28.

Kuhlthau, C. (2004). Seeking meaning: A process approach to library and information services (2nd ed.). Westport, CT: Libraries Unlimited.

Kuhlthau, C. C. (1999). Literacy and learning for the information age. In B. K. Stripling (Ed.), *Learning and libraries in an information age: Principles and practice*. Englewood, CO: Libraries Unlimited.

Lewis, L., & Chandley, N. (Eds.). (2012). *Philosophy for children through the secondary curriculum*. New York, NY: Continuum.

Lipman, M., Sharp, A. M., & Oscanyon, F. S. (1985). *Philosophy in the classroom*. Philadelphia, PA: Temple University Press.

Lucassen, T., & Maarten-Schraagen, J. (2012). Propensity to trust and the influence of source and medium cues in credibility evaluation. *Journal of Information Science*, 38(6), 566–577. doi:10.1177/0165551512459921

Mahood, Q., Van Eerd, D., & Irvin, E. (2014). Searching for grey literature for systematic reviews: Challenges and benefits. *Research Synthesis Methods*, 5(3), 221–234. doi:10.1002/jrsm.1106 PMID:26052848

Makino, T., Jung, C., & Phan, D. (2015, February 26). *Finding more mobile-friendly search results*. Retrieved May 10, 2016, from <https://webmasters.googleblog.com/2015/02/finding-more-mobile-friendly-search.html>

Manchikanti, L., Kaye, A. D., Boswell, M. V., & Hirsch, J. A. (2015). Medical journal peer review: Process and bias. *Pain Physician*, 18(1), E1–e14. PMID:25675064

Mbuagbaw, L., Thabane, M., Vanniyasingam, T., Debono, V. B., Kosa, S., Zhang, S., & Thabane, L. et al. (2014). Improvement in the quality of abstracts in major clinical journals since consort extension for abstracts: A systematic review. *Contemporary Clinical Trials*, 38(2), 245–250. doi:10.1016/j.cct.2014.05.012 PMID:24861557

McKeon, R. (1941). The basic works of Aristotle. *The Journal of Philosophy*, 38(20), 553. doi:10.2307/2017332

Meola, M. (2004). Chucking the checklist: A contextual approach to teaching undergraduates web-site evaluation. *Libraries and the Academy*, 4(3), 331–344. doi:10.1353/pla.2004.0055

Metzger, M. J. (2007). Making sense of credibility on the web: Models for evaluating online information and recommendations for future research. *Journal of the American Society for Information Science and Technology*, 58(13), 2078–2091. doi:10.1002/asi.20672

Metzger, M. J., Flanagin, A., & Medders, R. B. (2010). Social and heuristic approaches to credibility evaluation online. *Journal of Communication*, 60(3), 413–439. doi:10.1111/j.1460-2466.2010.01488.x

Pfeifer, M. P., & Snodgrass, G. L. (1990). The continued use of retracted, invalid scientific literature. *Journal of the American Medical Association*, 263(10), 1420–1423. doi:10.1001/jama.1990.03440100140020 PMID:2406475

Queens University. (2011). *Evaluating web sources*. Retrieved December 1, 2015, from <http://library.queensu.ca/inforef/tutorials/qcat/evalint.htm>

Rapp, C. (2010). *Aristotle's rhetoric*. Stanford Encyclopedia of Philosophy. Retrieved December 1, 2015, from <http://plato.stanford.edu/archives/spr2010/entries/aristotle-rhetoric/>

Ren, W. H. (2000). Library instruction and college student self-efficacy in electronic information searching. *Journal of Academic Librarianship*, 26(5), 323–328. doi:10.1016/S0099-1333(00)00138-5

No Shortcuts to Credibility Evaluation

Saint, S., Christakis, D. A., Saha, S., Elmore, J. G., Welsh, D. E., Baker, P., & Koepsell, T. D. (2000). Journal reading habits of internists. *Journal of General Internal Medicine*, *15*(12), 881–884. doi:10.1046/j.1525-1497.2000.00202.x PMID:11119185

Saracevic, T. (1975). Relevance: A review of and a framework for the thinking on the notion in information science. *Journal of the American Society for Information Science*, *26*(6), 321–343. doi:10.1002/asi.4630260604

Saracevic, T. (1996). Relevance reconsidered. In *Proceedings of the Second Conference on Conceptions of Library and Information Science*.

Schofferman, J., Wetzel, F. T., & Bono, C. (2015). Ghost and guest authors: You can't always trust who you read. *Pain Medicine*, *16*(3), 416–420. doi:10.1111/pme.12579 PMID:25338945

Scholz-Crane, A. (1998). Evaluating the future: A preliminary study of the process of how undergraduate students evaluate web sources. *RSR: Reference Services Review*, *26*, 53-60.

Selegean, J. C., Thomas, M. L., & Richman, M. L. (1983). Long-range effectiveness of library use instruction. *College & Research Libraries*, *44*(6), 476–480. doi:10.5860/crl_44_06_476

Shumaker, D. (2012). *The embedded librarian: Innovative strategies for taking knowledge where it's needed*. Medford, NJ: Information Today, Inc.

