NAVIGATING THE DIGITAL NARROWS: TEACHING STUDENTS TO READ CRITICALLY ON THE INTERNET

by

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ABSTRACT

The use of the Internet as a source of information is growing, especially among young people. Reading on the Internet poses unique challenges as texts on the Internet feature unique organizational features such as hypertext linking and search engines that must be navigated by readers; multimedia elements such as audio, video, and images that must be interpreted; and lowered barriers to publication that allow almost anyone to publish information in this medium. This last feature presents an important challenge to readers as they must exercise important skills of evaluation and critical thinking while reading in order to make sound judgments about the credibility of sources they find on the Internet. This study examined two approaches to teaching these skills to high school students. One approach focused on using the traditional checklist to teach students criteria of evaluative judgments; the other approach focused on strategies of sourcing and corroborating as well as using Internet tools to help students make these judgments. The results showed that both instructional approaches were effective in boosting students' accuracy in making judgments. Those in the first instructional approach showed increased abilities to explain their decisions using traditional criteria of credibility, suggesting that a concrete tool like a checklist may help all students learn these skills more effectively. Both groups also showed significant increases in their ability to look at

source information as a means of making judgments, suggesting that future instruction should focus first in this direction.

To my father, whose strength and encouragement

were felt even after he was gone

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CHAPTER 1

THE PROBLEM

A young man suffers a knee injury while playing soccer and he comes home from the game to search the Internet for his symptoms to see what kind of injury he might have and how to treat it. He finds a host of web sites that describe different symptoms and how to treat most knee injuries. A high school student, assigned to research the current health care debate in the United States, searches online for information about legislation currently under consideration that would alter the health care system. Her search results return a wide variety of opinions and points of view about the issue.

In both of these cases, and countless other instances where we turn to the Internet for help in answering a question or solving a problem, the Internet provides a potentially limitless source of information, facts, figures, and opinions. But while the Internet contains exciting possibilities in linking together terabytes of information and millions of people, it also poses dangers to those who search its pages. The young man who searches for information about knee injuries, while likely to encounter a number of reputable sources written by experts in the field, is just as likely to find personal anecdotes from blogs or discussion boards that do not reflect years of training and experience. The high school student searching for information about health care reform is just as likely to encounter sources that contain half-truths or strongly biased interpretations of

government efforts to reform health care as she is to find trustworthy, objective commentary about the legislation. For any reader who looks to the Internet for answers to questions or help with research tasks, the ability to discern what is valid and reliable from that which is not is of utmost importance.

Background of the Problem

The challenges posed for reading instruction by the new context of the Internet form the central problem my dissertation will address. In order to better understand this problem and its implications for instruction, in this chapter I will highlight a number of important ideas. First, I will discuss the growing use of the Internet in society as a whole and with teenagers specifically. Next, I will address the new skills and strategies that the increasingly-popular Internet requires of readers. Finally, I will discuss the current efforts of instruction in these areas and ways in which reading instruction needs to refocus to embrace new contexts like the Internet.

Increasing Internet Use and Availability

When I graduated from high school, the only "computer" in my entire high school of over 2,200 students was a mainframe computer with two dozen terminals used for the handful of computer programming classes my school offered. When I conducted research in my AP English course, I made exclusive use of the *Reader's Guide to Periodical Literature* and the books on our library's shelves. I was in a researcher's heaven when I began at the university and saw shelves stretching as far as I could see with printed, bound copies of almost every journal imaginable. As a graduate student, 20 years later, I

accomplish in a few minutes at an Internet-connected computer what took me hours of work as a freshman college student. The Internet, with its interconnected databases of digitized sources and its seemingly unlimited number of web pages, provides the most centralized collection of information in history.

While Internet connections were limited even 10 years ago, the availability of the Internet has grown remarkably in that short time. According to a Pew Internet study, 63% of adult Americans in April of 2009 reported having access to high-speed, broadband Internet in their homes, jumping from 55% of adults in May of 2008. This growth, in just 11 short months, represents an impressive increase in access to the Internet. And this growth was consistent across the board, with all groups from the wealthiest to the poorest homes showing increased access to the Internet (Horrigan, 2009). This increased accessibility has encouraged more Americans to turn to the Internet as they seek for information. Another Pew study showed that nearly one-half (49%) of Americans surveyed in 2008 reported using an Internet search engine at least once a day (Fallows, 2008).

As we might expect with any new technology, younger people are particularly drawn to the Internet. A study published in 2008 found that 94% of teens reported using the Internet, with nearly two-thirds (63%) reporting that they use the Internet daily (Lenhart, Arafeh, Smith, & Macgill, 2008). Another study showed that 76% of teenagers who use the Internet reported getting their news online and 31% reported using the Internet to find health information (Lenhart, Madden, & Hitlin, 2005). While not all of these students will have Internet access at home, their Internet access can come from schools, where a 2005 study found that 93% of K-12 classrooms have Internet access,

with 97% of those schools using broadband connections to access the Internet (Wells, Lewis, & Green, 2006). Increased availability of a resource like the Internet is clearly driving increased usage of that resource, both in schools and in the workplace.

New Literacies for a New Context

The textual world of the Internet is significantly different from that of the traditional print world. Where words on a page imply a somewhat one-dimensional, receptive sense of interaction with an author's ideas, the Internet—especially in its current iteration—invites a multidimensional sense of engagement with ideas. A text posted as a blog entry, for instance, invites immediate interaction with the ideas through the mechanism of comments posted to the entry. And the author can likewise respond in those same comment threads, elaborating on and exploring ideas with the audience in near real-time. Content is less static, too, as days or weeks later, the author may revise or update the original post to reflect changes that have occurred since the post was published. Tierney (2007) argues that literacy today involves "transacting with people and ideas" in both real and virtual spaces—and the immediacy of the interaction provided by the Internet embraces this very kind of literacy. The power of the Internet can bring together a wide variety of people, otherwise separated by time or geographical space, into a vibrant engagement with words and ideas.

The potential of the Internet has not been overlooked by the business world, either. The increased presence of the Internet within schools and amongst teenagers comes at a fortuitous time, as factors in the workplace have altered the demands these students' future employers will place on them. Employers increasingly seek to hire

individuals who can navigate the Internet and successfully read and write within this new context. Leu, et al. (2007) contend that the modern workplace values empowered workers rather than top-down management since these workers can solve important problems and increase productivity more effectively. The New London Group (2000) suggests that modern workers need to be flexible and able to adapt to changing contexts; they take on roles in the workplace that are very different from the historical assembly-line model where workers focused on piecemeal tasks. Thus it should be no surprise that recent reports on the current and future state of literacy instruction in this country have advocated for a focus on skills that will empower students in this new culture (Biancarosa & Snow, 2006; RAND Reading Study Group, 2002).

These new workplace demands require that workers be able to isolate problems, find and critically analyze information related to the problems in the effort to craft solutions, and then effectively communicate these solutions (Leu, Kinzner, Coiro, & Cammack, 2004; Leu et al., 2007). Similar skills are required as students read and make meaning using the Internet. Consider the case of a student—we'll call her Natalie—looking for information about the current health care reform debate in this country.

First, Natalie must understand where she can go to find information on the Internet. This might include familiar sites such as major cable news channel sites, but she might also make use of search engines like Google.com or search directories such as those found at Yahoo.com. Once Natalie decides where to go, she must then understand how to use each resource: Her approach to a keyword search engine like Google will differ from that to a web site like CNN.com. For a keyword search, Natalie will need to devise a handful of key terms to enter into the search engine, whereupon she will need to

critically evaluate the results returned by the search engine. In interpreting the information on the results page, she will look for key terms in a context that seems relevant to her search and may also begin evaluating the validity of this information as she scans which sites the results originate from. At this point in her search, Natalie may need to revise her terms in order to limit results to more relevant sources, an exercise that may require some patience indeed as she winnows down the results through multiple searches.

Once she has clicked through to a relevant site, Natalie will then need to find the specific information she wants from a web page which likely contains, in addition to text, multimedia images and video, advertisements, and links to other sites—all of which Natalie must skillfully examine and either use or reject as she locates the information she needs. In this process, she must also judge the credibility of what she encounters, as the kinds of editing safeguards that are often in plan for print resources do not exist for many Internet sources. And since visiting one site is not likely to provide Natalie with the complete picture she needs, she will return to the search results and visit multiple sites, all the while sorting out the information she needs and gradually synthesizing across multiple sources to build a complete representation of this issue. Finally, Natalie can communicate the results of her search through a variety of modes: as a traditional written report, as a blog entry, as a podcast with images and sounds, as a PowerPoint presentation—the possibilities are endless and each possibility has its own conventions that Natalie must master.

Throughout her research activity, Natalie has practiced a number of literacy skills, some of which carry over from those we emphasize in print literacy, but some of which

are unique to the new context of the Internet. If, as Tierney (2007) suggests, being literate is "being able to participate in one's world rather than just being an observer of it" (p. 22) and if the Internet is quickly becoming a legitimate source of information and ideas within that world, it is paramount that teachers of literacy acknowledge the need to help students acquire these new literacy skills. In so doing, we can better prepare students for a world that is likely, given the rapid pace of innovation, to look different even from the technologically amazing world in which they live today.

The Current Situation

Our hypothetical student Natalie seems agile in her use of new literacies and adept in reading on the Internet. A valid question at this point might be, Where did Natalie learn such proficient strategic behaviors? Unfortunately, it is difficult to assume that she may have learned these skills in school.

Cuban (2001) found that, in spite of advances in the numbers of computers in schools, teachers spent less than 10% of instructional time in computer labs in the best situation and only about 3% of instructional time in the worst situation. And in many cases, the use of the computers in these labs amounted to nothing more than word-processing or engaging in drill-and-practice activities. In a scientific poll of over 900 students, Strom, Strom, Wing, and Beckert (2009) found that, in spite of the fact that nearly two-thirds of students reported spending over an hour each day on the Internet, only 12% reported receiving school assignments that encouraged Internet use. Interestingly, 44% of students in this poll reported wanting to learn more in their school classrooms about Internet research skills. The results of a questionnaire delivered by

Gunn and Hepburn (2003) revealed that the majority of students surveyed (nearly 73%) reported learning Internet search techniques on their own, with nearly half of those students reporting that they used trial-and-error to learn these techniques. Given the increased importance of Internet-related skills in today's work environment, we have good reason to question the wisdom of continuing to allow students to teach themselves these new literacy skills.

It seems increasingly likely that teachers and schools will need to embrace the teaching of these strategies, for not many students are even learning these skills on their own. Too many students struggle to show the kinds of literacy skills that our hypothetical student Natalie possesses. One of the areas where we see students struggle is in locating information on the Internet. Recent studies (Bilal, 2001; Fidel, et al., 1999; Large & Beheshti, 2000) have shown that students struggle with using keyword searches effectively and seem more comfortable browsing the Internet rather than spending time in focused, more productive searches. One study (Guinee, Eagleton, & Hall, 2003) found that many students attempted a "Dot-Com" approach to finding information (inputting the research topic into a web browser address window and adding the ".com" suffix to it) before they considered using a search engine. However, search engines like Google or Ask.com are more useful tools and effective readers know how to use them in navigating the overwhelming number of links and pages that make up the Internet. In order to read successfully on the Internet, readers must be able to devise effective search keywords and revise those keywords when initial searches do not provide relevant information. That today's adolescents do not understand how to do this or may not even seem inclined to do this poses a challenge for teachers.

Once young readers have located information on the Internet, it is also clear that they struggle to know how best to use that information. It is not wise to trust information published on the Internet in the same way that we might trust information published in a reputable encyclopedia or peer-reviewed journal. Lowered barriers to publication on the Internet have allowed for a veritable explosion of material on the Internet, with some of that material being published by authors with agendas or biases that taint the trustworthiness of what they publish. Again, recent research (Agosto, 2002; Fidel et al., 1999; Hirsch, 1999; Shenton & Dixon, 2004) has shown that young readers are not equipped to deal with the need to critically evaluate the content of web pages that they encounter. In some cases, students in these studies showed no evidence at all of any effort to evaluate or question the validity of content they read on the Internet. And in those cases where students did engage in evaluation, they often used inadequate criteria (the amount of text on a web page or even the use of images, for example) as a basis for judgment. As with locating information, students' struggles to effectively evaluate the quality and validity of information they find online present a challenge for teachers.

This challenge is further exacerbated by the current conditions in schools. Many English and language arts classrooms focus on single printed texts that are chosen for students by the teacher and discussions of credibility rarely arise in situations like this. While many teachers, especially at the high school level, encourage research writing projects that could provide an opportunity for discussions like this, such discussions were rarely needed given that students in the past have relied more on print resources than on Internet sources. These print sources were often assumed to be trustworthy given editorial process in place for many of them, so such discussions may not have been deemed

necessary by teachers (Kinzer & Leander, 2003). Teachers who themselves were educated in a primarily print world may not be equipped to teach students the criteria and skills they need to be able to judge the credibility of sources and messages they encounter on the Internet.

Some schools have responded to this problem by putting in place filters designed to restrict students' access to sites and information on the Internet that is deemed questionable or unreliable. While there is certainly a need to protect young students in schools from unacceptable and harmful material, to use filters as a means for trying to ensure that students only receive credible information from the Internet is an effort doomed to fail (Harris, 2008; Lanke, 2008). With new sites and source being added every day, filters cannot be expected to keep up with this pace; overly conservative filter settings or schools that rely on the default settings may block sites that otherwise would provide rich information, especially for older students. Furthermore, students are often able to circumvent even the best filters, thus rendering them ineffective (Harris, 2008). Teachers have also tried to address this problem by preselecting Internet sites for students to use, as in the popular Web Quest activities (see http://webquest.org/index.php). Both of these approaches are less effective and certainly ineffective on their own as they fail to prepare students for the world of unfiltered Internet access they will encounter outside of the schools (Harris, 2008; Lankes, 2008).

Instead of relying solely on filters or controlled access, other teachers and schools have recognized the growing need to teach skills of critical reading on the Internet to students. The task of teaching how to evaluate the credibility of sources and messages has often fallen to school librarians, given their traditional authority in this area (Harris,

2008). Librarians have often, in this instruction, relied on the criteria and techniques that have been traditionally used with print and academic resources (Meola, 2004). However, the Internet is a different medium from traditional print resources which suggests that we might need to reconsider traditional criteria of credibility and how they apply to sources and messages on the Internet. While traditional print notions of credibility may give us a place to start the discussion about credibility on the Internet, the case can certainly be made that the Internet's unique features require us to refine these notions. Research in the area of credibility and how to teach evaluation skills to students can help clarify these ideas.

In summary, the research evidence suggests that students do not naturally possess the kinds of literacy skills they will need to successfully use new technologies like the Internet. As society and the workplace increasingly require facility with these new technologies, schools should feel increasing pressure to help students acquire the strategic knowledge students need to be literate in these new contexts. The evolution of technologies like the Internet, though, also challenges schools to reconsider traditional notions and techniques that worked in a print world but may not be completely suited to a new, digital world of networked information.

Purpose of This Study

One of the essential literacy skills required by these new technologies is a that of evaluative reading, which I define here as the collection of skills and strategies readers use to critically analyze and evaluate the relevance, trustworthiness, and accuracy of information encountered while reading a text or series of texts. While evaluative reading

plays a role in print contexts, the lack of editorial controls in Internet texts requires readers to more frequently make use of these skills.

This study compares two instructional approaches that are informed by two attitudes towards evaluative reading on the Internet. The first approach teaches students to make judgments about credibility using the criteria of accuracy, authority, objectivity, currency, and coverage as presented in a checklist form. This approach is heavily inspired by traditional means of evaluating credibility of print sources and will largely focus on evaluating Internet web sites independently, looking to the site itself to provide any information needed to make the judgment. Given this focus on sites as discrete sources, I have titled this approach the Localized approach.

The second approach focuses on similar criteria but teaches students to use this criteria through teaching them strategies of sourcing, corroborating, and contextualizing. This approach is informed by our understandings of the Internet today and the way texts are formed and presented in this medium. In this instruction, students are encouraged to conduct searches about the author or publisher of a site, to explore beyond the site itself for information to use in making judgments about an author's qualifications and possible intentions for publishing the source in question. Students are also be encouraged to review multiple sites at once, something more easily accomplished in an Internet search than in a traditional review of print sources, in an effort to compare and corroborate information as they make judgments about credibility. Students are also taught to make use of paid online databases that index trusted sources in an effort to build background knowledge about a topic that would help facilitate this corroborating. This second approach is titled the Contextualized approach because it seems to use the tools and

affordances of the Internet to help students more effective situate their research and sources and thus better judge the credibility of what they come across in reading on the Internet.

While these approaches differ in some fundamental views about how to best approach evaluative reading on the Internet, both are heavily informed by research that has shown the effectiveness of explicit strategy instruction in traditional print reading fields (Dole, Duffy, Roehler, & Pearson, 1991; Duke & Pearson, 2002; NICHHD, 2000; Pearson & Dole, 1987; Pressley, 2000). The elements of explicit strategy instruction that are incorporated in these approaches include teacher modeling, guided practice, and independent practice. In the case of the localized instruction, the use of the checklist and its criteria-based questions is seen as a single strategy that students should learn; in the contextualized instruction, the three strategies of contextualizing, sourcing, and corroborating are taught.

Additionally, I was interested in the possible influence that students' prior experience might play in the potential they had for learning what was presented in these instructional approaches. While the early research has shown that students are not engaging in effective evaluative reading behaviors on their own, I sought to take advantage of the opportunity to see if previous, independent experience with Internet searching might facilitate formal instruction in this area.

The growing need discussed here to teach students important reading skills for an Internet context has significant research implications. This study seeks to address some of these research needs and will answer these research questions:

1. Will students receiving instruction in evaluative reading perform better at evaluative reading tasks if taught with a contextualized approach or with a localized approach? Will students' self-reported, independent experience with Internet searches influence any gains?
2. Will students like participating in instruction about evaluative reading on the Internet? Will they show a preference for one approach over the other? Will students' self-reported, independent experience with Internet searches influence their likes or preferences?

This study seeks to first assess whether formal instruction in skills of evaluation will help students become more accurate in their judgments of the credibility of Internet sources and how one approach might be more effective at this than another. By so doing, this research can shed light on how teachers might appropriate time to this important area, given the many demands made on teachers and the limited resources (time most especially) they have to meet those demands. Positive results from the instruction described in this study could encourage teachers to devote time to teaching skills of evaluation in reading on the Internet. If the results of this part of the study are favorable, then teachers will be able to implement similar procedures in their classrooms with similar results. Teachers who may feel uncomfortable or unfamiliar with how to integrate instruction in new literacy skills needed for the Internet may, based on the results of this study, find an answer to that challenge. And teachers and schools who rely solely on Internet filtering as a solution to the problem of credibility on the Internet may reevaluate that stand and introduce instruction to help empower students to make judgments on their own.

In comparing the effectiveness of two instructional approaches, one based on traditional print concepts of credibility and the second that takes more advantage of the affordances of the Internet to make these judgments, this research can help clarify the picture of how to teach these skills. As notions of what makes a source credible and how to make judgments about credibility change in the face of technologies like the Internet, research needs to be conducted to understand how we should address these shifts instructionally. While much instruction in this area currently focuses on criteria of credibility and even techniques for evaluating credibility that come straight from the world of print, those standards may no longer be sufficient in the shifting milieu of the Internet. The results of this study can influence the discourse on such changes and help provide information about how this shift should be addressed in classroom teaching.

Finally, this study will explore the role that students' prior experience with Internet searching plays in their learning about how to evaluate Internet sources. Research described earlier in this chapter shows that young people increasingly turn to the Internet as a source of information and that they are more likely to do so right now than are adults. Young people's acceptance of the Internet implies more familiarity with this medium and this may influence their ability to learn new skills related to the medium. Not all young people have the same access to this technology and thus may not have the same levels of experience, a factor which may influence their ability to internalize instruction in reading on the Internet. The results of this study may help inform policy discussions about making the Internet available to more groups of young people and may also help inform teachers' practice in dealing with students of varying levels of experience with the Internet.

In the next chapter, I will further investigate the theoretical underpinnings of the issues I have introduced in this chapter. Additionally, I will explore in more detail current research efforts that inform the design of the intervention used in this study. The next chapter poses some challenges as the research in these areas is not centrally located. Valuable research has been done in the field of literacy and reading research, coming from a focus on the way readers on the Internet make sense of what they read given some unique features of Internet texts. This research, similar to much other research in the field, has sought to identify the skills that good readers use in this context as well as what makes reading on the Internet a unique experience versus reading in print. The literature of critical thinking also has bearing here in the way that this field has looked at how we make evaluative judgments based on specific criteria and in describing how higher-order thinking skills are used in these judgments. Additional important research has been done in the field of library sciences, often under the label of information literacy: research on credibility judgments and the criteria people use to determine credibility has revealed important ideas that are relevant to this study. The next chapter will combine the relevant ideas from these different research areas in presenting a framework for this study.

CHAPTER 2

LITERATURE REVIEW

In this chapter, I outline the theoretical framework for this study as well as describe and analyze previous research that informs my study. To begin, I examine the nature of reading on the Internet by exploring a theoretical framework of mental models or representations formed by readers as they read. Arguing that these cognitive models are not sufficient to address the process of reading on the Internet, I then look at more recent understandings that deal with reading in new contexts. The understanding gained from these frameworks can help in crafting a more effective intervention that helps students make better judgments about credibility while reading on the Internet, a major emphasis of this study. I then discuss the concept of *evaluative reading*, defined here as reading that involves adopting a judgmental stance where the reader seeks to not just understand the content of what is being read but to also assess the trustworthiness of the source and the validity of the information being read. Evaluative reading is an integral part of effective reading on the Internet and is the focal point of this intervention study. I then examine research that has explored students' attitudes towards evaluative reading and how they engage in such behaviors naturally, without any formal instruction. I conclude the chapter by examining current efforts in teaching skills of evaluative reading

to students and explore the potential weaknesses in these efforts as well as alternative approaches that might yield better results.

Theoretical Frameworks

Reading instruction, even when focused on lower-level processes like phonemic awareness or word recognition, has comprehension as its ultimate goal (Pressley, 2000). As teachers, we care that students can master letter-sound correspondences and fluently recognize a large body of words so that they can, ultimately, comprehend the meaning in the words and sentences they encounter while reading. It is important, then, to understand the processes that readers make use of in making meaning as they read. In this section, I will outline the theoretical frameworks that form an understanding of reading comprehension and, in turn, inform the instructional intervention undertaken in this study.

Mental Models: A Cognitive Lens

One of the primary frameworks I rely on in this study—mental models—is itself situated within a broader cognitive approach to reading comprehension. Cognitive approaches to reading comprehension advocate that meaning is established within the mind of the reader, that a text's messages do not exist solely within the words and sentences in the text itself (Rumelhart, 2004). Meaning is made as the result of an interaction between what a reader already knows and what the text itself has to say (Adams, 1994; Kintsch, 1988; Rumelhart, 2004). Reading comprehension is an interactive process in which the brain makes use of a variety of higher- and lower-order

processes to make meaning of the words and sentences presented in a text (Rumelhart, 2004). A reader achieves "comprehension" of the text by integrating the ideas she encounters in the text (understood through processes of decoding words and sentences) into a coherent body of knowledge that exists in the mind (Adams, 1994; Kintsch, 1994, 1998). This process of comprehension creates a mental model in the mind of the reader; this model represents the reader's understanding of the content of the text.

The formation of the model proceeds in stages and the initial model, often referred to as the *textbase*, is an interconnected network of the basic ideas in the text and is only a rough representation of the text (Kintsch, 1994; van Dijk & Kintsch, 1983). During reading, this textbase is further refined when the reader activates preexisting schemas of long-term and procedural knowledge and connects these schema to the text being read (Anderson, 1978 & 2004; Kintsch, 1994; Rumelhart, 1980). As knowledge from preexisting schema is activated and used during reading, it is integrated into the textbase, resulting in what is referred to as a *situation model*, a more elaborate representation of the text. A situation model is not simply a description of the text itself or the ideas derived from the text, but it is a more complete "representation of what the text describes" (Glenburg et al., 1987, p. 71). A solid textbase may be enough for the reader to recall facts or information from the text, but the situation model allows the reader to actually modify or elaborate her preexisting knowledge, thus facilitating new understanding and learning (Kintsch, 1994, 1998; Rouet, 2006).

Situation models are "updated" as the reader has new experiences or as new texts are assimilated into the reader's world knowledge (van Dijk & Kintsch, 1983). The process of updating a situation or mental model is an important one for educators with the

goal to help students comprehend texts and learn from their reading. This updating, where new knowledge is integrated into the existing mental model, represents learning and reading comprehension as most educators would define it (Kintsch, 1998; RAND Reading Study Group, 2002). In the context of reading on the Internet, updating serves an important purpose as readers look to integrate sometimes conflicting or contradictory information across multiple text sources into one mental model and to use skills of evaluative reading to decide which information is valid enough to be integrated into the final model. Breakdowns in the updating process can be a serious impediment to successful reading on the Internet.

Successful updating of a mental model can be problematic, especially if information encountered later in the text or in a later, related experience with another text contradicts information in the situation model. Research has shown that this is not a simple process nor is it something that always happens successfully for readers (Johnson & Seifert, 1999; van Oostendorp, 2002; van Oostendorp & Bonebakker, 1999). The theories that have arisen to explain the difficulties in updating a mental model after contradictory evidence is presented are particularly appropriate for this study given that reading on the Internet requires readers to both notice and reconcile possibly contradictory information across texts (Burniske, 2000; Qaintance, 1968). The specific strategies of evaluative reading require readers to incorporate information from multiple texts and to reconcile potentially conflicting information as they seek to determine trustworthiness of different sources—both of which have a significant role in the updating process.

Issues in Updating Mental Models

Much of the research into updating problems has shown that this is not a simple process nor is it something that always happens successfully for readers (Johnson & Seifert, 1999; van Oostendorp, 2002; van Oostendorp & Bonebakker, 1999). One explanation for this lack of updating has prompted Johnson and Seifert (1999) to theorize the existence of two levels of updating, *surface updating* and *global updating*. *Surface updating* entails taking note of the contradictory information, integrating it into the text representation, and detecting that the correcting information is connected to information already existing in the text and representation. This level of updating, as its name implies, only applies to the reader's surface construction of the text, the textbase representation. In reading on the Internet, this surface updating would come into play when reading multiple texts that contain contradictory information. Readers must be active enough while reading to recognize the contradictory evidence and link together the two texts so that later decisions can be made about how to resolve the conflict.

On the other hand, *global updating* entails a more thorough integration of the new, contradictory information into the situation model by recognizing the implications of the contradictory information and revisiting and revising, as appropriate, previous inferences to update the situation model. Such global updating implies the use of critical thinking skills that readers must bring to bear in making decisions about how to resolve discrepancies they encounter while reading.

Problems can occur at both of these levels of updating. At the surface level, readers may fail to even notice the correcting information, for instance, or they might notice the new information but not realize that it contradicts or corrects prior information.

Or, even if they notice the new information contradicts old information, readers may not fully accept that the new information replaces the old (Johnson & Seifert, 1999). At the global level, problems might arise because of the need to revisit old inferences made using the previous, incorrect information. The new information also needs to be integrated into the situational model by making links between text elements and the new information, not the invalid information (Johnson & Siefert, 1999). Both of these are mentally taxing processes and may not be readily engaged in by readers.

The challenges in updating at surface and global levels may help explain some discrepancies in the research on updating. That participants can recognize and recall the correcting information seems to be evidence of the surface level of updating while the fact that readers do not engage in global updating may account for low updating performance as seen in postreading tasks (Johnson & Seifert, 1999; van Oostendorp & Bonebakker, 1999). This suggests that while readers do not reject the new information outright they do not effectively integrate it into their situation model for the text, thus impeding their abilities to make correct inferences about the text. van Oostendorp and Bonebakker (1999) suggest two further explanations for why this global updating does not occur as effectively as it should. It is possible that readers refuse to make changes in important points in the situation model, perhaps because those points are strongly encoded in the original model. Or, a more plausible explanation, is that readers "skip" the new information because they think that they are already familiar with it. There is evidence for this "sloppy encoding" explanation in a separate study by van Oostendorp (1999).

These challenges in updating a situation model highlight the role of executive processes at work in the reader's mind. Within a cognitive framework, the reading process also includes comprehension monitoring processes or metacognitive controls that govern the processes of decoding and comprehension. These processes involve both monitoring comprehension and regulating the response to problems in comprehension (Hacker, 2004). A reader, then, can be aware of higher-level processes that guide the activation of schema and the integration of new knowledge, as discussed here in the context of creating and refining mental models. With this metacognitive awareness comes the ability to control these processes, to bring to bear specific kinds of knowledge (including procedural knowledge) to aid comprehension (Palincsar & Brown, 1984). In the case of updating a situation model, these monitoring processes can help the reader notice when conflicting information is presented and provide guidance for resolving these conflicts (van Oostendorp, 2002; van Oostendorp & Bonebakker, 1999).

Theories about mental models and metacognition provide an important framework for this study by helping researchers not only understand the meaning-making process readers engage in when reading, but also how readers adjust their understanding when they encounter conflicting ideas when reading. The wide variety of texts on the Internet practically guarantees that readers in this medium will encounter a variety of perspectives in the texts they read which can pose challenges for many readers. Good metacognitive awareness of their own strategies for resolving differences and synthesizing ideas will help them be better readers. An understanding of these strategies as they are used in the context of Internet reading will inform instruction in this area in

important ways, as the goal of instruction is often to help students' improve in these metacognitive abilities.

Limitations of Mental Models for Internet Texts

As much light as mental models can shed on the processes of reading comprehension, they are limited in their ability to explain the entire comprehension processes for readers who are working with texts from the Internet. This is evidenced in a study (Leu, 2006) that used the *Save the Northwest Tree Octopus* web site (http://zapatopi.net/treeoctopus/) to assess students' ability to determine the trustworthiness of information presented on that site. When asked by researchers whether the information presented on this site (which is actually designed as a hoax) would be suitable for use in a research project about endangered animals, students did not readily use conflicting information from linked web sites that could have discredited the original site, nor were all students willing to update their mental models and accept the hoax even after teachers had revealed the site's true nature to them. This study and other research that highlights students' difficulties with successful comprehension of Internet texts (Agosto, 2002; Fidel, et al., 1999; Schacter, Chung, & Dorr, 1998; Shenton & Dixon, 2004; Walraven, Brand-Gruwel, & Boshuizen, 2009) imply that comprehension of Internet texts does not consist solely of building a textbase into a situation model. Other factors are at work in these texts and must be considered fully before we can understand the comprehension processes at work and devise instruction that will help students become proficient with these skills.

Recent work has suggested that the differences between reading in print and reading on the Internet are significant and should not be ignored. Hartman, Morsink, and Zheng (2010), acknowledge that reading in an Internet context shares similar basic processes with traditional print contexts; however, they counter that higher-order process involved in comprehension do likely differ. The root of this difference, they suggest, is in the frequency of unusual demands on Internet readers, the degree of those demands, and the speed with which Internet readers are asked to process material that differs from traditional print sources. Burbles and Callister (2000) have specifically focused on hypertext and noted that this feature of Internet texts allows for unprecedented freedom in navigating texts and places unique demands on Internet readers that reading in print contexts does not do to the same degree.

Afflerbach and Cho (2009) reviewed studies conducted since the publication of Pressley and Afflerbach's *Verbal Protocols of Reading* (1995) to look specifically at emerging data about the strategies used by skilled readers in an Internet environment. In comparing the results of recent work with what had resulted from Pressley and Afflerbach's (1995) original work, they found that readers in the two environments did, indeed, employ many similar strategies, suggesting that the nature of reading in the two contexts does overlap. However, they also found that readers in Internet contexts did employ some unique strategies, including strategies related to "realizing and constructing potential texts to read" since the text a reader reads on the Internet is not as clearly defined as it is in a print context (p. 210). In addition, Afflerbach and Cho found that readers employed strategies of monitoring and evaluating in unique ways when they read on the Internet. These findings suggest that, although it certainly resembles and shares

much with reading in print contexts, reading on the Internet places unique demands on the reader and requires a different conception of the reading process.

Consequently, relying solely on mental models to explain reading on the Internet falls somewhat short because it does not account for specific features of Internet texts that present particular challenges to readers. Texts on the Internet, for instance, are not organized with any particular overarching order; consequently, good Internet readers must be able to efficiently locate information using search engines, extracting the most relevant texts from a vast body of potential search-engine results (Guinee, Eagleton, & Hall, 2003; Henry, 2006; Leu, et al., 2007; Sutherland-Smith, 2002). Internet texts also make use of hyperlinks that encourage a nonlinear form of reading that does not follow most patterns students might develop reading traditional texts (Kinzer & Leander, 2003; Sosnoski, 1999; Tierney, 2007). In addition, good Internet readers rarely focus their attention on a single text but instead read across multiple web sites authored by different individuals with unique perspectives and biases; not only does this imply the need for Internet readers to be more critical readers of text, but it also suggests that readers will need to synthesize the information from multiple sources into a coherent whole (Dalton & Proctor, 2008; Kuiper & Volman, 2008; Leu et al., 2007).

These specific features suggest that additional theoretical frameworks will be needed to help understand the nature of reading on the Internet. It will not be enough for us to conceptualize reading on the Internet in the same ways that we have traditional print texts. While good Internet readers may not engage in entirely new processes while they read, this reading takes place in a new context with unique characteristics and affordances that require us, at the very least, to broaden our theoretical constructs for reading. I will

next explore in more detail the specific characteristics of Internet texts that challenge a theoretical model that is purely cognitive and then explain how additional theoretical frameworks can inform our work with reading Internet texts.

Organizational Features

Texts on the Internet do not exist as a neatly compiled, well-organized set of documents such as we often encounter in the print world. Instead, Internet texts (i.e., individual web "pages" or elements of those pages) are scattered in many virtual locations, situated within web sites that themselves may possess an organization but that bear little or only coincidental similarities to other sites and pages on the Internet.

This lack of a unifying organization for the Internet has led to the creation of search engines that scour web sites, identifying key words and phrases as they create an index of the sites. These search engines then facilitate access to information spread across multiple pages and sites, but also create the challenge of learning an additional tool as part of the access process. A proficient Internet reader needs to understand how to effectively and efficiently use a search engine and interpret search engine results in order to locate information on the Internet (Eagleton & Dobler, 2006; Guinee, Eagelton, & Hall, 2003). These location skills include the ability to craft keywords for search engines, to quickly and effectively evaluate search engine results, and to readily find desired information on destination web pages (Henry, 2006; Leu et al., 2004, 2007).

The prevalence within web pages of hypertext links that link readers immediately to sources outside the immediate text also implies that reading on the Internet will be a nonlinear task that entails the use of multiple sources that readers must manage; Kinzer

and Leander (2003) suggest that there may be "an infinite number of paths through a document or domain" linked via hypertext links (p. 551). Purves (1998) argues that hypertext is not "nonlinear, but multilinear" or that even the word "multidirectional" may better characterize hypertext (p. 243). The demand for ordering and making sense of the connections between these texts (i.e., building a mental representation from these disparate texts) can be understandably significant (Leu et al., 2007). Hypertext links, which connect related concepts in one text with those in another text, pose a number of advantages and disadvantages for readers. Conklin (1986) suggests, for instance, that hypertext links encourage nonlinear reading that is more in line with the rational development of thought and ideas. Readers, he adds, have tremendous choice in their reading since they can choose which links to follow (and which ideas to explore further) and which to ignore. In essence, as Internet readers move from webpage to webpage and website to website, they are creating a highly individualized, unique "text" of their own in the process, engaging in an authorial process as they read (Burbules & Callister, 2000; Kinzer & Leander, 2003; Leu et al., 2007; Purves, 1998; Sosnoski, 1999; Sutherland-Smith, 2002). This notion of connections between texts has always been possible, but the facility with which authors can embed them and the immediate accessibility of hypertext links for readers encourages this kind of nonlinear, nonhierarchical reading on the Internet (Burbles & Callister, 2000).

While it has exciting possibilities, this highly interconnected system of links also poses challenges. In traditional reading instruction, focused primarily on single texts, students are often not conditioned to make connections between multiple texts; those strategies that they have mastered in the context of linear, isolated texts may not be as

effective in an Internet context (Kamil & Lane, 1998). Additionally, it can be all too easy for a reader to become "lost" in the sea of links, a problem Conklin (1986) refers to as the "disorientation problem" (n.p.) or that Burbles and Callister (2000) compare to the story of Hansel and Gretel who cannot find their way home after wandering through the woods. Given the overwhelming "number and flexibility of pathways that are available" (Burbules & Callister, 2000), readers can quickly become unsure of where they are in the network of links and texts and how to get where they need to arrive in their reading. Rouet and Levonen (1996) suggest that hypertext-connected texts can make it challenging for students to keep all the meaningful connections between texts in mind at one time, posing a significant cognitive challenge for readers. The design and layout of a web page can also contribute to this disorientation (Altun, 2000).

While readers can face similar challenges when reading multiple, related print texts, the situation with Internet texts is somewhat different. Hypertext links provide many, many more degrees of freedom and thus present specific challenges to the reader/author who navigates them. And the hypertext organization of the Internet (either deliberately constructed by a web site author or presented via a page of search engine results), is much more *present*—it is a simple task to click an underlined blue hypertext link on the Internet and be whisked away to a new text as opposed to the relatively arduous task of physically locating a related book or magazine article in the stacks of a library. Any model of reading processes that we use to understand Internet reading must account for the possibilities of hypertext and the challenges of integrating multiple texts into a single, coherent understanding.

Multimedia Elements

Individual texts or pages on the Internet may also differ from traditional print texts in their inclusion of a variety of elements on the page. A typical web page, for instance, is likely to include visual graphics that serve to illustrate the written text (Kamil & Lane, 1998). As Kress (1999) argues, this increased presence of the visual alongside the written is nothing new, but now writing is no longer the *only* medium for "conveying all the information which is judged to be relevant" (p. 74). Communication of some messages is best suited to a visual medium, as illustrated by Kress' (1999) discussion of a textbook page on electronics that uses visual images—with communicative purposes in and of themselves, not as mere illustrations of the written text—to communicate important information about circuit design. Reading a multimedia text like this, Kress suggests, makes a "different cognitive demand" on the reader as she moves between realist forms (the written text) and more abstracted forms (the representational images) within the same space (p. 76). Mayer (2009) suggests that in a multimedia context, a learner must engage in five processes: separately selecting relevant words and images for processing; organizing words and images into verbal and visual mental models, respectively; and, finally, integrating these verbal and visual models into a single model. The processes Mayer describes represent the different cognitive demands made by visual elements when present in a text like those encountered on the Internet.

Internet texts containing these multimedia also provide a medium for displaying advertising images alongside the written text. These commercial elements may not be readily distinguishable from images designed to communicate part of the text's meaning, thus requiring Internet readers to carefully select the most relevant images and words

from the mix (Mayer, 2009; Sutherland-Smith, 2002). With the advent of targeted advertising like Google's AdWords program that is contextually appropriate for the page on which it is displayed, these advertisements can be even more difficult for a reader to identify since their content is often meaningfully related to the information in the web page. In order to boost revenues, many web sites will incorporate these ads into the written content of the page and, given their striking connections to the page content, an unsuspecting reader could easily see these ads as part of the written content. Or consider pop-up advertisements designed to imitate the visual style of an operating system error message in the hopes that unsuspecting Internet readers will "click-through" and purchase software or services they do not really need (Eagleton & Dobler, 2006). Effective reading on the Internet, then, requires that readers be able to employ critical thinking skills (Coiro, 2003b; Leu et al., 2004; Sutherland-Smith, 2002) in evaluating the purpose of a page or even elements on a page so as to distinguish important graphics like charts or illustrations connected to the text from those that serve a commercial purpose.

Given the multimedia capabilities of today's modern web browsers, Internet texts can also include in-line video clips, music, spoken word, or other forms of media. From an educator's perspective, these integrated media can be a boon for teaching purposes. A web site designed, for instance, to explore Martin Luther King, Jr.'s historic "I Have A Dream" speech may include not just the text of the speech and written commentary on it, but link also to video and sound clips of the speech and images from the speech, the march leading up to the speech, and related events of the civil rights era. A presentation of this sort can allow for a much more comprehensive understanding of the speech and its historical context. However, while these integrated media can be a boon, they can also

challenge Internet readers. Multimedia clips are enticing to young students and can detract from the written text or may not be appropriate to the content being studied, especially in the case of flashy, eye-catching advertisements (Eagleton & Dobler, 2006; Sorapure, Inglesby, & Yatchisin, 1998).

In addition, multimedia pieces are "texts" in and of themselves. As Rouet (2006) demonstrates by analyzing a typical page from a history text book that includes not just informational text but images and other documents, these elements place higher cognitive demands on the reader since they must be integrated into a single mental model, in spite of the lack of coherence that might exist between the printed text and these multimedia elements (see also Mayer, 2009). These multimedia features demand that readers be more discriminating in what they attend to on a page and how they attend to certain elements, such as text or links to other pages, over others, such as video clips or other multimedia. This places demands on readers for more complex critical thinking skills (Leu et al., 2004) and the use of processes of selection and integration discussed by Mayer (2009).

Finally, the presence of more visual elements suggests that we need a framework for understanding how readers parse these images that incorporates social and cultural concerns existing outside the text. As Kress and van Leeuwen (2006) argue, "visual structures point to particular interpretations of experience and forms of social interaction" (p. 2). Culture influences the way we interpret visual and linguistic texts. We cannot consider visual elements on an Internet web page in isolation but must understand them within a broader, social and cultural context. To fully capture how readers process these images and text, we must embrace frameworks which consider social and cultural factors and how they influence meaning making.

Authorial Issues

Texts on the Internet represent a wide variety of authors with divergent attitudes and motives for publishing on the Internet (Coiro, 2003b; Dalton & Proctor, 2008; Leu et al., 2004; Sorapure, Inglesby, & Yatchsin, 1998). Again, this can be a boon in cases where readers seek different viewpoints, but it can also serve as a major obstacle to successful comprehension. Traditional editorial processes that exist in many print contexts do not exist on the Internet, and with recent innovations in social networking and other participatory technologies, it is easier than ever for any person, regardless of skill level, to publish on the Internet. These lowered barriers to publication suggest that, when searching and reading on the web, biased or unreliable information is just as likely to be encountered as is trustworthy content. It is critical that the Internet reader adopt a skeptical attitude while reading and to methodically determine the validity of the information found on the Internet (Burbles & Callister, 2000; Dalton & Proctor, 2008; Eagleton & Dobler, 2006; Kinzer & Leander, 2003; Kuiper & Volman, 2008). A reader unable to do this effectively might be misled and form misconceptions or, potentially worse, suffer financial or other personal losses.