Smith, E., & Williams-Jones, B. (2012). Authorship and responsibility in health sciences research: A review of procedures for fairly allocating authorship in multi-author studies. *Science and Engineering Ethics*, *18*(2), 199–212. doi:10.1007/s11948-011-9263-5 PMID:21312000

Špiranec, S., & Zorica, M. B. (2010). Information Literacy 2.0: Hype or discourse refinement? *The Journal of Documentation*, *66*(1), 140–153. doi:10.1108/00220411011016407

Street, J. M., Rogers, W. A., Israel, M., & Braunack-Mayer, A. J. (2010). Credit where credit is due? Regulation, research integrity and the attribution of authorship in the health sciences. *Social Science & Medicine*, *70*(9), 1458–1465. doi:10.1016/j.socscimed.2010.01.013 PMID:20172638

Strudler, A. (2009). Deception and trust. In C. Martin (Ed.), *The philosophy of deception* (pp. 139–152). Oxford, UK: Oxford University Press. doi:10.1093/acprof:oso/9780195327939.003.0009

Tai, Z., & Zhang, Y. (2013). Online identity formation and digital ethos building in the Chinese blogosphere. In M. Folk & S. Apostel (Eds.), *Online Credibility and Digital Ethos: Evaluating Computer-Mediated Communication* (pp. 269–284). Hershey, PA: IGI Global. doi:10.4018/978-1-4666-2663-8.ch015

Taylor, A., & Dalal, H. A. (2014). Information literacy standards and the world wide web: Results from a student survey on evaluation of internet information sources. *Information Research: An International Electronic Journal*, *19*(4), 1–33.

Taylor, J. (2015). An examination of how student journalists seek information and evaluate online sources during the newsgathering process. *New Media & Society*, *17*(8), 1277–1298. doi:10.1177/1461444814523079

Test, D. W., Kemp-Inman, A., Diegelmann, K., Hitt, S. B., & Bethune, L. (2015). Are online sources for identifying evidence-based practices trustworthy? An evaluation. *Exceptional Children*, 82(1), 58–80. doi:10.1177/0014402915585477

The University of British Columbia. (2015). *Evaluating information sources*. Retrieved December 1, 2015, from <http://help.library.ubc.ca/evaluating-and-citing-sources/evaluating-information-sources/>

Thomas, N. P. (2004). *Information Literacy and information skills instruction: Applying research to practice in the school library media center*. Westport, CT: Libraries Unlimited.

Thomson, R., Ito, N., Suda, H., Lin, F., Liu, Y., Hayasaka, R., & Wang, Z. et al. (2012). Trusting tweets: The fukushima disaster and information source credibility on twitter. In *Proceedings of the 9th International ISCRAM Conference*.

University of Pittsburgh. (2015). *Evaluating web resources*. Retrieved December 1, 2015, from <http://www.library.pitt.edu/evaluating-web-resources>

Vassilakaki, E., & Moniarou-Papaconstantinou, V. (2015). A systematic literature review informing library and information professionals' emerging roles. *New Library World*, 116(1/2), 37–66. doi:10.1108/NLW-05-2014-0060

Wager, E., & Williams, P. (2011). Why and how do journals retract articles? An analysis of Medline retractions 1988–2008. *Journal of Medical Ethics*, 37(9), 567–570. doi:10.1136/jme.2010.040964 PMID:21486985

Wang, R. (2006). The lasting impact of a library credit course. *Libraries and the Academy*, 6(1), 79–92. doi:10.1353/pla.2006.0013

Wartenberg, T. E. (2014). *Big ideas for little kids: Teaching philosophy through children's literature* (2nd ed.). New York, NY: Rowman & Littlefield.

Wathen, 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. doi:10.1002/asi.10016

Wichowski, D. E., & Kohl, L. E. (2013). Establishing credibility in the information jungle: Blogs, microblogs, and the CRAAP test. In M. Folk & S. Apostel (Eds.), *Online Credibility and Digital Ethos: Evaluating Computer-Mediated Communication* (pp. 229–251). Hershey, PA: IGI Global.

Zurkowski, P. G. (1974). The information service environment relationships and priorities. Washington, DC: National Commission on Libraries and Information Science. Retrieved from <http://files.eric.ed.gov/fulltext/ED100391.pdf>

KEY TERMS AND DEFINITIONS

Epistemology: A branch of philosophy that studies the nature, scope, origins, and limits of human knowledge.

Grey Literature: Various research reports, white papers, issue briefs, conference proceedings, and other non-peer-reviewed documents, typically not published through traditional avenues.

ICMJE: The International Committee of Medical Journal Editors is a working group of selected biomedical journal editors. This group created the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals.

Information Literacy: A set of competencies enabling the effective location, evaluation, and utility of information.

Information Professional: An individual, such as a librarian, with a specialized skill set and expertise in collecting, organizing, describing, storing, preserving, and disseminating information packets in both physical and digital formats.

Peer Review: The process in which a research article is evaluated by other professionals in the same field.

Systematic Review: A methodology in which all clinical evidence (relevant to the review question) is appraised and synthesized.