Students who, for example, conduct a Google search for information on Martin Luther King, Jr. by entering his name as a keyword search will come across a link early in the first page of search results to a site sponsored by the white supremacist group Stormfront that, behind an innocuous-looking home page, contains racist and inflammatory content. A reader who cannot discern authorial intent in this case may be led to accept false and misleading information. And while students will tell researchers that it is important to not trust everything they encounter on the Internet, they often have

difficulty putting such advice into practice (Leu, 2006; Metzger, Flanagan, & Zwarun, 2003). For instance, the study that looked at students' evaluation of the *Save the Northwest Tree Octopus* (Leu, 2006) found that 42 out of 48 high-performing students mistakenly trusted the web site, which was designed to be a hoax. The fact that some students insisted on the validity of the site's information even after they were informed of the site's true nature further emphasizes the challenges readers face as they search and read on the Internet. Some of this difficulty is explained by the research on updating situation models that highlights the difficulties readers have in integrating new and conflicting information into a pre-existing mental model (Johnson & Seifert, 1999; van Oostendorp & Bonebakker, 1999) and some is explained through social and contextual issues that will be explored below.

Being aware, as a reader, of an author's credentials or potential biases plays a role in successful print comprehension and is not a unique skill required by Internet texts. However, it is an important skill to apply in all reading contexts on the Internet given the open nature of publication in this medium. It is not enough, though, to simply apply the traditional criteria we might use in print contexts to evaluate a source's credibility (Kinzer & Leander, 2003; Sorapure, Inglesby, & Yatchisin, 1998). While criteria like purpose and author credentials certainly can play a role in the way Internet readers must evaluate the texts they encounter, the unique nature of the Internet requires that we better contextualize our use of these criteria and adopt different criteria as well. For instance, in researching the Iraq war on the Internet, a reader who encounters a personal blog written by a solider who participated in this conflict might, applying traditional criteria to evaluate this source, dismiss the source because it does not meet standards effective for

secondary, library-type sources. A blog like this, however, made possible due to the democratic publication standards on the Internet, could provide valuable primary source information if contextualized within and connected to credible secondary sources (Sorapure, Inglesby, & Yatchisin, 1998). So Internet readers must also understand social and rhetorical elements of the Internet in order to effectively apply evaluative criteria (Kinzer & Leander, 2003).

While concerns about the trustworthiness of the information in a text are also relevant to print texts, their importance for Internet reading cannot be understated. Skills of critical analysis and evaluation must be brought to bear more frequently and regularly in Internet reading, to the point that they should become common practice for Internet readers. A model of reading process on the Internet must take into account this need for critical analysis of texts and their authors to adequately explain Internet reading.

Additional Lenses for the Challenges of Internet Texts

Although a framework like mental models can provide us with a meaningful explanation for how readers comprehend a single print text, it does not provide the complete picture we need to make sense of good reading in the context of Internet texts. Explanations need to be provided for the mental models readers develop based on integrating multiple texts, as would be demanded of an Internet reader who explores ideas across related texts. The need for critical questioning while reading, where a reader may need to judge the validity of information (textual or visual) contained in a text before making a decision about integrating that information into the situation model needs also

to be explored. Additional frameworks will be needed to fully explain the process of the Internet reader.

As the context within which reading takes place has shifted with the introduction of new communication technologies and media like the Internet, an increasing number of researchers and writers are encouraging teachers and educational researchers to consider both expanded definitions of what constitutes a "text" and what we mean by "literacy" (Biancarosa & Snow, 2006; Bruce, 1997; Dalton & Proctor, 2008; International Reading Association, 2009; Kinzer & Leander, 2003; Lankshear & Knobel, 2006; Leu, 2000; Leu, Kinzer, Corio, & Cammack, 2004; The New London Group, 1996; RAND Reading Study Group, 2002; Reinking, 1998). Some of the ideas that have come about as a result of this exploration inform this study in important ways.

New Literacy Studies and Social Frameworks

As work has progressed in defining reading in these new contexts, researchers are shifting from more psychological or purely cognitive paradigms for viewing literacy and incorporating those that are more social and cultural; as Lankshear and Knobel (2006) suggest, this shift is concerned "with a new approach to thinking about literacy as a social phenomenon" (p. 24). This paradigmatic shift has taken the form of efforts like the New Literacy Studies which focus on literacy as social practice, describing multiple literacies that shift within time and space but also within power relationships (Gee, 1991; The New London Group, 1996; Street, 2003). Theorists in the New Literacy Studies group are not only concerned with issues of literacy and technology but also with broader issues of access to technology and knowledge. This group is concerned, too, with broader

implications of social and cultural practices of reading that have social and political implications.

Social models of the reading process, such as the sociocognitive model put forth by Ruddell and Unrau (2004), provide important insights into the "meaning-construction" process of reading that inform the work in Internet reading as well. Ruddell and Unrau's model provides something of a bridge between purely cognitive and social frameworks of reading in the way it integrates three key components—reader, text and classroom context, and teacher—in the meaning-making process. The reader brings prior life experiences (similar to the prior knowledge referred to in the construction-integration model) but also personal values to the act of reading, with knowledge about reading, language, and processing strategies being brought to bear in a reading task through the control of executive processes. The reader has attitudes towards reading and adopts stances towards both the act of reading and the text itself that influence the meaning-making process. These stances are most informative to work with Internet reading since they allow the reader to negotiate meaning from the text in collaboration with others or through social practices. From this model, the text itself does not contain meaning, but that meaning is negotiated between text, author, and reader within the context of social practices within the classroom. Ideas in this area from Luke and Freebody (1997) encourage us to not only see reading as a social activity, but to also see all texts as motivated. No text can be truly neutral and all texts reflect their writers' particular visions of the world and serve purposes that further a particular class or group of people. These ideas inform the way teachers and students should view Internet texts, regarding them as motivated, purposeful pieces rather than neutral, context-free objects. This approach

informs the way we critically read and evaluate the information we encounter on the Internet.

New Literacies

In spite of their similar names, those in the new literacies group have taken a subtly different path by responding more to the rise in "posttypographic" technologies and examining the implications for literacy when new media are substantially different from traditional media (Lankshear & Knobel, 2006). This has prompted the desire to collect research work and theoretical ideas from a wide variety of disciplines under the umbrella idea of "new literacies" (Coiro, Knobel, Lankshear, & Leu, 2008; Lankshear & Knobel, 2006; Leu et al., 2004).

In the seminal piece, "Toward A Theory of New Literacies Emerging from the Internet and other Information and Communication Technologies," Donald Leu and his colleagues outline a basic definition of new literacies; other work has further shaped and defined these ideas (Coiro, Knobel, Lankshear, & Leu, 2008; Leu, 2000; Leu et al., 2007). Theorists in new literacies argue, first, that literacy is largely shaped by social forces and the tools and practices that these forces create. As the work environment has changed in the past decades, so too have society's expectations about what it means to be "literate." New technologies, with the Internet being perhaps foremost, have emerged that have proven to be powerful communicative tools and these require new understandings about the way meaning is created and communicated via these new technologies. Given the variety of technologies that are emerging and the multiple contexts within which these technologies are used, we must consider the idea of literacies in the plural rather

than considering a single, monolithic conception of literacy. Critical thinking and reasoning skills are vital to these new literacies as is strategic knowledge, including strategies of generating questions or problems, locating information to address these, evaluating that information, and synthesizing and communicating the results to others (Leu et al., 2007). Learning of these new literacies is often mediated through social interaction: between teacher and student but also between students and their peers. Our conception of student readers as focused on a single text changes as we see students needing to explore a variety of texts with a wide variety of potential connections; while they are still strategic, student readers also need to be inquirers and collaborators (Tierney, 2007). While some may infer from this a devalued role for the teacher in this process, a new literacies framework argues that teachers become more important because they must "thoughtfully guide students' learning within information environments that are richer and more complex than traditional print media" (Leu et al., 2004, p. 1599). In addition, because technology is constantly shifting and new technologies appear regularly, teachers must be familiar with these and find ways to help students adapt their strategic knowledge to meet these new demands.

Although subtly different, both the New Literacy Studies framework, with its emphasis on literacy as social action and critical practices, and the new literacies framework, with its focus on the skills needed to address unique literacy challenges posed by new technologies, provide an important lens through which to explore the practices of Internet readers. Through the next two sections, I will explore specific elements of these perspectives that help to address the challenges of reading on the Internet. Given the

focus of this study, my attention here will be focused on two particular areas of concern for Internet readers: reading multiple texts and evaluative reading.

Reading Multiple Texts on the Internet

Instruction in reading comprehension using Internet texts requires an understanding of the unique nature of reading in this context. Reading on the Internet requires the reader to engage with multiple texts, and so our understanding of how meaning is made with Internet texts cannot rest solely in what we know about how readers make sense of a single text, as has often been the focus of traditional comprehension research and instruction. Instead, we must consider how readers extract meaning from multiple texts, how they establish connections between and draw conclusions from a group of texts. Research in the area of interextuality and in theorizing a documents model both inform an understanding of how meaning is made from multiple texts.

Intertextuality

The term intertextuality as I use it in relation to Internet reading is closely aligned with the ideas that Kristeva first outlined when she coined the term (Kristeva, 1969, as cited in Hartman, 1995). This model of intertextuality argues for readers who transpose one text with another, join texts together, and establish connections between texts, creating in the process an integrated "mosaic of intersecting texts" as the result of reading (Hartman, 1995, p. 526). Agger (1999) further elaborates on Kristeva's ideas and suggests that we should see intertextuality as representing "various dialogues and

negotiations between texts and authors, within and between genres, and between different systems of representation" (n.p.). These ideas about intertextuality are appropriate for an exploration of reading on the Internet, given the demands on Internet readers to browse through multiple texts, written by a variety of authors who may possess divergent viewpoints, formed in a variety of genres with their own purposes and conventions (personal blogs, message boards, information web sites), and presented via different media (text, video, sound).

One element of intertextuality that informs the framework for this study comes from research conducted by Hartman (1995) who observed eight skilled readers as they read a set of texts. He identified three "discourse stances" assumed by the readers as they read which influenced the kind of connections the readers made between the texts. A *logocentric* stance identifies the reader who seeks to limit meaning to the bounds set by the author of the text while a *resistant* stance characterizes a reader inclined to "fighting" with the passage and making meaning centered on the reader (p. 557). A reader adopting an *intertextual* stance, on the other hand, is one who reads a single text while at the same time considering the plurality of texts that exist outside the one being currently read. In this stance, a reader makes meaning by actively considering various links among other texts. It is this stance that is often adopted by effective readers on the Internet, allowing for a synthesis of information from multiple sources and facilitating the use of corroboration to verify information during the process of updating mental models.

The nature of the connections that readers make between texts and the types of information that these connections provide a reader are important elements in understanding the way readers make meaning from multiple texts. Work in the field of

history teaching provides important insights into the mental processes and representations that proficient users read when they make sense of multiple texts. The work that expert historians engage in recognizes the fact that there is no one "true" telling of historical events (Lee, 2001, 2004; Lévesque, 2008; Levstick & Barton, 2001; Wineburg, 1998). Historians, instead, gather evidence from multiple sources created by a wide variety of authors with a range of intents and rely heavily on inferential thinking as they critically evaluate this historical evidence. The domain of history is an appropriate one to look for in discovering how readers draw meaning from multiple texts.

Rouet, Britt, Mason, and Perfetti (1996) theorized a tentative mental model for multiple documents after conducting research with undergraduate students in which students read and analyzed a set of documents (primary and secondary) related to the issue of the U.S. involvement in the Panamanian revolution. Based on what they observed in students' writing, these researchers theorized that readers form individual situation models (similar to those described earlier in this chapter) for single texts but that they also built an additional level of representation, which these researchers called an *argument model*, containing information about how the individual situation models were connected to each other as well as information about the sources of the documents. This model allows a reader to hold contradictory claims from different sources, connecting these claims in argumentative relationships while still maintaining a coherent model that integrated information about the different sources.

Later work refined this initial theorizing and arrived at the *documents model*, which provides a framework describing how readers make a single, cohesive model from multiple texts (Perfetti, Rouet, & Britt, 1999; Rouet, 2006). The concept of a situation

model really only helps us understand how a reader builds a mental representation of a single, isolated text. Complex reading tasks, such as those associated with conducting research or with trying to establish a single perspective from multiple texts representing multiple points of view or lacking the coherence of a single text (both tasks which are integral to reading on the Internet) require a model that can provide affordances for the kinds of connections established between texts (Rouet, 2006). The documents model provides just such a model and is critical to this study as it explains what information about a text must be attended to in order to make sound judgments about the validity of that text.

The Documents Model

As first described by Perfetti, Rouet, and Britt (1999) the documents model consists of two submodels, the Intertext Model, which depicts the connections between documents and between the documents and the situation they describe, and the Situations Model, which represents the situations described in documents. A complete documents model consists of an Intertext Model interconnected with a Situations Model.

Within the Intertext Model are "nodes" for each document and links between the documents. Every document node has "slots" available for information gleaned from or about the text such as information about the source of the text, the rhetorical goals of the writer, and the content of the text (Perfetti et al., 1999; Rouet, 2006). Each of these slots may be further subdivided into additional categories of information about the document. Within the slot for source information, for example, the reader may fill in additional slots with information about the author's name, credentials, motivations, access to information

(e.g, as a witness or participant), intended audience, or purpose for writing (Perfetti et al., 1999; Rouet, 2006). See Figure 1 for a visual representation of the connections between slots within a document node (taken from Perfetti et al., 1999, p. 104). How these slots are filled in (or whether they are even filled in at all) will depend on things such as how skilled the reader is in a certain domain, the nature of the reading task, time constraints for the task, and so forth. A skilled historian, for instance, may fill in quite a few of the slots about sourcing for a specific document given his understanding of the role sourcing plays in judging the reliability of a text (Rouet, 2006). This speaks to the importance of the cognitive processes gathered under the label of metacognitive or executive processes that govern what a reader attends to and which schemas are activated and how prior knowledge is revised during reading.

The nodes within the Intertext Model are connected in ways that express the relationships between texts within the document space, described in Perfetti et al. (1999) as *intertext predicates* or in Rouet (2006) as simply *predicates*. These include a range of possible relationships that can exist between pairs of documents. Individual documents may be connected with links to express that one document supports or builds upon another; conversely, the link may represent one document contradicting another. Perfetti et al. (1999) argue that these links are dominated by a single dimension (e.g., binary relationships such as *support* vs. *oppose*, *gives evidence for* vs. *gives evidence against* or more incremental relationships like *predecessor-successor* or *relevant to*). These links take on particular significance in the context of reading on the Internet and applying evaluative reading skills as information that would inform a judgment about the credibility of a source (such as an author's qualifications or motivations for writing) can

be integrated into the content pulled from a source. Different perspectives and conflicting information can similarly be integrated into the documents model and linked together in the reader's mind. The resulting model can then be used in evaluating the trustworthiness of information encountered on the Internet.

Bråten, Strømsø, and Britt (2009) argue that the documents model is "the most influential framework for thinking about multiple-text comprehension" (p. 7). Much of this model's power comes from the way it affords an understanding of how information about sources can be integrated within information about the content of a source. This information about the source of a text informs further decisions about trustworthiness or reliability of sources that is used when making judgments about contradictory elements present in the set of texts. The documents model, then, helps us understand the meaning-making process that proficient readers engage in during complex reading tasks. Reading on the Internet fits into the category of a more complex reading task given that, when searching for information, most readers encounter multiple texts: search engine results, web pages, multimedia elements within those web pages, and so forth. Having a framework like the documents model not only helps us to understand meaning-making in cases of multiple texts but also informs our understanding of how readers evaluate the quality of information contained within these texts. It will also inform the design of instruction aimed at improving students' ability to form accurate models of the texts they read.

Evaluative Reading

Another important element of Internet reading that the intervention in this study addresses is the element of evaluative reading and the role it plays in reading on the Internet. *Evaluative reading*, the term I used in this study to describe this kind of critical thinking, refers to a collection of skills and strategies readers use to critically analyze and evaluate the relevance, trustworthiness, and accuracy of information encountered while reading a text or series of texts. While evaluative reading shares much in common with traditional concepts of critical thinking and critical reading, it is narrower in its focus than the latter. In order to best understand the nature of evaluative reading, I will first contextualize the term within the broader domain of critical thinking and reading skills and then discuss the particulars of evaluative reading as a collection of strategies.

Critical Reading's Roots in Critical Thinking

Reading is a complex activity that consists of a number of processes in the brain. Lower order processes, like word recognition and vocabulary access, allow for a surface-level understanding or decoding of text, providing recall of events or details from the text. Reading also consists of higher order processes, such as relating text to prior knowledge, questioning, summarizing, and monitoring understanding; these higher order processes lead the reader to comprehend the meaning of text, a more complex result than simple decoding and recall (Adams, 1994; Flood, Lapp, & Fisher, 2003; Pressley, 2000). While a superficial understanding of text is important (even foundational), society increasingly requires that students go beyond simple comprehension (Perkins, 1992; Resnick, 1987). Education has increasingly emphasized the need for students to apply

higher-order thinking skills (or critical thinking) within the context of reading comprehension. The Internet is a reading context in which these skills play a significant role.

Resnick (1987) describes this higher order thinking as complex and problematic, involving the consideration of multiple criteria and the exercising of subtle judgments and interpretations as well as requiring metacognitive skills to aid in the self-regulation of thinking. She argues that these kinds of thinking are brought to bear as readers must resolve ambiguities or inconsistencies both within the text and between the text and their own experience; furthermore, while these thinking skills have historically been considered "advanced" skills, changing economic and social conditions require that all students learn these thinking skills (see also Paul, 1992). The goal of any of these higher-order cognitive processes is to move beyond a literal level and into deeper and more meaningful processing of information.

Perhaps the most well known description of this higher-order thinking comes from the work Bloom and his colleagues did with their now-famous taxonomy of educational objectives (Bloom, Engelhrat, Furst, Hill, & Krathwohl, 1968). In the higher levels of the taxonomy (analysis, synthesis, and evaluation), emphasis is placed on critical thinking skills such as judging a text based on criteria, distinguishing between facts and opinions or hypotheses, clarifying unstated assumptions, and finding evidence of and evaluating the author's purpose. These specific skills are good examples of the complexity of higher-order thinking and the depth of processing required for deeper understanding as discussed by Resnick (1987) and Perkins (1992). In revisiting Bloom's taxonomy, Anderson and Krathwohl (2001) construct a similar definition for these

higher-order critical thinking skills. In their description of the cognitive process of evaluation, these authors discuss the skills of checking for inconsistencies and judging based on specific criteria, skills which lie "at the core of what has been called critical thinking" (p. 84). In discussing other higher-order cognitive processes (analysis and creation), the authors describe differentiating between relevant and unimportant parts; determining point of view, bias, or intent; and generating alternative explanations based on specific criteria. Critical thinking skills like these require students to move beyond literal levels of understanding (being able to recall facts, understanding a literal message) and towards more complex activities in judgment, analysis, and synthesis.

Critical Reading

Critical reading takes these concepts and skills of critical thinking and applies them specifically to the realm of reading comprehension. Huus (1968) notes that critical reading "requires the evaluation of the material, comparing it with known standards and norms" (p. 163). This emphasis on evaluation through established criteria links the goals of critical reading to higher-order thinking. Durr (1968) characterizes critical reading as the top of a "ladder of reading skills" that begins with simple decoding and surface-level comprehension and progresses to a level of analysis that requires the reader to distinguish fact from opinion and to recognize the author's assumptions and intent. These upper levels of the "reading ladder" are connected to the upper levels of Bloom's taxonomy of cognitive objectives in that both require the reader to exercise analysis and judgment. In summarizing the writing about critical reading in the 1960s, Cervetti, Pardales, and Damico (2001) list additional components of critical reading such as investigating

sources, making inferences, arriving at judgments, detecting propagandistic techniques, formulating and testing hypotheses while reading, and suspending judgment until evidence is gathered and considered. These skills clearly move beyond the level of decoding words and building simple propositions that characterizes surface comprehension of a text.

Critical reading, as defined along these lines, is often mistaken or confused with the tradition of critical literacy and critical theory or critical pedagogy, according to Cervetti, Pardales, and Damico (2001). *Critical reading* arises from a liberal-humanist philosophical tradition and is concerned with the interpretation of a text, including analyzing the author's purpose in writing the text, or with drawing meaning primarily from the text itself. In *critical literacy*, however, we see a fundamentally different approach where the meaning of a text is understood within the context of social, historical, and power relations and not simply as the result of an author's purpose and the content of the text. The consideration of elements of social power and historical relationships that is the hallmark of critical literacy is not emphasized in a traditional definition of critical reading, although this need not imply that these concerns are completely absent from critical reading. The educational goals of critical literacy place emphasis on, as Peter McLaren contends, empowering students "to transform the oppressive features of the wide society" (in Frechette, pp. 32-33). While critical reading certainly seeks to empower students, it does not have as its central goal the transformation of traditional power structures within a larger society. Instruction in critical reading may use social and political issues as a means to develop greater aptitude

in critical reading strategies, but these issues do not sit at the center of instruction in critical reading.

Evaluative Reading: Critical Reading Refined

Evaluative reading embraces many of the core components of critical reading (and, thus, critical thinking); to be a successful evaluative reader requires mastery of many of the skills already mentioned (Burniske, 2000; Dagostino & Carifio, 1994; Frechette, 2002). However, the use of the adjective *evaluative* to describe the reading implies an important focus of this kind of reading: a focus on judgment, on weighing the merits of what is being read. Critical reading skills are certainly an important part of this package, but the initial point of departure in considering this kind of reading should be the attitude (skeptical, judgemental, evaluative) that a reader adopts. For these reasons, I have chosen to adopt this term in describing these specific reading behaviors. In defining evaluative reading here, I will explore first this idea of stance and then the criteria that are used in making higher-order, critical judgments about what is being read.

Stance and Evaluative Reading

Before any of these critical reading skills can be put to use, the evaluative reader must adopt a certain attitude or disposition towards the text. This idea of the role a reader's attitude towards a text plays in how the reader interacts with the text was explored early by Rosenblatt (1995). In describing the efferent and aesthetic stances, Rosenblatt demonstrated how a stance, or attitude, taken towards a text influenced what a reader attends to and how the reader interprets the text. Her original ideas have been

refined in more recent work that has looked more specifically at stance and its influence on evaluative judgments about texts.

In looking specifically at evaluative reading, Dagostino and Carifio (1994) assert that a reader's level of maturity allows him or her to look closely at the text while maintaining a detachment from the text that allows for judgment and evaluation. This detachment allows the reader to set aside a purely emotional response to a text and instead consider it from a more rational perspective—a perspective informed by appropriate criteria for judgment. Intellectual curiosity, a willingness to question, and a tendency towards skepticism all characterize a good evaluative reader. Qaintance (1968) even goes so far as to assert that this kind of reading is *biased* reading (although not in the same sense as *prejudiced* reading). He argues that the reader should, at least, be willing to suspend acceptance of an author's message until all the evidence can be considered. If a reader does not adopt such a stance, then he or she is unlikely to even bring evaluative reading skills to bear in the comprehension processes, being unaware of the need to even do so. This notion of the stance a reader adopts towards a text is particularly relevant to reading on the Internet since lowered barriers to publication on the Internet guarantee that not everything a reader encounters in this medium will be trustworthy or relevant to a specific reading purpose. A reader's stance has particular influence on the way the situation or document model is updated during reading, especially when the reader is confronted with contradictory information or when issues of authorship may cast doubt on the validity of information (Johnson & Seifert, 1999; van Oostendorp, 2002; van Oostendorp & Bonebakker, 1999).

Clarifying possible stances that readers might take can assist teachers in identifying stances students take in order to help move them into more sophisticated, appropriate stances. Damico and Baildon (2007a), as a result of observing students' use of a web tool that scaffolded evaluative reading of Internet web sites, define a *claims continuum* and a *receptivity continuum* that characterize such stances. Readers at the lower end of these continua tend to accept claims without considering alternative possibilities and tend to read on the Internet focused solely on information that supports their preexisting opinions. At the upper end of the continua, readers recognize that multiple claims exist and are willing to evaluate each claim on the basis of the evidence presented to support it. Readers at the upper end also are willing to change their own views as they encounter new information that they judge to be valid. Readers who adopt these more evaluative stances will be more willing to update a situation model based on the quality of information they encounter while reading on the Internet; in addition, it is likely that they would create more sophisticated documents models that incorporate information about sources that could be used in making judgments about relationships between texts as well as the quality of information (Bråten, Strømsø, & Britt, 2009). Effective teachers, and good instruction, will help move students along these continua towards more skilled evaluative reading.

Peter Freebody and Allan Luke have conceptualized this idea of stances within a context of four "resources" or collections of literary practices that a reader draws from; these take the form of roles that a reader assumes while making meaning with a text. When assuming the role of *code breaker*, readers are focused on decoding the words and sentences in the text; in the role of *meaning maker*, readers use prior knowledge and

understanding of genre to aid them in understanding the text; as *text users*, readers use their understanding of the social and cultural roles that texts play (Freebody, 1992; Freebody & Luke, 1990; Luke & Freebody, 1997). The role that applies most in this context is that of *text critic*, a role characterized by critically analyzing and transforming texts. When readers tap into this resource, they read with an understanding that texts are not neutral and that they serve the function of forwarding a particular group or individual's perspective. They also understand that these texts can be critiqued and their meaning negotiated based, in part, on an understanding of the author and the biases and interests that author might have (Luke, 2000). Freebody (1992) argues that successful reading requires that these analytic skills be used and that simple decoding or even using the text in literate ways is not enough to characterize good reading. These ideas center around the metaphor of "role" as opposed to identifying discrete skills for reading: the use of the term "role" (similar, I would suggest, to the use of the term "stance") suggests important things about the way a reader interacts with or participates with a text (Freebody, 1992).

Criteria Used in Evaluative Reading

In addition to the adoption of an appropriate stance and the understanding of the inherent biases present in any text, evaluative reading requires noting specific information about a text and applying specific criteria in making a judgment about the text. Evaluative reading involves seeking information about a text's author in order to establish both competency and potential bias of the author; this information, in conjunction with the content of the text, is used also to analyze the author's point of view

and intent (Cervetti, Pardales, & Damico, 2001; Dagostino & Carifio, 1994; Huus, 1968). Evaluative reading also requires readers to note inconsistencies when facts in the reading disagree either with other texts or the reader's own background knowledge (Dagostino & Carifio, 1994; Huus, 1968; Qaintance, 1968); reconciling these will require judging authors and text by specific criteria. The author's use of words (especially those that may color an argument or excite emotion) that contribute to style and tone can also be analyzed in the process of judging the intent of an author and the worth of the text (Burniske, 2000; Wolf, 1968).

The kinds of information about a source that a reader pays attention to and how a reader makes decisions about the credibility of a source are also dependent on that reader's criteria of credibility. In an important review of research in credibility, Rieh and Danielson (2007) note that credibility researchers discuss different types of credibility: *source* credibility, *medium* credibility, and *message* credibility. Medium credibility is a discussion beyond the scope of this chapter and something of a moot point: that the Internet is a medium where care and judgment need to be exercised is an assumed point in this study and as such there is little need to discuss anything beyond that in this context. Source credibility is a discussion much more relevant to this study, especially since Rieh and Danielson (2007) note that source and message credibility are often attached: Most people assume that a credible message will come from a credible source and vice versa, so criteria used for judging the source and message are related and often result in the same evaluation. The documents model (Perfetti, Rouet, & Britt, 1999) sheds some light here on the kinds of information about a source—the author's qualifications and purpose, the setting for the source, and so on—that can inform these criteria.

Other writers have identified specific criteria people use in making judgments of source and message credibility. In discussing how people judge quality, a concept closely related to credibility when accuracy or "truthfulness" of information lends it quality, Taylor (1986) identified criteria of *accuracy*, *comprehensiveness*, *currency*, *reliability*, and *validity* as those used in making these judgments. Not all of these criteria are held in equal esteem in these decisions, as not all sources will necessarily be high in all of these criteria (a source, for instance, may be highly current but may not be totally comprehensive); this makes judgments of this kind complex and requiring higher-order thinking skills. Wilson (1983) discussed at length the criteria of *authority* as an important one in making judgments about credibility. This authority refers to our sense of whether someone is qualified to write about a certain subject, and it can be applied to individuals but also to organizations such as academic or governmental institutions.

This research has informed the way credibility has been taught to high school and university students, where librarians and research specialists have often focused on the criteria of *accuracy*, *authority*, *objectivity*, *currency*, and *coverage* (Kapoun, 1998; Meola, 2004; Schrock, 2009). The validity or correctness of information is captured in the criterion of accuracy while an author's or publisher's qualifications are connected to the criterion of authority. The criterion of objectivity investigates the author's motives or purposes in publishing the information in question; currency emphasizes the need for information that is recent and implies that more current information may be more credible. The criterion of coverage questions the completeness of the information presented, including its explicit connection to other sources, often as seen in citations or references to other sources. These criteria nicely summarize the ways that people have

traditionally judged quality or trustworthiness in the information and sources they encounter.

Evaluative reading, to summarize, entails a group of strategies that includes adopting a skeptical or critical stance towards a text, questioning the authorship of a text by examining potential biases in the author's attitude about the content, and examining the accuracy and quality of information in the text using criteria such as authority, accuracy, objectivity, currency, and coverage. The value of these reading behaviors for Internet readers cannot be overstated. I turn my attention now to explore research with young people that examines whether they recognize the value of evaluative reading and how they currently approach this in reading on the Internet. I will then discuss how instruction in this area is being approached now which will lead to the central focus of this study.

Young People and Evaluative Reading

Young people who have grown up with technologies such as the Internet are often praised for their apparent skill with these technologies in spite of never having been formally instructed in their use. A general assumption among older people is that teenagers naturally "pick up" these new technologies and need no instruction in their use since it seems to come naturally to them. In terms of being critical readers of the Internet, however, research would suggest that such is not the case for today's young people. In fact, research has shown that while they recognize the value of approaching the Internet with a skeptical stance and the need to be evaluative of what they read on the Internet,

they are unlikely to actually engage in effective evaluative behaviors when they read on the Internet.

Do Young People Engage in Evaluative Reading?

Some research has examined whether or not young people engage in evaluative reading when they read print texts. Wineburg (1991a, 1991b) studied this in the context of historical sources and, after comparing high school students and expert historians, found that high school students rarely engaged in the same kinds of higher-level, critical questioning of sources that they expert historians did. He identified heuristics used by the experts that were not commonly used by the high school students in his study; later research work with print texts has corroborated these findings and shown that these heuristics are not typically used by most high school students (Britt & Aglinskas, 2002; Britt & Gabrys, 2001).

A number of studies have looked at whether or not young people engage in evaluative reading when they read on the Internet. In a study described by Leu (2006), it was found that the vast majority of eighth-graders who participated in the study recognized the need to be cautious while reading on the Internet, but few of them actually made judgments about credibility while they researched. Metzger, Flanagan, and Zwarun (2003) surveyed college students and found that while these students did not consider Internet sources as reliable as more traditional, print sources, they reported that they rarely tried to verify the information they found on the Internet. This suggests that young people profess not to trust the Internet, but are either misrepresenting their beliefs or, more likely, do not have enough knowledge of how to evaluate credibility of Internet

sources. Working with elementary school students, Schacter, Chung, and Dorr (1998) asked students to rate the "truth" of web sites they bookmarked during their search tasks on a five-point scale; participants rated most sites they bookmarked (72% in the well-defined task and 68% in the ill-defined task) as true (either a 4 or 5 on the scale). Although the researchers caution that this result cannot be considered significant, it suggests that students do not discriminate well in terms of web site credibility and gave the authors of this study reason to suggest further research into teaching these skills. Shenton and Dixon (2004), through focus groups and interviews with 188 students from elementary to high school, found that few of the students took any actions to engage in evaluative reading strategies, either through questioning author credentials and possible bias or through searching for corroborating information. Walraven, Brand-Gruwel, and Boshuizen (2009), found that students rarely engaged in evaluation of the sources they consulted on the Internet. Out of 780 different page views made, students only explicitly evaluated the source of information four times (or 0.5%). Given the use of a think-aloud protocol in this study, it is possible that students engaged in this behavior more frequently and simply did not mention it to the researchers. It is hard to accept, however, given the weight of other research, that the results would have been significantly better even had students enumerated every instance of evaluative behavior.

Some students do engage in a form of evaluative reading on the Internet, and research has identified some of the criteria for evaluating sources they use, but these criteria are not the most effective and do not reflective productive strategies of evaluative reading such as corroboration and sourcing. Shenton and Dixon (2004) found that students used quantity of information as a primary criterion for a source's quality.

Students observed in the Fidel et al. (1999) study also used quantity of information as an evaluative criterion but also mentioned using the quality (or even presence) of graphic images on a web site as another criterion for measuring the quality of information on a site. Agosto (2002), in testing a model for young people's criteria for evaluating web sites, found that students reported using the quality of graphic or multimedia content on a site as a primary criterion for evaluating the quality of the site. While students in this study did report a need to be cautious about trusting information they came across while on the Internet, most students "tended to equate information quality with information quantity" (p. 327); informants in this study made no mention of issues of author bias or credibility. Lorenzen (2001), analyzing data collected from interviews conducted with 19 high school students, found a significant number of "I don't know" responses when students were asked how to recognize the difference between good and bad information on the Internet. Some students suggested trusting information from "institution like places" (universities, libraries, government agencies) where they assumed trusted authorities would be published, but showed little understanding of how to assess trustworthiness for themselves (p. 157). In research with high school students, Kiili, Laurinen, and Marttunen (2008) found that students were much more likely to evaluate the sources they found on the Internet by how closely related they were to their search goal than they were by how credible the source was. While relevance is certainly an important criteria for evaluating search results, it does not speak to the need to judge the trustworthiness of sources in certain search tasks.

This research suggests that students, while they may recognize the value of and need for making evaluative judgments while reading on the Internet, are either unwilling

or are unsure of how to make such judgments. Since students do not seem to be picking up these skills on their own, there is a need in schools to teach them the skills of evaluative reading. This need has not escaped the attention of researchers and teachers and has been the focus of some early instructional attempts and research studies.

Current Efforts in Teaching Evaluative Reading

Given the emphasis on evaluative reading in print contexts and domains such as history teaching, there have been some efforts to teach evaluative reading in print contexts that bear examination here. In one such study, Nokes, Dole, and Hacker (2007) describe efforts to teach students to use the strategies of sourcing and corroborating while they examined historical documents. Students under two of the four intervention groups were taught these strategies explicitly and allowed time to practice the strategies with authentic historical tasks. Results of this study suggest that, with strategy instruction, students can learn to attend to features of a source and compare information across multiple sources as they make evaluative judgments about the quality and credibility of these sources. Such results are important to the current study as they demonstrate that such strategies can be learned in print contexts, suggesting that young people could also learn these strategies in an Internet context.

In spite of the growing reliance on the Internet as an information source in all domains, it seems that little is being done to teach evaluative reading with the Internet in ways similar to those in print contexts as just described. In a scientific poll of over 900 students, Strom, Strom, Wing, and Beckert (2009) found that in spite of the fact that nearly two-thirds of students reported spending over an hour each day on the Internet,

only 12% reported receiving school assignments that encouraged Internet use. Cuban (2001) found that little instructional time was spent in computer labs, which implies very little, if any, time spent in the instruction of reading on the Internet. The results of a questionnaire delivered by Gunn and Hepburn (2003) revealed that the 73% of students surveyed reported learning Internet search techniques on their own, with nearly half of those students reporting that they used trial-and-error to learn these techniques.

Some schools and teachers have chosen to avoid the challenge of the credibility issue. Other recent research projects highlight some of the variety of approaches being used to teach the skills right now; however, these studies are, perhaps, overshadowed by the more dominant checklist approach that has arisen from the field of library and information sciences.

Filtering Approaches

The challenges raised for schools and teachers by the lowered barriers to publication on the Internet have caused some to look to solutions that control access to Internet sources. These approaches can take the form of filtering software that is installed to limit students access to certain web sites or it can come in the form of teachers pre-selecting web sites for students to use in classroom activities rather than allowing students freer access to sites.

Most schools and districts that install filters to restrict access to harmful or questionable Internet content do so to protect students from dangerous material such as pornography, hate speech, and other clearly objectionable content. Few would argue the value to preventing students, especially younger students, from accessing this

information. However, Internet filters that are installed with default settings can often be overzealous in blocking otherwise useful sites (Harris, 2008). Although federal laws requiring the use of filters allow for settings to be adjusted in ways that allow access to potentially helpful materials, districts that do not make these adjustments can prevent students not only from accessing these materials but from even having to make evaluative decisions at all (Harris, 2008; Lankes, 2008). Removing such blocks for individual web sites can be a hassle-filled process for teachers and thus students are unable to have practice in making judgments about credibility for themselves.

Another way teachers have provided a filter for students that likewise obviates the need to practice skills of evaluative reading is to preselect sites for students' use in learning activities. Many adults, assuming that if they only expose students to "good" Internet material they will thus teach students to recognize that good material, assume the role of authority on credibility and choose sites for students to use (Lankes, 2008). This also allows teachers to ignore the discussion of credibility, which is an admittedly complex topic especially given the different ages and developmental levels of students. Although well-intentioned, these activities deprive students of the need to learn skills of critical evaluation and raise concerns about students' ability to succeed in the world outside of school, where these young people are not likely going to be handed pre-selected sites by university professors or employers. However appealing they may be, Internet filters or preselected websites do nothing to address the real challenge of teaching students to employ skills of evaluative reading in authentic contexts.

Other Efforts

One group of researchers (Exter, Wang, Exter, & Damico, 2009) describe their work with The Critical Web Reader (CWR) which is an instructional tool designed to support students' guided and independent practice of strategies of evaluative reading while on the Internet. CWR uses a separate frame in the browser window to present prompts and questions designed to help students engage in critical ways with web sites by asking them to examine points of view included and excluded, how the author attempts to persuade or convince, and how their own views influence the reading of the web site. While this tool has not been assessed by any empirical studies to this point, it has proved helpful in descriptive research conducted by Damico and Baildon (2007b).

Henry (2006) describes an instructional framework designed to help students as they read on the Internet. The framework, characterized by the acronym SEARCH, encourages students to engage in strategies of setting a purpose for searching, interpreting search engine results, reading web sites critically, citing sources, and evaluating the effectiveness of the search activity. In looking at how to help students read critically, Henry encourages students to first understand how web pages are constructed and how to locate information about a page's author. Corroboration of information students encounter while reading can happen via consulting reputable sites like the Library of Congress site. While Henry did not conduct any experimental assessments to discover the effectiveness of this instructional framework, her framework does fit with other recommendations for teaching these skills in a classroom context.

In another study, Kuiper, Volman, and Terwell (2008) used a multiple case study design to look at the impact of collaborative inquiry activities designed to teach critical

reading skills to fifth grade students as part of a unit on healthy foods. Instruction was focused on critical web literacies, including (during 2 weeks of instruction) a focus on judging the accuracy and reliability of Web information. This instruction was delivered within a series of thematic inquiry activities, using collaborative methods that encouraged students' active participation in the activities. Using data gathered from lesson observations, teacher and student interviews, teacher diaries, and student questionnaires and assignments, researchers observed that, in all but one class of four classes, students showed gains in their understandings of web literacies that were the focus of instruction: web searching skills, reading skills, and evaluative skills.

The Use of Checklists

While these recent studies recognize some unique and creative approaches to teaching skills of evaluation, arguably the first approach to this was developed by librarians who, often asked to take part in helping students with research projects at the secondary and undergraduate levels, developed checklists to help teach these skills (Harris, 2008). Given the perceived authority of librarians in this area, the use of checklists has gained in popularity and even today, despite its relative age and the evolution of the Internet, is widely considered to be the most common approach to teaching these skills in classrooms (Alexander & Tate, 1999; Eagleton & Dobler, 2006; Harris, 2008; Meola, 2004). In this approach, students are taught to use a checklist containing a variety of questions designed to prompt them to focus on specific criteria for evaluating a web site or Internet source.

These checklists typically use criteria informed by standards of trustworthiness in

the traditional print and academic worlds (Harris, 2008). These criteria include standards of accuracy, authority, objectivity, currency, and coverage (Kapoun, 1998; Meola, 2004). Examples of some popular checklists include one provided by the library at the University of California at Berkeley (Barker, 2002), an often-referenced checklist provided by Kathleen Schrock at the Discovery Channel's education web site (Schrock, 2009), and a checklist provided by a reference and instruction librarian at Southwest State University (Kapoun, 1998).

In encouraging students to assess the authority of a web site, these checklists often ask students to look for an "About the Author" or email link within the site; if no link can be found or if only vague contact information can be found, checklists often warn students about the site in question. Checklists like these encourage students to look at the web site's domain (.edu, .com, .k12., .org, etc.) as further evidence of credibility or lack thereof, implying that some domains (e.g., .edu, .gov, or .org domains) are more likely to contain credible information. These checklists also encourage students to look for links to other sites and discourage students from trusting a site with broken (nonfunctioning) links or links to unrelated web sites. Looking for bibliographies or citations of sources, date stamps on the web page that indicate date of authorship and date of last update, and looking for a balance between print and images are examples of other criteria these checklists use to guide students in critically evaluating an Internet source.

Concerns With the Checklist Approach

Some argue that a major issue with the checklist approach is their focus on web sites as single entities and their encouragement to look solely within the site for markers

of credibility (Meola, 2004). A web site might include a detailed "About Me" page that gives the author seeming credibility by listing university degrees or significant experience in a given field. However, there is no guarantee that this information is valid and by not encouraging readers to go beyond the web site itself to seek corroborating information about this author, checklists might generate a "false positive" and have students considering as valid a site that is not so (Harris, 2008). By encouraging students to trust domains like .org, .edu, or .gov, checklists imply that all information on such sites can be trusted instead of encouraging students to think more deeply about authorial intent in presenting the information. Simply because information is presented on a web site in an educational domain does not mean it has been vetted by an editor or has undergone similar fact-checking procedures.

Similar problems can occur when checklists ask students to look at the amount of detail included in a site (e.g., Kapoun, 1998 or Schrock, 2009) rather than asking students to consider the accuracy of that detail compared with their own background knowledge or with information gathered from known, reputable sources. Checklists might ask students to consider if the site is largely commercial in its purpose or whether advertisement is present on the site in question, but they do not encourage students to explore other possible motives an author might have for publishing information on the Internet. The mere presence of advertising does not signal a commercial purpose for a web site; more thoughtful examination is often needed to determine purpose. And checklists that encourage students to examine the balance between images and text on a site miss the need for critical examination of those images to determine how the images are used (e.g., as supporting the text, replacing the text, or for advertisement purposes) or to examine the

possibility that the images might be doctored or altered in some way to serve the author's purpose.

Using a checklist approach to evaluate a site like the aforementioned *Save the Northwest Tree Octopus* site can highlight the potential problems with using this approach. The site's main page contains a significant amount textual detail, including numerous scientific terms and references, something that would trigger a positive response from many checklists. The site also contains numerous links to other external sites that carry information about cephalopods and environmental organizations; many checklists urge that the presence of links to other sites suggests greater credibility for the site in question. The presence of photos on the site might also suggest credibility to some students, especially since checklists rarely encourage students to question the accuracy of images present on a web site. While there is the presence of some advertising on the site (in the form of links to a site store whose profits purportedly go to tree octopus conservation efforts), because checklists do not encourage deep examination of an author's intentions, even this potential red flag may seem benign to most evaluators. In short, it is quite likely that a student using an evaluation checklist might find little reason to be suspicious of the tree octopus site. Similar cases can be made for other sites that seek to mislead (such as the Stormfront organization's Martin Luther King, Jr. page) or that are simply questionable in their veracity (Harris, 2008).

These critiques suggest that potential problems with the checklist approach stem from a lack of recognition of the nature of Internet texts and authorship in this new medium and how this influences our notions of credibility. The kinds of sources that can be found on the Internet and the ways in which the Internet affords different kinds of

authorship need to be accounted for in teaching critical evaluation of Internet sources. An entry on the Wikipedia site, for instance, may have abundant links to sources that document the facts it contains and may, when compared to other sources, be found to contain solid, credible information. However, the noticeable absence of an email link to the author or to a page with the author's credentials might encourage a checklist user to abandon the site as untrustworthy. Such a link would not make sense for Wikipedia entries given that they are often written by multiple authors in a collaborative effort, under the assumption that pooling knowledge in this way results in more comprehensive and less biased interpretations (Leuf & Cunningham, 2001). The fact that Wikipedia entries each link to a "Discussion" page wherein contributors engage in sometimes heated and lively discussion about the content of the entry page and the appropriateness or validity of said content may enhance the sense of credibility inherent in a Wikipedia entry. For instance, the discussion page for the entry on Martin Luther King, Jr. (http://en.wikipedia.org/wiki/Talk:Martin_Luther_King,_Jr.) displays meaningful discussion of the quality of the information contained in the entry as well as debates about including controversial or unfounded claims about the civil rights figure. Elements such as these lend credibility to the Wikipedia entry and should engender some trust in the information it contains, but many checklists might discourage students from trusting such a source due to the lack of internal markers like an "About the Author" link.

This discussion of the credibility of a Wikipedia entry provides a good example of the shifting notions of credibility and trustworthiness that must be addressed as a result of both new types documents facilitated the Internet (e.g., wikis and blogs) and the textual features already outlined that make Internet texts uniquely challenging for readers (e.g.,

hypertext links, collaborative authorship, use of images and sound). Some have likewise argued that new communications media require us to re-examine previously held notions of credibility (Kinzer & Leander, 2003). I would argue that an approach to teaching students to critically evaluate the credibility of sources and information they read on the Internet must embody criteria of evaluation that are more appropriate for the textual features of Internet texts. An approach that seeks to teach students heuristics for critical evaluation may be better suited to reading on the Internet given the ill-defined nature of this task.

Alternatives to the Dominant Checklist Approach

Recently, some researchers have articulated approaches to teaching critical evaluation that move beyond the checklist approach in an effort to better account for the nature of reading on the Internet. Meola (2004) suggests using a "contextualized approach" in which teachers and students first acknowledge that not all content on the Internet is suspect: Online databases provided by such groups as EBSCO, SIRS, or JSTOR provide access to trusted, reputable sources. When teachers encourage students to begin their Internet reading in these high quality sources, they help students build a context for a general Internet search, establishing background knowledge for the topic under consideration. With this context established, students then conduct more open searches on the Internet and are trained to compare web sites from the general Internet with each other or with those from the high quality, online databases. These comparisons allow for the creation of "reference points" based on the quality of the source which we can then use to compare sites (p. 340). Meola (2004) further suggests that comparison can

allow students to find elements of a topic that are controversial and deserving of additional attention (as provided through follow-up Internet searches); comparison can also help students recognize biased language as they compare wording in reference point sites to other sites. During the process of comparison, students can also be encouraged to corroborate facts across multiple sites in order to pull out credible, reliable information.

Meola's suggestions are supported in part by recent work done by Rieh and Hilligoss (2008) exploring college students' search techniques on the Internet. This research found that some students turned to trusted sources early in the search process, often asking trusted human sources or visiting specific websites that had earned students' trust in the past before they turned to general Internet searches. This research suggests that young people might be receptive to instruction that helps them structure their searches by starting with trusted sources, as Meola suggests. Meola's proposal, combined with the work of two other researchers, informs one of the instructional approaches used in this study.

Work With Historical Sources

In many ways, Meola's (2004) suggestions are in line with the work done by Wineburg (1991a, 1991b) in describing the practices of expert historians as they evaluate the credibility of sources in their reading of historical documents. In analyzing the data to understand what the historians did that allowed them to be more skilled evaluative readers, Wineburg (1991a) arrived at three heuristics that the historians used: corroboration (comparing a document and its informational content with others), sourcing (attending to relevant information about the source of a document prior to reading the text

itself), and contextualization (placing the document in a context of time and social considerations). Wineburg's (1991a, 1991b) analysis of these heuristics reveals some strong connections with the instructional approach the Meola (2004) argues for.

The first of these heuristics, *corroboration*, involves accepting something as valid only once it has appeared in multiple places across differing texts. Noting discrepancies between the way facts are presented across texts leads the expert historian to question the validity of any single representation; only once agreement can be found between sources will the historian conclude that a certain representation can be considered valid. The second heuristic, *sourcing*, encourages readers to examine first the author and attribution of a source. The expert historians in Wineburg's study often employed this heuristic first, before any reading of the source content, and used information gleaned about the author and the time and place of the source's creation to make predictions about the source's content and about its trustworthiness. Based on these predictions, Wineburg argues, the historians also activated appropriate schema for text types and used these to evaluate the content (e.g., a source identified as a textbook would encourage historians to consider the likelihood that content would be broad and presented in such a way as to favor a particular viewpoint). In short, this information about a document's source would encourage the adoption of a specific stance towards the text. The final heuristic, *contextualization*, entails paying attention to when and where the historical events described in the documents took place. The historians in this study paid attention to elements of time, ordering events chronologically and situating them within a timeline. They also situated events within more spatial dimensions of geography, weather, and landscape. Attending to these details allowed historians to make important inferences

about the historical events the documents sought to portray, inferences that in some cases allowed them to make judgments about the reliability of sources.

Wineburg's description of the way expert historians contextualized the information presented in historical sources has parallels to Meola's suggestion that Internet readers should establish a strong context for the topic before venturing out into general Internet searches. Meola argues that by building a context for their searches, students will be able to better evaluate trustworthiness since they have a solid base of accurate information with which to corroborate the new information they encounter while reading on the Internet. And Wineburg's description of how historians corroborated information across sources as they looked for similarities and differences in the source materials is very similar to Meola's suggestions about corroboration and comparison as activities that will help students detect bias and potential problems in the way sources present information. These parallels imply that the contextualized approach suggested by Meola is based in sound practice as seen in other disciplines where critical evaluation plays an important role. And work by Nokes, Dole, and Hacker (2007) as described earlier in this chapter suggests that these heuristics can be successfully learned by high school students, lending confidence in an approach that focuses on teaching students sourcing and corroborating.

The 21st Century Information Fluency Project

Another approach to teaching critical evaluation that is based in sound understandings of the nature of Internet reading comes from The 21st Century Information Fluency Project (http://21cif.com), a project started in 2001 by the Illinois

Mathematics and Science Academy with federal funding with the purposes of developing, in part, materials that help young people to evaluate digital information more effectively (The 21st Century Information Fluency Project, 2009). The materials developed by this project focus student attention on three heuristics to be used in evaluating sources on the internet: investigating the author, investigating bias in the source, and evaluating the sites that link to the site in question. The instruction developed by this project focuses on questions that students can ask as part of these heuristics, but the questions asked here differ significantly from those asked on typical evaluation checklists. Where the checklist often asks a yes/no question about the presence of an email link for an author, the questions developed by the CIF prompt students to think more critically about the author of a site:

- Who is the author of the web page?
- How *much* experience does the author have in this area?
- What is the author's occupation?
- What is the author's educational background?
- What is the author's reputation among others in the field? (The 21st Century Information Fluency Project, n.d.)

These questions require the use of inferential skills, using what information may be provided on the web site in conjunction with additional Internet searches to find more information about the author or organization responsible for an Internet source. By encouraging students to travel outside the immediate source under investigation, a more comprehensive picture of the author can be established, leading to more accurate judgments about the credibility of the source. Instruction in the heuristic of determining

bias uses similar types of questions to encourage students to look for missing information, one-sided presentations, and extreme language. In the heuristic for linking from other sites, students are encouraged to use probing questions and specific features of Internet search engines that allow exploration of linked sites in order to corroborate information on the site in question and to establish a context for that information.

The potential strength of an approach like this lies in the recognition of the unique challenges and affordances of reading on the Internet. Authorship can be difficult to determine on the Internet but there are tools like search engines available to help us in the task; these tools also allow us to gather more information on an author and the author's associations and reputation than have previously been available with print sources. In a context where just about anyone can publish information, though, knowing about the author may not be enough; we must look to author intent and potential bias, and this approach encourages students to do so in more critical ways than most checklists. Finally, with these heuristics we take advantage of search engines to help build a context for the information found on one source and to uncover additional information about credibility by looking to sites that link to and from the site in question.

Purpose of This Study

I seek in this study to determine how best to teach skills of evaluative reading to high school students. To do so, I designed an intervention inspired by the ideas set forth in Meola's (2004) contextualized approach, the heuristics identified by Wineburg (1991a, 1991b), and the heuristics developed by The 21st Century Information Literacy Project. This intervention consists of teaching students heuristics for establishing a context for the

topic under consideration by accessing high quality online databases, for evaluating the author and authorial intent, and for comparing and corroborating Internet sources. However, I did not want, as Meola (2004) suggested, to "chuck" the checklist and reject it completely (p. 331). Little empirical study has been conducted with the checklist approach and so it behooves us to examine its potential for teaching students how to critically evaluate sources on the Internet. While the checklist may seem, in theory, to have limitations in its effectiveness, such a conclusion should only be reached after empirical study has shown it to be so.

This study compares two instructional approaches, then, that are informed by two attitudes towards evaluative reading on the Internet. The first approach teaches students to make judgments about credibility using the criteria of accuracy, authority, objectivity, currency, and coverage as presented in a checklist form. This approach is heavily inspired by traditional means of evaluating credibility of print sources and will largely focus on evaluating Internet web sites independently, looking to the site itself to provide any information needed to make the judgment. Given this focus on sites as discrete sources, I have titled this approach the *localized* approach.

The second approach focuses on similar criteria but teaches students to use these criteria through teaching them strategies of sourcing, corroborating, and contextualizing. This approach is informed by our understandings of the Internet today and the way texts are formed and presented in this medium. In this instruction, students are encouraged to conduct searches about the author or publisher of a site, to explore beyond the site itself for information to use in making judgments about an author's qualifications and possible intentions for publishing the source in question. Students are also encouraged to review

multiple sites at once, something more easily accomplished in an Internet search than in a traditional review of print sources, in an effort to compare and corroborate information as they make judgments about credibility. Students are also taught to make use of paid online databases that index trusted sources in an effort to build background knowledge about a topic that would help facilitate this corroborating. This second approach is titled the c*ontextualized* approach because it seeks to use the tools and affordances of the Internet to help students more effective situate their research and sources and thus better judge the credibility of what they come across in reading on the Internet.

While these approaches differ in some fundamental views about how to best approach evaluative reading on the Internet, both are heavily informed by research that has shown the effectiveness of explicit strategy instruction in traditional print reading fields (Dole, Duffy, Roehler, & Pearson, 1991; Duke & Pearson, 2002; NICHHD, 2000; Pearson & Dole, 1987; Pressley, 2000). The elements of explicit strategy instruction that are incorporated in these approaches include teacher modeling, guided practice, and independent practice. In the case of the localized instruction, the use of the checklist and its criteria-based questions is seen as a single strategy that students should learn; in the contextualized instruction, the three strategies of contextualizing, sourcing, and corroborating are taught.

Additionally, I was interested in the possible influence that students' prior experience might play in the potential they had for learning what was presented in these instructional approaches. While the early research has shown that students are not engaging in effective evaluative reading behaviors on their own, I sought to take advantage of the opportunity to see if previous, independent experience with Internet

searching might facilitate formal instruction in this area.

Specifically, this study sought to answer two research questions about the instructional approaches described above:

1. Will students receiving instruction in evaluative reading perform better at evaluative reading tasks if taught with a contextualized approach or with a localized approach? Will students' self-reported, independent experience with Internet searches influence any gains?
2. Will students like participating in instruction about evaluative reading on the Internet? Will they show a preference for one approach over the other? Will students' self-reported, independent experience with Internet searches influence their likes or preferences?

Conclusion

In this chapter, I have reviewed literature from different research fields that have examined the way readers make meaning while reading on the Internet. This has included looking into mental models and how they are created and updated while reading, examining the differences between Internet texts and traditional texts and the implications of those differences for how we see this meaning-making process, and the additional frameworks that inform our understanding of reading on the Internet. This review has also defined the concept of evaluative reading and discussed the lack of skills in evaluative reading young people display and the ways those skills can be taught. I ended with a discussion of two different ways to approach the teaching of these skills: using a checklist focused on single Internet sites in making judgments about credibility,

the approach that dominates instruction today, and using a more contextualized approach that addresses the uniqueness of Internet texts and relies more on the resources of the Internet to make judgments about credibility. In the next chapter, I will outline the methods I used to conduct the study comparing the efficacy of these two approaches. I will also detail the materials and procedures I used in the study and the instructional interventions.

CHAPTER 3

METHODOLOGY

The purpose of this study is to investigate the impact of targeted instruction on students' ability to read evaluatively the materials they encounter in Internet contexts. Specifically, I hope to analyze the effects of two instructional approaches to teaching evaluative reading skills, referred to subsequently as the *localized* and *contextualized* approaches. The localized approach focuses on teaching evaluation as a skill practiced with individual web sites, separate from other sites or Internet tools, and using a checklist to remind students of important criteria. The contextualized approach teaches evaluation by first building a context for the search by building background knowledge of the topic to be researched and then using strategies of sourcing and corroborating, with a strong focus on comparing information across web sites and using additional Internet searches and tools to explore credibility. The study I propose here is designed to answer two research questions about these instructional approaches:

1. Will students receiving instruction in evaluative reading perform better at evaluative reading tasks if taught with a contextualized approach or with a localized approach? Will students' self-reported, independent experience with Internet searches influence any gains?

2. Will students like participating in instruction about evaluative reading on the Internet? Will they show a preference for one approach over the other? Will students' self-reported, independent experience with Internet searches influence their likes or preferences?

In this chapter I will outline the design of the study I conducted, discuss the participants who were part of the study, explain the procedures and materials used in completing the study, and outline the analysis I conducted to answer these questions.

Study Design

This study features a quasi-experimental, pre-/posttest design with the dependent variable as performance on an Internet-specific critical evaluation task (described in the Measures section below) and the independent variable as type of instruction (with two levels, localized instruction and contextualized instruction). Students were placed in two groups (Group 1 and Group 2) and each group received one of the two types of instruction (Group 1 received the localized instruction and Group 2 received the contextualized instruction). Both groups completed the same pretest and posttest, an Internet-specific critical evaluation task.

Participants

Participants for the study were selected from preexisting English classes at a high school in the Western United States; both classes selected were taught by the same teacher. A convenience sample was used for this study, consisting of students enrolled in junior-level English classes at the high school.

Student Participants

Participants in this study consisted of students enrolled in two preexisting English classes of students at Quail Ridge High School (not the actual name of the school), a high school in a medium-sized city in the Western United States. The students in both classes were juniors (all aged 16 or 17) and each class had an enrollment of 34 students. The high school involved in this study is a 4-year high school with approximately 1,700 students enrolled across four grades (9-12). The school meets on a block schedule where students attend each of their classes every other day for 84 minutes each session.

Based on information gathered from surveying the students, 96% reported having a computer in their home and 88% of all students reported having Internet access in the home. For those few students without computers or Internet access in their homes, most (67%) reported using the school computers for their primary access to the Internet. When asked about the amount of time they spent daily on the Internet, only 6% of students reported spending no time on the Internet; 35% reported spending an hour or less per day on the Internet and 13% reported spending 3 hours or more of their day on the Internet. When asked about the way they search for information on the Internet, 90% of students reported that they first used an Internet search engine like Google or Bing as opposed to accessing Wikipedia or going to a recognizable, familiar web site like CNN.com or ESPN.com.

Teacher Participant

Heather Smith (not her real name) has been an English teacher at Quail Ridge High School for 4 years; at the time of the study she was in her 5th year of teaching. She

has taught English courses for 9th- and 11th-grade students, including a course for struggling readers in the ninth grade. Traditionally at Quail Ridge High School, students in all 4 years are exposed to research strategies and tasks. The junior year typically features a more rigorous research study project, and Heather has encouraged the use of Internet sources in a cautious way with her students. She has, in the past, done very little to help her students understand exactly how to read evaluatively when they conduct research on the Internet. She is familiar with resources such as the checklist used in this study but has never made a concerted effort to teach or use these resources with her students.

Heather describes herself as an avid Internet user, using the Internet to find ideas for teaching her students and for personal and professional communication. She uses the Internet in her teaching, encouraging students to conduct research on-line. She recognizes the vast potential of the Internet as a source of information but also understands the potential challenges with the Internet. She is concerned that students be able to evaluate the reliability of information they find online, but has not emphasized any instruction of this topic given the emphasis during most of the year on topics of writing and literature. She was eager to address the issue of evaluation of sources as part of her traditional unit on research writing.

Instruments

A number of instruments were used in this study to assess students' initial, self-reported experience with searching on the Internet as well as to measure their abilities with evaluative reading before and after the interventions. Field notes were kept during

the intervention and a teacher interview was also conducted after the completion of the study. This section describes these instruments.

Internet Experience Survey

The Internet Experience Survey, administered to students before the pretest measure, gathered descriptive data on students' Internet use. (See Appendix A: Internet Experience Survey.) In this survey, students reported on the time they spend on the Internet, what strategies they use for searching for information on the Internet, and activities for which they use the Internet (gaming, social networking, email, etc.). This survey was created to gather descriptive data and to use in data analysis as a means to examine potential differences in students with certain levels of self-reported experience with Internet searches.

Web Site Evaluation Checklist

The checklist that students used in the pre- and posttests and with the instruction for the localized treatment group was designed to reflect trends in the majority of checklists published in pre-existing teaching materials for web site evaluation (See Appendix B: Web Site Evaluation Checklist for a copy of the checklist used). A checklist first suggested by (Kapoun, 1998) was used as a starting point. The checklist used for this study emphasizes the same criteria of trustworthiness that often appear in checklists of this sort:

- *accuracy*, relating to the validity of information in the source and the qualifications of the author,

- *authority*, relating to the qualifications of the publisher and examination of the Internet domain or site hosting the source,
- *objectivity*, relating to the purposes the author or publisher have in creating the source, the existence of bias in the source, and level of detail in the source,
- *currency*, the posted dates of publication and the dates of any updates to the source,
- and *coverage*, the presence and quality of links in the source, any costs or special software required, and the presence of citations.

Each criterion on the checklist is broken down into a handful of questions designed to help students think critically about the trustworthiness of a single web site. The checklist does not encourage students to corroborate information with other sources nor does it encourage students to conduct Internet searches for additional information about authors or publishers and their credentials.

Pretest

The pretest consisted of a Microsoft Word document with instructions for students on using the Internet to search for information about a specific topic (see Appendix C: Pretest for the complete pretest document). The topic used for the pretest was drilling in the Arctic National Wildlife Refuge (ANWR). This topic was chosen primarily because of the controversy surrounding this issue, controversy that ensured that a variety of websites representing both legitimate and questionable sources would be uncovered in the students' research. In the instructions for the pretest, students were provided key word terms for the topic (*ANWR*, *drilling*, *controversy*, and *oil*) and were

instructed to conduct a search and browse the results before proceeding further with the pretest. The pretest consisted of two parts.

The pretest was piloted with a group of 12 high school seniors from the same high school in which the study was conducted. The pilot test gave important information about the logistics of delivering the test, including providing the Microsoft Word document used for the test to students and having them edit and save it for later retrieval. It also helped to inform the scoring process described later in the procedures section.

Pretest Part One: The Restricted Task

In the first part (referred to subsequently as the *restricted task*), students were given a preselected website and were asked to evaluate the trustworthiness of that site using a scale of zero to three, with three being completely trustworthy and zero being completely untrustworthy (four levels were used to prevent students trending towards the middle in their judgments). Students were instructed to make this decision using the criteria presented on the Web Site Evaluation Checklist provided for them and were also asked to explain their evaluation in writing. The score students gave the site would allow for measuring their accuracy as evaluators of an Internet source while their written defense would allow for measuring their ability to use the criteria of the checklist (accuracy, authority, objectivity, currency, and coverage) to make that evaluation.

The site chosen for the restricted task, or part one of the pretest was PlanetForLife (http://planetforlife.com/anwr/index.html). This site features detailed and accurate information about the controversy over drilling in the Arctic National Wildlife Refuge and presents a balanced view of the issue; however, its visual presentation is a bit dated, a

characteristic that has caused young readers in other studies to dismiss sites (Agosto, 2002). In addition, the author of this site is not immediately clear; further investigation on the site reveals that the author has strong credentials in the field and that the site's purpose is to explore the global energy crisis, a goal which could introduce issues of bias and should be noted by expert readers.

The restricted task was designed to provide a measure for both groups to assess how well students could use the checklist to evaluate the trustworthiness of an Internet source. This would provide both groups a chance to show initial performance with the checklist, prior to any instruction.

Pretest Part Two: The Authentic Task

In part two of the pretest, referred to also as the *authentic task*, students were instructed to choose two websites which they regarded as trustworthy and two which they regarded as questionable or untrustworthy from the search results of the Internet search they had conducted. For each of these four choices students were asked to defend their decisions in writing. In this part, no mention of using the checklist was included in the student directions. However, students still had the checklist available as it had been provided them to complete part one of the pretest. Students' choices of web sites could be evaluated to determine the accuracy of their judgments; their written responses would allow measurement of their ability to use the strategies or the criteria of the checklist to make their judgments.

The authentic task was designed to situate students in a more authentic research scenario where they were in charge of choosing how to approach the search and which

links to follow, thus allowing for assessment of their ability to evaluate credibility within a more natural context. While choice was less controlled in this part of the pretest, this part reflects a more authentic Internet search.

Posttest

The posttest was the same as the pretest (see Appendix E: Posttest for a complete copy of the posttest document) except for a difference in topic and key words; this difference was necessary to avoid and test-posttest effects. A different topic was used in the posttest (the use of nuclear energy as a power source) and different key words were given students to use in their Internet search (*nuclear*, *power*, *humans*, and *environment*). As with the topic for the pretest, this topic and key words were chosen because of the controversy surrounding this issue and the likelihood that students would encounter a variety of perspectives and varying degrees of credibility in the results. The key words were also tested prior to the posttest to ensure that search results would provide this variety. The posttest asked students to complete the same two tasks, a restricted task with the preselected web sited and an authentic task with their own search results, as described above with the pretest.

The site used in the posttest, *Safety of Nuclear Reactors* (http://www.world-nuclear.org/info/inf06.html) published by the World Nuclear Association, was chosen because it presents detailed and accurate information including sources; however, this site, published by an organization that represents workers in the nuclear industry, might also be subject to some bias in the information it presents. Examining this site critically,

expert evaluative readers would likely consider it trustworthy but should suspend final judgment until information can be corroborated with other, trustworthy sources.

An additional piece of descriptive data was gathered on the posttest. After completing the two parts of the test, students were asked to describe (in writing) how they felt about the instruction they had received. Students were given a four-point Likert scale and asked to score the instruction on that scale, with one representing that they absolutely hated it and four that they absolutely loved it. Students were then asked to explain their score in a few sentences.

Field Notes

Field notes were limited but were gathered to capture the teacher's fidelity to the lesson plans as well as any important events that occurred during instruction that may have had an impact on the instruction. Although the focus of these field notes was largely on the classroom teacher and her performance, some student comments were recorded because of their relevance to the study's goals. To assess the fidelity of the teaching, a chart was prepared with the major points and examples from the lesson plan on one side with a column where the researcher could mark on the other. As the teacher progressed through the lesson plan, the researcher would make a check in this latter column each time the teacher completed the element of the lesson plan. Notes about any significant deviations from the plan or significant student responses to the instruction were noted by the place in the lesson plan in which they occurred.

Teacher Interview

Approximately 2 weeks after the end of the intervention and the completion of the posttest, the classroom teacher was interviewed. This interview was designed to gather additional descriptive data to inform the quantitative results. The teacher was asked the following questions and her responses were recorded digitally for later analysis:

- Which approach did you enjoy better (if you had a preference)?
- What were your thoughts about the two approaches?
- What kinds of things did you observe students struggling with during their independent practice?
- You mentioned during the instruction observing that some students didn't have patience for the task of evaluating a web site; did you see the students becoming more patient by the end?
- Are there some challenging aspects to credibility that were missed in either of the two instructional approaches?
- Aside from time, were there other aspects of the instruction that you would change/modify?

Instructional Intervention

The instructional intervention in this study took two different forms: one centered around a localized approach to instruction and the other around a contextualized approach. In the localized approach, the intervention consisted of teaching students to use a web site evaluation checklist in making judgments about web sites, considering those sites in isolation. In the contextualized approach, students were taught to use the tools of

the Internet, specifically online databases of trusted print sources, additional web searches, and hyperlinks to other sources or documents, to make judgments about web sites, considering those sites as part of a larger network of information about a topic. This section describes these interventions.

The intervention program for both treatment groups consisted of five complete lessons covering 2 weeks of instruction, with each lesson comprising approximately 80 minutes of instruction. (Appendix F provides the exact, detailed lesson plans provided to the teacher for the localized treatment group; Appendix G provides the exact, detailed plans for the contextualized group.) These lesson plans were designed to fit within a larger research unit that the classroom teacher had planned for her students. Prior to the intervention and lesson plans described here, the teacher had reviewed with students how to choose a topic to research and how to create key words for Internet searches based on those topics. By the time this intervention began, students had each chosen a research topic and were prepared to conduct an Internet search for information about that topic.

The planned instruction for both groups consisted initially of an introduction to the concept of critical evaluation and a discussion of the need for such reading skills while researching on the Internet. From this introduction, the plans varied quite a bit depending on the treatment group to which the class had been assigned. These lesson plans, while not providing an exact script for the teacher, included detailed descriptions of the way activities were to be presented and sequenced for students; in addition, specific examples were prescribed in the lesson plans for the teacher's use in modeling and guided practice and suggested comments to be made about these examples were provided in the lesson plans.

Intervention for the Localized Instruction Group

After the introduction to the topic of credibility and the Internet, planned instruction for the group assigned to the localized treatment consisted of instruction and practice using the checklist to assess individual sites as discrete and unrelated sources. Each of the five criteria on the checklist formed the focus of lessons consisting of modeling, guided practice, and independent practice with the criteria.

For example, on Day 1 of instruction, after the introduction to the concept of evaluative reading, the plan instructed the teacher to focus on the criteria of accuracy. She did this by reviewing with students the questions under the checklist heading of accuracy and then modeling how she used these questions to assess the accuracy of a specific web site (in this case, a US Army web site that relates to the teacher's search for information about the impact of military deployments on families). She then asked for students to help her while she explored two other web sites related to her topic; together, they looked at each site and answered the questions from the checklist section on accuracy, making a judgment about the site's accuracy based on their answers to those questions. Once this was complete, the teacher took students to the computer lab where they practiced using these questions to analyze the accuracy of sources they found while engaged in research about their own topics. While students were in the lab, the teacher moved around the room to address questions and remind students about what they had learned regarding the use of the checklist. While working, students made notes about the accuracy of the sources they found on the Internet at the same time as they read and took notes on their topic.

A similar pattern was prescribed in the remaining lesson plans. After a brief review of the previous day's instruction on accuracy, Day 2 of instruction focused on the criteria of authority; again, the plans called for the teacher to model using the questions from the checklist section for authority with web sites related to her topic of interest and students engaged in guided and then independent practice with this criterion. Instruction for the other days was planned in a similar way, with objectivity being the focus of Day 3 and the Day 4 focused on currency and coverage. The final day of instruction consisted of more modeling, guided practice, and independent practice; on this day the teacher modeled a complete experience where she used the entire checklist to evaluate web sites related to her topic.

Intervention for the Contextualized Instruction Group

After the initial introduction described earlier, lesson plans for the group assigned to the contextual instructional treatment first emphasized showing students how to build a context and background for their Internet searches by reviewing trusted sources first. In the instruction on Day 1, the lesson plan instructed the teacher, using the same topic of military deployments as was planned for the localized group, to model for students how to search for her topic in the online database EBSCO and how to review the search results to gain important background information on her topic. A student then shared his or her topic and the class engaged in guided practice of conducting an EBSCO search and reviewing the results with this topic. Students then had a chance to practice contextualizing their own searches in the computer lab.

Subsequent lesson plans for the next four class periods detailed how the teacher was to introduce students to the strategies of sourcing and corroborating. Instruction Day 2 and Day 3 consisted of modeling, guided practice, and independent practice with the strategy of sourcing. The plans instructed the teacher to model how she used information from the Internet site itself and from additional Google searches about authors or publishers to determine an author's credentials and potential purposes or biases in writing about the topic; the teacher also was to discuss the different kinds of sites she encountered in the search (e.g., blogs, Wikipedia, news sites, etc.) and how those document types influence her judgments. Students and teacher then engaged in guided practice with another group of web sites, exploring how to use other sites and searches to help establish a picture of the authors of these sites and discussing how the type of site they were examining shaped their evaluation of the credibility of the site. Students finally were to be given time to practice the strategy of sourcing with their own research topics and search results they found related to their topics.

Day 4 of instruction involved teaching the strategy of corroboration and proceeded in a similar fashion with the teacher modeling how to corroborate information across multiple web sites. Using the *Save the Northwest Tree Octopus* web site (http://zapatopi.net/treeoctopus.html), the teacher was to model how comparing that page to what turned up in additional Internet searches about this fictitious animal provided a way to discredit much of the information on the original page. Students and teacher were to engage in guided practice of the strategy of corroboration with a set of web sites discussing drilling in the Arctic National Wildlife Refuge; by looking at multiple sites at once, students were able to see how corroborating could help establish the credibility of

some sites over others. Again, students were then to be given individual time to practice this strategy within the context of their own searches about their research topic.

Materials

The materials used in the study included IRB consent forms and lesson plans used by the classroom teacher to deliver the intervention for both instructional conditions as well as the web site checklist that was used in the localized instructional condition. This section will describe these materials.

Student Consent Forms

Forms for students' assent to participate in the study and have data gathered about their performance were prepared according to the standards of the University Institutional Review Board and were approved by that board. These forms provided information to students about the purposes of the study, the information that would be collected, and their rights as research participants. A similar but separate form was prepared and approved by the IRB for the teacher participant. In addition, similar forms were prepared for students' parents to give their permission for students to participate in the study; these forms were approved by the IRB as well. (These forms can be found in Appendix L.)

Lesson Plans

Lesson plans were designed by the researcher for each day of the instructional intervention, with separate plans developed for each instructional condition (localized or contextualized). These detailed lesson plans provided the classroom teacher with a

sequence of activities, examples to use with students during modeling and guided practice, and directions for independent practice. Copies of the detailed lesson plans for the localized condition are included in Appendix F; plans for the contextualized condition are included in Appendix G.

Web Site Evaluation Checklist

The checklist that accompanied the instruction for the localized treatment group was designed to reflect trends in the majority of checklists published in pre-existing teaching materials for web site evaluation (See Appendix B: Web Site Evaluation Checklist for a copy of the checklist used). A checklist first suggested by Kapoun (1998) was used as a starting point. This checklist was used in the localized instructional condition to help teach students to use the criteria of accuracy, authority, objectivity, currency, and coverage in making judgments about the credibility of sources the found on the Internet. The teacher modeled the use of the checklist and its criteria and facilitated guided and independent practice using the checklist.

Each criterion on the checklist is broken down into a handful of questions designed to help students think critically about the trustworthiness of a single web site. The checklist does not encourage students to corroborate information with other sources nor does it encourage students to conduct Internet searches for additional information about authors or publishers and their credentials.

Procedures

This section will describe the process of gathering data before, during, and after the intervention as well as the methods for delivering the assessments measures.

Teacher Meetings

Before the scheduled classroom intervention began, I met with the classroom teacher to provide training in the implementation of planned instructional activities. These sessions began with an overview of the two interventions and the materials used in each intervention. We spent time discussing the checklist itself and how it related to evaluative reading as well as discussing the strategies of corroborating and sourcing used in the contextualized approach. I modeled for the teacher how to use both of these approaches to critically evaluate a web site so that she understood the main goal of instruction in the lesson plans. We also reviewed the general pattern of each lesson plan and the activities of modeling and guided and independent practice within those plans.

During the intervention, we met for approximately 10-15 minutes every other day to preview upcoming lesson plans for the two instructional groups. On a couple of occasions, during these meetings we also had brief discussions about what she had seen in the instruction and students' practice in previous class periods. On the day before the pretest and posttest were to be administered, we reviewed the instructions for administering those tests.

Administration of Student Consent Forms

Prior to the beginning of the intervention, I visited the two classes selected for the study to explain the study and distribute assent forms for students to sign and consent forms for students to take home and have parents read and sign (these forms can be found in Appendix L). The classroom teacher collected these forms and delivered them to me. At this point the classroom teacher also administered the Internet Experience Survey (see Appendix A); again, these surveys were returned to me for recording and to facilitate later data analysis with students' self-reported experience with Internet searches.

Pretest Administration

The pretest was administered in a computer lab setting (a fixed lab with thirty computer stations supplemented, as needed, with a handful of laptops from one of the school's mobile labs) before the start of the intervention. A Microsoft Word document containing the instructions for the pretest was saved before-hand on each computer's desktop (see Appendix D). The classroom teacher previewed the instructions in this document with students in the classroom before traveling to the lab and gave instructions to students about how to open, edit, and save the document; she also handed out a copy of the checklist tool to all students and explained that it was to be used in conjunction with the first part of the pretest. She then gave the students as much time in class to complete the test as they needed; during this time, the teacher only answered student questions unrelated to strategy implementation or use of the checklist. As students completed the tasks, they composed their responses in the Word document; once the task was completed, they saved these documents with unique names. After both classes had

completed the pretest, I transferred the Word documents containing their responses to an external hard drive.

Implementation of Intervention

The instructional interventions took place within the context of students' regular work on writing a research paper, a unit that normally lasts about 4 to 5 weeks. The intervention described here took place over 2 weeks: five class sessions of 84 minutes each for a total of 420 instructional minutes. Before students began the intervention, the classroom teacher had already discussed with them ways to formulate topics and research questions, how to generate key words for researching their topic, and how to find information from traditional, print resources; this instruction took place over the course of three class periods. The intervention described here was designed to fit into this context by presenting students with concrete ways to judge the credibility of Internet sources they found as part of their research for the project.

In both instructional conditions, the intervention began with a general discussion of broad differences between traditional, print sources (often held to be more reliable and credible due to editorial processes typically in place for these sources) and sources we might encounter on the Internet (perhaps more questionable given the lack of controls or editorial oversight). Once students had explored these differences and recognized a need to be cautious about accepting the credibility of Internet sources, instruction diverged depending on the condition to which the class had been assigned.

Instruction in the Localized Condition

In the localized condition, instruction focused around the use of a checklist that presented students with questions to ask of single sites and specific features to look for in each site as a means of judging the trustworthiness of that site. Instruction over the next few days was based on the divisions on the checklist (accuracy, authority, objectivity, currency, and coverage), with the teacher modeling how to use the checklists questions and imperatives to assess the credibility of single sites. On the 1st day of instruction, students learned about the use of the accuracy criterion and how to use the questions within the accuracy section of the checklist. On the 2nd day the focus was on authority and on the 3rd day the focus was on objectivity; currency and coverage were the focus of the 4th day of instruction. The final day focused on modeling and practicing how to use the checklist as a whole, combining instruction from the previous days.

As described earlier in the materials section, each instructional lesson began with a brief review of the previous day's instruction. During the next phase of the daily instruction, the teacher would model how to use that section of the checklist to evaluate sites that appeared in a model research exercise; after the modeling and some practice with students, they were allowed to practice using the checklist while conducting their own research. To provide for accountability in their practice, students took notes on their topics, listed sources, and evaluated the quality of those sources in a Google document which was then shared with the teacher. On the final day of the intervention, the teacher modeled using the entire checklist as a whole to make an evaluative decision about the quality of a pair of web sites and students were allowed further practice using the checklist as a whole. During this practice time, the teacher actively moved around the

computer lab, answering students' questions and coaching them in using the checklist criteria to evaluate sources.

Instruction in the Contextualized Condition

In the contextualized condition, instruction continued after the introduction with teaching students how to build a context for the research they were going to do, how to build some background knowledge that they could use in research to help make judgments about the credibility of Internet sources. Students were shown how to use EBSCO, a popular and highly-regarded database that indexes hundreds of reputable print journals and periodicals, to conduct a search about their topic; the teacher demonstrated how reading through the sources presented in these results could help a researcher build important, accurate background knowledge for a topic and help establish a context for future searches. Students then had the chance to practice this for themselves in the computer lab while the teacher monitored their search progress and pointed out results from EBSCO that could be reviewed to build their background knowledge about their research topic.

Instruction over the next three class periods focused on teaching students the strategies of sourcing and corroborating. Similar to the procedure set forth for the localized group, each day the teacher would model these strategies for students and allow for guided practice as a class in the strategies. In one lesson, for instance, the teacher demonstrated for students how she conducted a Google search for a web site's author or publisher and how the information she gained from that search could help her make a decision about the credibility of the source. In another lesson, she demonstrated how she

corroborated ideas and facts in one source with those in another source or with what she had learned from building a context for the search by looking in the EBSCO sources. After this modeling and guided practice, students were allowed time to implement what they had learned in the context of their own research on the Internet. As with the localized group, students were held accountable for their practice by taking notes in a Google document, listing and evaluating sources they had found. The final day of instruction consisted of the teacher modeling for students how to conduct a search using all of the techniques described: building a context, sourcing each search results that looked relevant, and corroborating information across sources. Students were then given additional time to practice these strategies in the context of their individual searches.

During the practice time on all instructional days, the teacher moved around the room actively and responded to students' questions about their research. This often included coaching them in the use of the strategies and recording notes in the Google document students were creating to track their evaluations.

Fidelity

To ensure fidelity to the lesson plans, I was present for all class periods in which instruction is delivered. During these times, I recorded the classroom teacher's adherence to the lesson plan by charting her adherence on a tracking sheet generated from the details of the lesson plan. In addition, I made annotations on a copy of the lesson plan to more fully record any deviation from the lesson plans and the context in which those occurred. While these notes were rather limited, I did record a few comments made by

students during instruction that seemed relevant to the study and made general observations about the practice time.

Posttest Administration

The classroom teacher administered the posttest assessment measure in the same fashion to that described for the pretest (see Appendix E for a copy of the posttest document). The one addition to the posttest was the instruction to students to write a brief evaluation of the instruction at the end of the posttest document. The posttest was administered in the class period immediately following the completion of the instructional intervention.

Analysis

This study features a quasi-experimental, pre-/posttest design with the dependent variable described as performance on an Internet-specific critical evaluation task and the independent variable as type of instruction (with two levels, localized instruction and contextualized instruction). The data gathered for this analysis included the results of the Internet Experience Survey and the pretest and posttests. Additionally, descriptive data were gathered in the form of the limited field notes and the teacher interview. In this section, I will describe the methods I used to score and analyze these data.

Scoring the Internet Experience Survey

Students' responses on the survey items were recorded in a database and then initially analyzed to build a descriptive picture of students in these two groups in terms of

Internet use, access, and experience. Data were further exported into SPSS where they were used in the analysis to divide students into groups representing those with self-reported high and low levels of experience with Internet searching. These groupings were used to analyze some of the results of the pretest and posttests (as detailed in the next chapter).

Scoring the Pretest and Posttest Assessments

Scoring of the pre- and posttests took place in two phases, coinciding with the two parts students completed in each of the tests. I will describe the scoring process for each part separately. A scoring sheet was used to keep track of students' performance on the pre- and posttests. (Appendix H shows a copy of the scoring sheet that was used to keep track of students' scores; Appendix I gives the complete scoring instructions given to scorers.)

Scoring Part One (The Restricted Task)

The first part of the pretest and posttest asked students to score, using the checklist, a preselected web-site on a scale of 0-3 for trustworthiness and then to provide a written defense of their score. To score these answers, scorers first determined the accuracy of the student's numerical rating of the preselected site: a student who scored the site as a two—probably trustworthy but subject to review of other sites and information—received full credit (two out of two points possible) for this task while those who scored the site as completely trustworthy received only partial credit (one out of two points possible) and those who scored the site as untrustworthy received no credit

for the task (zero points). This score reflected the accuracy of the student's evaluation of the preselected site.

The student's written justification for the score was then scored for evidence of using the checklist, with scorers tallying mentions of accuracy, authority, objectivity, currency, and coverage as described in the rubric. The instances of checklist use were summed into a score for the student's checklist use for the restricted task. This score reflected a student's use of the criteria from the checklist in forming the evaluation of the pre-selected site.

Scoring Part Two (The Authentic Task)

The first step in scoring part 2 was to extract all of the URLs (Uniform Resource Locators, more commonly known as web addresses) of trustworthy and questionable web sites that students had chosen as part of these tasks. These URLs were then evaluated by a group of teachers who are familiar with issues of trustworthiness and credibility on the Internet (including myself), using a rubric that detailed criteria of trustworthiness (see Appendix J: URL Scoring Instructions for the rubric and Appendix K: URL Scores for the resulting scores for student-selected Internet sources). Each chosen site was then given a score of 0, 1, or 2 based on its level of trustworthiness. These scores were then used to assess the accuracy of students' choices.

Scoring of the authentic task then proceeded in two phases. First, students' choices of trustworthy and questionable Internet sources were compared to the results generated by the panel of experts; students' choices were scored based on the agreement between the two scores. For the sites chosen as trustworthy sites, if the experts judged the

chosen web site as trustworthy, then full credit of two points was awarded for this choice; if the experts deemed the site as questionable, then only partial credit of one point was awarded for the task; if the experts decided the site was untrustworthy, then no credit was awarded. Similarly, when judging students' choices of questionable sites, if the experts agreed that the site was completely untrustworthy then full credit of two points was awarded for the student's choice; if the site was questionable according to the experts, then partial credit of one point was awarded; if the site was deemed trustworthy by the experts, then no credit was awarded since students had labeled the site as questionable. If the site chosen was unrelated or if the experts could not access the site, then students were given no credit for their selection. This process yielded a total of eight points possible for this score, since a student who correctly identified two trustworthy and two untrustworthy sites could earn two points for each choice. This score established the accuracy of the student's decisions regarding the trustworthiness of the selected web sites.

After scoring the student's site choices, scorers then scored students' written justifications for their choices twice: once looking for evidence of the use of the criteria present in the checklist (accuracy, authority, objectivity, currency, and coverage) just as described in the scoring for the first part of the posttest, and a second time looking for evidence of the use of the strategies of sourcing and corroborating, both times basing their scoring on the different rubrics generated for checklist and strategy use (see Appendix D). This resulted in two scores for each written defense: one scoring the use of checklist criteria and one scoring the use of the strategies. This process of scoring written responses was repeated for the other three written responses in this part of the test. The

resulting four scores students received for their use of the checklist criteria were added together for a total checklist use score; the four scores for the strategy use were added in a similar fashion for a total strategy use score. These final two scores established how well the students used the criteria of the checklist or the strategies of sourcing and corroborating in making their choices of trustworthy and untrustworthy sites.

The total strategy score was subdivided into two scores to differentiate between the use of strategic behaviors that mimicked those encouraged by the checklist (i.e., students using both the checklist and the strategies would be likely to consider such things as the author's qualifications or elements of bias in the source) and behaviors that were unique to the instruction about sourcing and corroborating (i.e., only students who were taught these strategies were likely to discuss the type of Internet source or to talk about comparing information in one source to a previously-read source). This was done to help discriminate performance in behaviors that were unique to the strategy instruction.

Interrater Reliability

To establish interrater reliability, two trained scorers scored 25% of the students' written responses from the pretests and posttests. These scorers then compared their scores, looking for points of disagreement. Interrater reliability was 93% for the scoring of the first task in the tests and 95% for the second part of the tests. Those differences that did exist (7% of scores for the first task and 5% of scores for the second task) were resolved by discussions held between the two scorers resulting in an agreed-upon score.

Scoring Students' Emotional Responses

The final piece of the posttest to be scored was the students' responses to a question asking them to rank the instruction on evaluative reading on a four-point Likert scale and to explain that score in writing. Students' Likert scores were recorded on the scoring sheet used in scoring the posttest and their comments were extracted and placed into a separate document, one document for comments from students receiving the localized instruction and one for those receiving the contextualized instruction. Likert scores were tallied and entered into a spreadsheet to allow for analysis of frequencies and percentages. Using the constant-comparative method, I read through the written comments multiple times and made note of emerging themes.

Field Notes and Teacher Interview

The descriptive data consisted of the interview conducted with the classroom teacher after the conclusion of the study and the field notes kept by the researcher during the intervention. The interview conducted with the teacher was recorded. I later analyzed the teacher's comments using the constant-comparative method to look for themes that emerged from her answers. While the field notes were not extensive aside from the tracking of the teacher's fidelity to the plan, I also reviewed them multiple times and pulled out important elements of those notes that could shed further light on the quantitative results of the analysis.

Conclusion

This chapter has described the materials used in the study and the procedures employed to implement the intervention; in addition, I have described the procedures for scoring the data that were gathered during the study. In the next chapter, I will discuss the results of the analysis of this data.

CHAPTER 4

RESULTS

This study sought to evaluate the effectiveness of instructional interventions designed to improve students' abilities to judge the credibility of sources they encounter on the Internet. The questions I sought to answer through analysis of the data gathered during this study are as follows:

1. Will students receiving instruction in evaluative reading perform better at evaluative reading tasks if taught with a contextualized approach or with a localized approach? Will students' self-reported, independent experience with Internet searches influence any gains?
2. Will students like participating in instruction about evaluative reading on the Internet? Will they show a preference for one approach over the other? Will students' self-reported, independent experience with Internet searches influence their likes or preferences?

To answer these questions I measured one dependent variable (performance on an Internet research task) while manipulating one independent variable (type of instruction) with two levels (localized instruction and contextualized instruction). The dependent variable was operationalized as five variables derived from the pre- and posttests:

- evaluative ability on the restricted task, measuring ability to correctly identify a preselected web site as trustworthy or untrustworthy
- checklist use on the restricted task, measuring ability to apply the criteria of the provided checklist in making the evaluative judgment in the restricted task
- evaluative ability on the authentic task, measuring ability to correctly identify, from students' search results, web sites as trustworthy or untrustworthy
- checklist use on the authentic task, measuring ability to apply the criteria of the provided checklist in making the judgment in the authentic task
- strategy use on the authentic task, measuring ability to use the strategies of sourcing and corroborating in making the judgments in the authentic task

I will present the results of the analysis of these variables by looking at each of the two research questions separately.

Differences Between Instructional Approaches

The first research question sought to determine whether students receiving the localized instruction performed better at the evaluative reading tasks on the posttest than did students receiving the contextualized instruction. Before comparing the results of the posttests for the localized and contextualized treatment groups, analysis was needed to establish that these two groups were similar in terms of their initial aptitude for evaluative reading on the Internet. Although some performance-based assessments of students' Internet reading abilities do exist such as the Online Reading Comprehension Assessment

(ORCA) in development at the University of Connecticut (Leu, et al., 2008), these are still fairly new and undergoing testing. For this reason, comparing the pretest performance of students between these two groups was used as a way to investigate any initial differences in the students' abilities. An independent-samples *t*-test on the five scores that were derived from the pretest was conducted in order to look for differences between the groups. Table 1 summarizes the results of this statistical test.

The results for the comparison of the treatment condition groups show that the only area in which students in these two groups showed significant difference in their initial performance abilities was in their evaluative ability as measured by their judgment of the preselected site; in all other areas, differences in performance were insignificant. Given these findings of difference in only one of five variables, I felt justified in assuming that preexisting ability levels for evaluative reading between the two groups were evenly matched and thus could proceed with looking at differences in posttest performance. To look for these differences, I used a mixed factorial design with one within-subjects factor (pretest/posttest score on the dependent variable) and two between subjects factors (low/high self-reported experience and contextualized/localized instructional approach). I conducted repeated measures ANOVAs on the five dependent variables. In this section, I will discuss the results of these tests by grouping related variables together.

Evaluative Ability

On the posttest, evaluative ability was measured by scoring the accuracy of students' judgments about a given web site. For the restricted task, students were asked to

score the trustworthiness of a pre-selected web site; for the authentic task, students were asked to choose from their own search results two trustworthy and two untrustworthy web sites. Table 2 summarizes the results of the ANOVAs conducted on the two variables related to students' evaluative ability.

These results show a significant interaction (at $p < .05$) for the instructional approach on the students' evaluative ability as demonstrated in the restricted task. No significant difference between these groups was seen in evaluative ability on the authentic task; the two instructional groups can be assumed to have performed equally on that task. Likewise, no significant interactions between these groups were seen in relation to levels of self-reported experience with Internet searches and there was no significant interaction between the instructional approach and levels of experience.

Additional analysis of the difference between students' performance on the restricted task was conducted by running an independent-samples *t*-test on the pretest and posttest scores of the two groups. The results of this analysis are summarized in Table 3. The difference reported in the ANOVA results can be seen to be attributed to the differences that existed in groups prior to the intervention, on the pretest, where students in the localized condition performed significantly better in evaluative ability on the restricted task (at $p < .05$). The results of the analysis for the posttest scores show that, by the end of the intervention, no significant difference existed between the two groups' performance on this measure (at $p < .05$).

I was also interested in whether differences existed within the instructional groups, which would indicate that the instruction had an effect on performance differences within the groups between the pretest and posttest. The within-subjects results

of the ANOVA tests for evaluative ability are summarized in Table 4. These results show a significant interaction for the pretest/posttest factor within groups for evaluative ability in the authentic task, with a significant effect size. For post hoc analysis of this interaction, a paired-samples *t*-test was used to analyze differences between pretest and posttest scores in evaluative ability on the authentic task for the localized group and the contextualized group. The results of these tests are displayed in Table 5. The results of this post hoc analysis show that both groups demonstrated significant gains in their evaluative ability on the authentic tasks between the pretest and the posttest (at $p < .05$), where students chose trustworthy and untrustworthy web sites from the results of their Internet searches. This finding suggests that, regardless of the form it took, the instruction delivered in the intervention improved students' abilities to make evaluative judgments about Internet sources.

Checklist Use

I tested the two checklist use variables, for the authentic and restricted tasks, to look for differences between the two instructional groups in regards to their ability to use the language and criteria of the checklist. Students could use these criteria and language in their written explanations defending either the score they gave the pre-selected website or their reasoning for choosing sites as trustworthy and untrustworthy. Table 6 summarizes the results of the analysis conducted on these two variables.

The results of this analysis show a significant interaction for the instructional approach and students' use of the checklist criteria on both the authentic task and the restricted task (at $p < .05$). The effect size of the interactions here are small and not likely

significant. There were no significant interactions for the self-reported levels of experience with Internet searches which suggests that students' prior experience with Internet searches played little role in how well they use the checklist criteria to make evaluative judgments.

I conducted a post hoc analysis using the two checklist use variables to further investigate the nature of the interaction described above. The results of an independent-samples *t*-test conducted on the posttest scores for these variables is summarized in Table 7. These results show that students in the localized instructional group performed significantly better than students in the contextualized instructional group in using the checklist criteria and language to defend the choices they made about the trustworthiness of Internet sources. These findings would indicate that students receiving the localized instruction better learned how to use the criteria of the checklist in explaining the evaluative judgments they made. This advantage was seen for these students in both the restricted task and the authentic task.

While the localized instructional approach prepared students to use the checklist and checklist criteria more effectively than the contextualize approach, I was also interested in whether the contextualized instructional approach had any impact on that group's ability to use the checklist and checklist criteria, even though the checklist was not a central feature of this instruction. Such an effect could be seen by conducting a paired-samples *t*-test on the scores for this group in the pretest and posttest; the results of that test are displayed in Table 8. The results show that students receiving the contextualized instruction performed significantly better in using the checklist criteria to defend their decisions on the authentic task in the posttest but not on the restricted task (at

$p < .05$). Although the contextualized instruction did not focus students' attention on the use of the checklist per se, the instruction did seem to help students use those same criteria in explaining their selections of trustworthy and untrustworthy web sites from their search results.

Strategy Use

A third set of variables measured students' ability to use the strategies of sourcing and corroborating to defend their web site selections in the authentic task. Scores for these variables were derived from students' written defenses of their judgments. Some overlap does exist in the goals of the localized instruction and the contextualized instruction; both instructional methods encouraged students to consider the author or publisher of a source and potential bias in a source. Given this overlap, during the scoring process the strategy use score was divided into two sub scores: one that would measure potential overlap with the use of the checklist and the other that measured evidence of the use of elements of sourcing and corroboration that would specifically not be represented by the checklist (specifically, references to the type of document being evaluated and mention of corroborating information in one source with other sources or prior knowledge). These are indicated in the following charts by sub scores A and B, respectively.

It might be expected that the group receiving instruction in the contextualized approach, focused on the strategies of sourcing and corroborating, would perform better than the localized instruction group which in using the strategies of sourcing and corroborating to explain their judgments. The results of the ANOVA tests conducted on

the strategy use variables are summarized in Table 9. These results show no significant differences between the two instructional groups for the factors of instructional approach or level of self-reported experience with Internet searching.

I sought next to determine if gains in the ability to use these strategies had occurred within the instructional groups. The within-subject results of the ANOVAs, as summarized in Table 10, showed a significant interaction (at $p < .05$) for the variables of strategy use and sub score A, which measured students' use of elements of the strategy of sourcing; in addition, the effect sizes of both of these interactions were significant. This finding suggests that the instruction played a significant role in increasing students' ability to use the strategies, and especially the strategy of sourcing. No other significant interactions were seen in these results, implying that levels of self-reported experience with Internet searches played no significant role in the results and that students did not make significant gains in their ability to corroborate information across Internet sources.

I conducted a post hoc analysis on the strategy use scores for students within each group to determine the nature of the significant interaction seen in these results. The results of the paired-samples *t*-tests conducted for this analysis are summarized in Table 11. The post hoc analysis showed that mean scores for strategy use for students in the localized group demonstrated an increase between the pretest and posttest, and that this difference was statistically significant ($p < .05$). Analysis of the two subscores showed that these gains were limited to those areas where the two instructional methods overlapped. Mean scores showed an increase for subscore A (measuring the overlapping areas) but not for subscore B (measuring elements unique to the strategies), where the mean score actually dropped (although not significantly); the difference in scores for

subscore A was statistically significant ($p < .05$), implying that gains in use of the strategies for students in this group was attributable to the areas in which the two instructional methods overlapped (author and publisher issues and issues of bias).

The post hoc results for the contextualized group showed that mean scores for strategy use for students in the contextualized group demonstrated an increase between the pretest and posttest and that this difference was statistically significant ($p < .05$). Analysis of the two subscores showed that, similar to what was seen with the localized group, these gains were limited to those areas where the two instructional methods overlapped. Mean scores showed an increase for subscore A (measuring the overlapping emphases in instruction) but not for subscore B (measuring students' analysis of the document type and their corroboration between sources), where the mean score actually dropped (although this drop was not statistically significant at the level of $p < .05$); the difference in scores for subscore A was statistically significant ($p < .05$). This demonstrates that students in the contextual instruction group were better able to grasp the strategy of sourcing and use that in explaining their evaluative judgments. However, as with students in the localized instruction group, these students showed no gains in their ability to apply strategies of corroborating when defending their judgments of a web site's trustworthiness.

The Role of Experience

While looking at the performance of students both within and between the instructional groups, I also conducted statistical analysis to explore the potential interaction between these results and students' self-reported levels of independent

experience with Internet searching. This analysis was done to address the possibility that students with different levels of independent experience with Internet searches may have responded differently to the instructional interventions in this study.

To look at the impact of self-reported search experience, the student participants were divided into two groups based on students' self-reported experience with Internet searching on the Internet Use Experience Survey (see Appendix A) that was completed by students prior to the pretest and delivery of interventions. On the survey, students responded to one of five descriptors indicating different levels of experience with Internet searching as measured by the frequency of searching: several times a day, once a day, a few times each week, once a week, less than once a week, or never. Students who responded on the survey that they used a search engine several times a day or once a day were sorted into the high-experience group; students choosing any of the other three responses were placed in the low-experience group.

Table 12 summarizes the results of the between-subjects ANOVA tests conducted to determine any interaction for the experience factor in student performance on the posttest. These results show no significant interaction for experience with any of the variables used to measure students' evaluative abilities as they made judgments about the credibility of Internet sources. This would suggest that students' levels of prior experience with Internet searches neither gave them an advantage nor presented a hindrance to them in learning the skills focused on in the interventions.

I also looked at results from the within-subjects test to explore whether this self-reported experience with Internet searches had any impact within the instructional groups. The results of this analysis, looking at any interactions between the test

performance and the level of experience, are summarized in Table 13. The results of this analysis show that the levels of students' prior experience with Internet searches made no significant difference in their evaluative ability in both the authentic and restricted tasks; in addition, prior experience played no role in their use of the strategies in defending their choices on the authentic task. However, the results do show that level of experience did have a significant interaction (at $p < .05$) with students' use of the checklist criteria on the restricted task but not on the authentic task; the effect size for this interaction is not likely significant. Given this interaction, I then conducted paired-samples *t*-tests comparing the scores of students in low- and high-experience groups within the instructional groupings. The results of this analysis are summarized in Table 14.

The results for students in the localized instruction group show that both groups, regardless of experience with searches, made significant gains on the posttest in their ability to use the checklist criteria to defend their judgment of the preselected web site (at $p < .05$). In fact, by examining the mean score for students in both experience groups we see that the groups were brought to parity in terms of their performance on this task. For the contextualized group, students who reported high levels of prior experience showed significant gains in their ability to use the checklist criteria on the restricted task (at $p < .05$), but no such gains were seen for students with low reported levels of prior experience with Internet searches. This could imply that the localized instruction may be better suited for less-experienced students than the contextualized approach. To further explore this possibility, I compared posttest scores for checklist use on the restricted task between instructional groups; the results of this analysis are summarized in Table 15. These results show that, in fact, students receiving the localized instruction with low

levels of self-reported searching experience outperformed their peers who received the contextualized instruction. Students with high levels of self-reported searching experience did not manifest similar differences in performance on the posttest. This finding adds some weight to the notion that students with lower levels of experience with Internet searches may benefit more from the localized instructional approach.

Students' Emotional Response to Instruction

The second research question sought to assess emotional responses to the instruction in general and whether or not students preferred one approach to the other; as well, this question sought to discover whether students' self-reported level of experience with Internet searching had any effect on these responses. This section will discuss results of the Likert scale instrument used on the posttest and the comments students left as part of the posttest.

Likert Scale Results

As part of the posttest measure, students were asked to indicate their enjoyment of the instruction in evaluative reading on a four-point Likert scale, with 1 representing that they absolutely hated the instruction and 4 that they found in very enjoyable. Students were also asked to explain the Likert score in writing. These results were analyzed descriptively through the use of percentages. This method was chosen because the ordinal and skewed nature of the data violated the assumptions of other statistical tests (Tabachnik & Fidell, 2007).

Not all students responded to both of these prompts; of the 52 total participants in the study, 45 left comments on the posttest and 38 actually gave a response on the Likert scale. Responses to the Likert-scale prompt were grouped into positive responses (a 3 or 4 response from students) and negative responses (a 1 or 2 response). Table 16 summarizes the frequency and percentages of Likert responses for all participants who responded and for participants grouped by treatment condition and by self-reported experience.

The results for all participants show that the majority of students responded positively to the instruction; a little less than half of respondents reported a negative response to the instruction. In looking at how the treatment groups responded, the students were fairly evenly split on finding or not finding the instruction enjoyable. A small majority of the students in the localized condition did not find the instruction to be enjoyable, but a solid majority of students in the contextualized group did find the instruction enjoyable. A majority of students who responded and identified themselves as high-experience searchers did not find the instruction enjoyable. A larger percentage of students in the group who self-reported having less experience with searching reported enjoying the instruction than any other group.

Student Comments on the Posttest

On their posttests, 45 of the 52 student participants made comments about the experience of receiving instruction in evaluative reading. Using the constant comparative method (Glaser & Strauss, 1967), I analyzed these responses and identified a set of themes that emerged from students' responses. These themes included comments about

learning (or not learning) the content of evaluative skills, seeing value (or lack thereof) in the instruction, and the tediousness or difficulty of the tasks required of students as part of the instruction.

By far the most common comments students made centered around what they felt they learned in the instruction. Of those students who commented on this theme, 22 students expressed appreciation for what they had learned during the instruction. One student commented, "I noticed how well I could trust [a web site] and know that I am not putting faulty information in my paper which is a cool thing to know!" Some students expressed how their behaviors in reading on the Internet had changed as a result of the instruction: "Before I knew this check list that you go through, I basically trusted any website I used." Another student wrote that the instruction had "given me important evaluation skills and now I am more comfortable knowing what is true and what is not." Not all students felt that they had learned new skills from the instruction; 3 students specifically commented that they had not learned much as a result of the instruction. One student remarked, "I already knew most of the stuff to tell me if [a web site] was a reliable source or not."

Students also commented on the value they saw in the instruction; for example, some students who had not enjoyed or even learned much nevertheless commented that they felt the instruction was worthwhile. Of the 22 students who made comments on the value to the instruction or lack thereof, 15 students made positive comments about the value of the instruction. Many of these commented that what they learned about evaluating credibility would transfer to other classes and subject areas. One student commented that the instruction "gave us a good look about the dangers on the web of

fake articles and biased information"; another wrote that the instruction "will help me in school from now on." Five students who chose to comment on this theme found little value to the instruction. One of these students felt that she ended up trusting information even without knowing much about the author and another commented that he felt evaluating the web sites distracted from the goal of gathering information.

A final theme that emerged from these comments revealed some students' sense that the process of evaluating an Internet source's credibility was tedious and/or time consuming. Of the 45 students who left comments, 15 wrote about the time consuming nature of evaluating these sources. Some students commented about how it was hard to stay focused on using the checklist or the strategies; some used phrases like "dragged on" or "got to me" to describe how they felt about the methodical nature of evaluating the sites they investigated. This was not the only time students commented about the time involved in this process. During instructional time in both treatment conditions, students made comments about how long the teacher's modeling was taking, observing that they would not have spent nearly that much time on a web site.

Summary of Emotional Responses

The second research question sought to determine how students responded emotionally to the instruction, looking at the preferences for one approach over the other; in addition, the questions seeks to explore any influence of students' self-reported experience in their preferences. In general, a small majority of students seemed enjoy the instruction. More students in the contextualized group reported liking the instruction than did those in the localized group and students reporting lower experience with Internet

searches reported more positive responses to the instruction than did students reporting higher levels of experience.

In their written comments, students made important observations about seeing value to the instruction given the shifting focus on Internet research; these comments were made even by students who reported disliking the instruction. Other important comments made discussed a sense of tedium that some students felt with regards to taking the time to evaluate the web sites they encountered in their searches.

Teacher Interview

The interview conducted with the classroom teacher, Mrs. Smith, after the completion of the study was focused mostly on her observations during instruction and students' practice and her sense of what went well and what could have been improved. Analysis of the interview was completed by using the constant-comparative method (Glaser & Strauss, 1967), reviewing the recorded interview multiple times to look for emerging themes. This section summarizes the major themes that emerged from the interview.

The Issue of Time

A primary theme that emerged during the interview was the amount of time Mrs. Smith's students had to learn and practice the skills of evaluative reading in an Internet context. She felt that the 2 weeks (five class periods) we spent were simply not enough to give students enough time to develop the critical thinking skills they needed. However, she clarified that she did not want additional time simply "added on" to the instruction I had developed (i.e., 3 weeks of lesson plans instead of the 2 we delivered). She, instead,

would suggest introducing the concept of evaluative reading early in the school year and integrating instruction and practice with these skills in meaningful ways throughout units during the year. Embedding instruction this way would provide students with multiple opportunities to practice and internalize the skills without overwhelming them with concentrated instruction in a short window of time.

Mrs. Smith commented that she saw students making gains in their abilities but felt that they did not have a chance, nor were they willing to push themselves hard enough, to fully develop those skills. She observed, though, that simply adding more time for practice would not have been effective given that students were tiring of the focused practice by the end of the 2 weeks.

The Teacher's Preferences

Another theme to emerge from the interview was that of the instructional approaches the classroom teacher preferred and which she felt achieved better results. Mrs. Smith noted that she appreciated the checklist because it presented concrete, simple-to-grasp concepts for the students and allowed them to readily apply the criteria to the Internet sources they found in the searching. She observed, however, that the use of the checklist led to faster, more superficial analyses of sources and she did not feel that students in the localized group gathered the same quality sources as students in the contextualized did. She expressed concern that the use of the checklist may have given students a simplified notion of evaluating for credibility and even made them less patient. Based on her observations, she felt that students receiving the contextualized instruction took more time with the evaluations they made and, as a result, gathered more high-

quality sources for their research. So while students may have grasped the concepts in the checklist more quickly, she did not see that they were achieving better results in their judgments of credibility while researching on the Internet.

Challenges and Possible Changes

A final theme that emerged in the interview is that of unforeseen challenges the teacher observed students struggle with and the consequent ways that she would like to see the instruction revised to better help them meet those challenges. Throughout her responses in the interview, Mrs. Smith repeatedly talked about the challenges of students' learning these evaluative skills. In specific terms, she found that students struggled some with the concept of publisher and how to distinguish between a publisher and an author. In her comments, she suggested that changes to address this issue would help students distinguish between the two.

She also felt that while students gained in their ability to identify and recognize bias in sources, she did not see that they were adequately recognizing the role that bias can play in making a judgment about credibility. She observed that students tended to make snap, black-and-white judgments based on bias rather than recognizing subtleties in the way bias can influence credibility (i.e., that a biased source may still be valid, especially when used in the context of other sources). Her comments illustrated that bias is a complex issue and one that deserves more attention than it was given in these instructional approaches.

The classroom teacher also commented that while she felt students in the contextualized instruction group grasped the concepts of the sourcing and corroborating

strategies, they struggled to contextualize their searches: Few seemed to grasp the technique of building background knowledge for a search before starting into the search and using that knowledge to corroborate with sources as they researched. She attributed some of these struggles to the abstract nature of contextualizing, especially when compared to the concreteness of the checklist used with the localized group. However, she did note that some of the higher quality sources she witnessed with the contextualized group could be attributed to their early use of EBSCO and some of the sources gathered from that database. Again, she expressed a desire to spend more time on this facet of the contextualized approach to help students see value in it and to give them further experience using it their own searches.

Conclusion

This chapter presented the results of the analysis of students' performance on the pretest and posttests; in addition, the results of students' responses to the Likert-scale question and comment prompt on the posttest were discussed. The themes that emerged from the teacher interview were also presented. The next chapter will discuss how these results inform answers to the research questions and will consider these results within the context of existing research in this field. Additionally, the next chapter will discuss the implications of this research for future studies in the area of reading on the Internet.

Table 1
Results of T-Test for Pretest Scores Between Groups

		Localized Condition		Contextualized Condition			
Variable	*N*	*M*	*SD*	*M*	*SD*	*t*(50)	*p*
Evaluative Ability (restricted task)	52	1.58	0.58	0.96	0.82	3.12	.003
Evaluative Ability (authentic task)	52	3.42	1.33	3.69	1.23	-0.76	.45
Checklist Use (restricted task)	52	1.54	1.53	1.92	1.72	-0.85	.40
Checklist Use (authentic task)	52	5.08	2.77	5.81	3.89	-0.78	.44
Strategy Use Total (authentic task)	52	4.00	1.96	3.54	2.00	0.84	.40

Table 2
Differences in Evaluative Ability Between Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
approach	Evaluative Ability (restricted task)	1	3.995	8.05	.007	0.14
	Evaluative Ability (authentic task)	1	.167	0.12	.73	0.003
experience	Evaluative Ability (restricted task)	1	.319	0.64	.43	0.01
	Evaluative Ability (authentic task)	1	.079	0.06	.81	0.001
approach * experience	Evaluative Ability (restricted task)	1	.336	0.68	.41	0.01
	Evaluative Ability (authentic task)	1	.597	0.43	.51	0.01

Table 3
Comparison of Scores (Pretest and Posttest) for Evaluative Ability

	Localized Group			Contextualized Group				
Measure	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*(50)	*p*
Pretest	52	1.58	0.58	26	0.96	0.82	3.12	.003
Posttest	26	1.50	0.51	26	1.31	0.68	1.15	0.25

Table 4
Differences in Evaluative Ability Within Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
test	Evaluative Ability (restricted task)	1	.449	1.15	.29	0.02
	Evaluative Ability (authentic task)	1	35.00	32.94	.001	0.41
test * condition	Evaluative Ability (restricted task)	1	1.07	2.73	.11	0.05
	Evaluative Ability (authentic task)	1	1.50	1.41	.24	0.03
test * experience	Evaluative Ability (restricted task)	1	0.00	.001	.98	0.00
	Evaluative Ability (authentic task)	1	0.86	0.81	.37	0.02

Table 5
Results of Analysis of Evaluative Ability Differences Within Groups

			Pretest		Posttest			
Group	Variable	*N*	*M*	*SD*	*M*	*SD*	*t*(25)	*p*
Localized	Evaluative Ability (authentic task)	26	3.42	1.33	4.77	0.99	-3.79	.001
Contextualized	Evaluative Ability (authentic task)	26	3.69	1.23	4.69	0.97	-3.84	.001

Table 6
Differences in Checklist Use Between Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
approach	Checklist Use (restricted task)	1	17.85	5.30	.03	0.01
	Checklist Use (authentic task)	1	160.87	6.43	.02	0.12
experience	Checklist Use (restricted task)	1	0.07	0.02	.89	0.00
	Checklist Use (authentic task)	1	20.85	0.83	.37	0.02
approach * experience	Checklist Use (restricted task)	1	5.15	1.53	.22	0.03
	Checklist Use (authentic task)	1	16.93	0.68	.42	0.01

Table 7
Comparison of Posttest Scores for Checklist Use

	Localized Group			Contextualized Group				
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*(50)	*p*
Checklist Use (restricted task)	26	4.50	2.04	26	2.35	1.29	4.54	.001
Checklist Use (authentic task)	26	13.58	5.91	26	7.58	4.18	4.23	.001

Table 8
Checklist Use Results for the Contextualized Instruction Group

		Pretest		Posttest			
Variables	*N*	*M*	*SD*	*M*	*SD*	*t*(25)	*p*
Checklist Use (restricted task)	26	1.92	1.72	2.35	1.29	-1.20	.24
Checklist Use (authentic task)	26	5.81	3.89	7.58	4.18	-1.90	.07

Table 9
Differences in Strategy Use Between Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
approach	Strategy Use Total Score	1	15.73	1.55	.22	0.03
	Strategy Use Sub Score A	1	17.19	1.93	.17	0.04
	Strategy Use Sub Score B	1	0.01	0.01	.92	0.00
experience	Strategy Use Total Score	1	2.56	0.25	.62	0.01
	Strategy Use Sub Score A	1	1.79	0.20	.66	0.00
	Strategy Use Sub Score B	1	0.12	0.13	.72	0.00
approach * experience	Strategy Use Total Score	1	15.13	1.49	.23	0.03
	Strategy Use Sub Score A	1	5.86	0.66	.42	0.01
	Strategy Use Sub Score B	1	2.41	2.65	.11	0.05

Table 10
Strategy Use Within Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
test	Strategy Use (Total)	1	76.36	28.63	.001	0.37
	Strategy Use (Sourcing)	1	89.98	33.28	.001	0.41
	Strategy Use (Corroborating)	1	0.42	1.20	.28	.002
test * approach	Strategy Use (Total)	1	4.14	1.55	.22	0.03
	Strategy Use (Sourcing)	1	5.12	1.89	.18	0.04
	Strategy Use (Corroborating)	1	0.10	0.28	.60	0.01
test * experience	Strategy Use (Total)	1	0.19	0.07	.79	0.00
	Strategy Use (Sourcing)	1	0.55	0.21	.65	0.00
	Strategy Use (Corroborating)	1	0.05	0.15	.70	0.00

Table 11
Post Hoc Analysis of Strategy Use Within Groups

			Pretest		Posttest			
Group	Variable	*N*	*M*	*SD*	*M*	*SD*	*t*(25)	*p*
Localized	Strategy Use (Total)	26	4.00	1.96	6.15	3.17	-5.57	.001
Instruction	Strategy Use (Sourcing)	26	3.19	1.81	5.54	3.09	-5.87	.001
	Strategy Use Corroborating)	26	0.81	0.75	0.62	0.70	1.00	.33
Contextualized	Strategy Use (Total)	26	3.54	2.00	4.85	2.72	-2.62	.02
Instruction	Strategy Use (Sourcing)	26	2.77	1.84	4.19	2.55	-2.88	.01
	Strategy Use Corroborating)	26	0.73	0.92	0.65	0.80	0.63	.54

Table 12
Results of Analysis Focused on Experience

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
experience	Evaluative Ability (restricted task)	1	.32	0.64	.43	0.01
	Evaluative Ability (authentic task)	1	0.08	0.06	.81	0.00
	Checklist Use (restricted task)	1	0.07	0.02	.89	0.00
	Checklist use (authentic task)	1	20.85	0.83	.37	0.02
	Strategy Use Total Score	1	2.56	0.25	.62	0.01
	Strategy Use Sub Score A	1	1.79	0.20	.66	0.00
	Strategy Use Sub Score B	1	0.12	0.13	.72	0.00
approach * experience	Evaluative Ability (restricted task)	1	0.34	0.68	.41	0.01
	Evaluative Ability (authentic task)	1	0.60	0.43	.51	0.01
	Checklist Use (restricted task)	1	5.15	1.53	.22	0.03
	Checklist use (authentic task)	1	16.93	0.68	.42	0.01
	Strategy Use (Total)	1	15.13	1.50	.23	0.03
	Strategy Use (Sourcing)	1	5.86	0.66	.42	0.01
	Strategy Use (Corroborating)	1	2.41	2.65	.11	0.05

Table 13
Experience Interaction Within Instructional Groups

Source	Measure	*df*	Mean Square	*F*	*p*	Partial Eta Squared
test * experience	Evaluative Ability (restricted task)	1	0.00	0.00	.98	0.00
	Evaluative Ability (authentic task)	1	0.86	0.81	.37	0.02
	Checklist Use (restricted task)	1	12.44	6.08	.017	0.11
	Checklist use (authentic task)	1	19.91	1.54	.22	0.03
	Strategy Use (Total)	1	0.19	0.07	.80	0.00
	Strategy Use (Sourcing)	1	0.55	0.21	.65	0.00
	Strategy Use (Corroborating)	1	0.05	0.15	.70	0.00

Table 14
Comparison of Checklist Use Scores on the Restricted Task by Experience

		Pretest		Posttest				
Instructional Group	*N*	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*
Localized Low Experience	14	2.00	1.80	4.50	1.87	-4.37	13	.001
Localized High-Experience	12	1.00	0.95	4.50	2.32	-4.58	11	.001
Contextualized Low Experience	15	2.13	1.92	1.80	1.08	0.69	14	.50
Contextualized High Experience	11	1.64	1.43	3.09	1.22	-4.66	10	.001

Table 15
Comparison of Posttest Scores of Experience Groups for Checklist Use

	Localized Low-Experience Group			Contextualized Low-Experience Group				
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*(27)	*p*
Checklist Use (restricted task)	14	4.50	1.87	15	1.80	1.08	4.80	.001

	Localized High-Experience Group			Contextualized High-Experience Group				
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*(21)	*p*
Checklist Use (restricted task)	12	4.50	2.32	11	3.09	1.22	1.80	0.09

Table 16
Likert Response Frequencies by Group

Question	Treatment Group or Sub Group	*N*	Negative f (%)	Positive f (%)
Rate how well you enjoyed the instruction of the last two weeks.				
	All Participants	38	17 (45%)	21 (55%)
	Localized	21	11 (52%)	10 (48%)
	Contextualized	17	6 (35%)	11 (65%)
	Low-Experience	22	8 (36%)	14 (64%)
	High-Experience	16	9 (56%)	7 (44%)

CHAPTER 5

DISCUSSION

The first chapter of this dissertation presented statistics that have been frequently used to show the growing influence of the Internet as a source of information in our daily lives. While the Internet is playing a growing role in the lives of American adults, it is already arguably the primary source to which teenagers go for their information. Employers and even colleges and universities are expecting students to arrive already with mastery of the skills needed to locate and evaluate information on the Internet. All of this is small wonder given the vast amount of information available on the Internet and accessible literally at the click of a button. The Internet's potential is amazing but it also poses new challenges for readers that turn to it for answers, and these challenges need to be addressed by schools and teachers who wish to prepare students for a productive and successful life in our society.

Many researchers have turned their attention to the challenges of reading on the Internet, especially those challenges associated with evaluating the credibility of the information found in this medium. One of the primary concerns in this study was investigating whether traditional approaches to teaching these skills to students were limiting students by focusing on single sites and looking within the site for evidence of credibility. Given the powerful resources of the Internet, students could also be making

these judgments by more fully investigating authors and publishers as well as by comparing facts across multiple Internet sources. Also, since instruction in this area has so far been limited in many schools, this study also sought to explore if students' own experience with Internet searching—at home, without the tutelage of any experts—would have any impact on their ability to make well-defended judgments of credibility. I created two research questions to address these issues:

1. Will students receiving instruction in evaluative reading perform better at evaluative reading tasks if taught with a contextualized approach or with a localized approach? Will students' self-reported, independent experience with Internet searches influence any gains?
2. Will students like participating in instruction about evaluative reading on the Internet? Will they show a preference for one approach over the other? Will students' self-reported, independent experience with Internet searches influence their likes or preferences?

This chapter will focus on discussing the results of the study within the context of these questions. I will present this discussion by focusing on each research question individually. I will then present the limitations to the study and follow that with a discussion of the implications of this study for future research.

Question One: Differences in Performance Between Instructional Groups

The first research question that defined this study sought to determine whether an instructional approach based on the traditional checklist approach to teaching evaluative

reading would prove more effective than an approach that was based on teaching evaluative reading through instruction in strategies of contextualizing the Internet search and using Internet tools to support the strategies of sourcing and corroborating. To explore the effects of the different instructional approaches, this study gave students two tasks that allowed them to demonstrate growth in these skills: a restricted task where students evaluated a preselected web site using the checklist and a more authentic task where they referred to their own Internet search results and identified trustworthy and questionable sites from within their search results. The analysis of students' performance on these tasks focused on three areas: evaluative ability (students' accuracy in identifying or selecting trustworthy and untrustworthy web sites), checklist use (students' use of the criteria and language of the checklist to defend their choices of trustworthy and untrustworthy sites), and strategy use (students' use of the strategies of sourcing and corroborating to defend their choices). Students' performance in these three areas was measured with two tasks: a restricted task that asked students to score the trustworthiness of a preselected web site and an authentic task that asked students to select trustworthy and untrustworthy web sites from their own search results; both tasks also asked students to defend their choices in writing I will discuss the results for each of these three areas separately.

Differences in Evaluative Ability

No significant difference on the posttests existed in terms of students' accuracy in identifying sites as trustworthy or untrustworthy between the two groups, in both the restricted and the authentic tasks. There were, however, significant performance

differences within the two instructional groups in terms of performance on the authentic task, where students chose trustworthy and untrustworthy web sites from the results of the Internet searches they had conducted; similar gains were not seen with the restricted task. These results suggest that the two instructional methods were equally effective at helping students become more accurate at making distinctions in their own searches between trustworthy and untrustworthy web sites.

The lack of gains within the instructional groups seen with the restricted task may be explained in a few ways. It is possible that students saw this task, with its preselected web site, as a "trick" where things were not as they might seem on the surface and this attitude may have colored their thinking about the site. Perhaps more likely is the fact that, even though students were instructed to spend some time on the Internet acquainting themselves with the topic prior to judging this web site, the field notes taken during the testing and comments made by the teacher indicated that few students did so. In making this judgment of the preselected web site, they may not have had enough context or background knowledge to make an accurate judgment. This explanation is supported by other research that has shown that prior domain knowledge can influence searching success (Bilal, 2001; Hölscher & Strube, 2001), an effect which may carry over to evaluative choices as well. Researchers in print domains have also found that background knowledge can influence the way readers practice these strategies (Britt & Aglinskas, 2002; Wineburg, 1991a, 1998).

In looking at the results on the restricted task, it is important to point out that this measure of accuracy is the only area in which students differed significantly in their pretest performance: Students in the localized instruction group were significantly more

accurate on the restricted task than were those in the contextualized instruction group. That there would be no significant difference between these groups by the end of the intervention might suggest that the instruction students received helped level the playing field between the two groups and brought the one into parity with the other. It might also suggest that the contextualized instruction is better suited to raising accuracy rates for students who struggle with determining credibility, although since the two groups were not equally deficient in this area at the beginning of the intervention, this cannot be argued with certainty. Coupled with the fact that the localized group showed no growth in accuracy, these results also might suggest some threshold of performance in a task like this. To see further increases in this accuracy may require more instruction and especially instruction spread out over time.

Gains demonstrated within the instructional groups in the authentic task might suggest that with some time to familiarized themselves with the topic students were able to make better, more accurate, judgments about the web sites they encountered. By having to browse the search results and read through a number of web pages in order to make selections for the authentic task, it is likely that students gained more understanding of the topic, which informed their choices. Motivation could also play a factor in these results as the restricted task allowed for less choice and independent exploration than did the authentic task, potentially discouraging students from applying themselves and their knowledge at the same level on the restricted task as on the authentic task. The choice allowed in the authentic task may have increased students' intrinsic motivation, a factor which has been shown to influence readers' success (Guthrie & Wingfield, 2000); in the specific field of reading on the Internet, it has been often noted that this control is one of

the advantages provided by the Internet and similar technologies (Leu, 2000). This result bodes well for teachers who want to include instruction about evaluative reading into units on research and research writing, where students are given some freedom in terms of topics to research. This is also an important result as much of what students read in "real life" on the Internet will be the result of queries that they themselves construct in search of answers they really care about. In these cases of self-initiated searches, it seems more likely that students will apply what they learn in schools to evaluate the credibility of the sources they encounter.

Differences in Checklist Use

Based on the evidence in their written defenses, students in the localized instruction group demonstrated significantly better skill at using the checklist criteria to justify their evaluative judgments when compared to the group receiving contextualized instruction. The instruction designed to acquaint students with the criteria of the checklist and to model using that checklist to evaluate web sites seems to have been effective. Students were better able to use the language of the checklist and of accuracy, authority, objectivity, currency, and coverage, after having been taught to do so. While students in the localized group may not have become any more accurate in their choices, they certainly showed gains over the students in the contextualized group in their ability to use the checklist in making those decisions. The concrete nature of the checklist and its user-friendly sets of questions for each criteria may have contributed to these gains and permitted the students in the localized group to more quickly grasp these concepts and apply them to an Internet search. These results indicate that using the checklist as a

central focus in teaching evaluative reading has a significant, positive impact on students' ability to use appropriate criteria in making judgments about the credibility of Internet sources.

This finding is significant for a number of reasons. First, little if any research to this point has explored the impact of using the checklist to teach these skills to students. While the checklist itself is a much-talked-about and -implemented instructional approach (Kapoun, 1998; Meola, 2008; Metzger, 2007), little empirical research exists to substantiate any claims as to its effectiveness with students. These findings suggest that the checklist can, in fact, support instruction in evaluative reading. Secondly, this finding is significant in light of the research that has been conducted examining students' evaluative reading habits, showing that students either rarely engage in evaluative reading (Leu, 2006; Metzger, Flanagin, & Zwarun, 2003; Wineburg, 1991) or, when they do engage in evaluative judgments, do so using inappropriate criteria such as the quantity of information in a source or the presence of multimedia elements (Agosto, 2002; Rieh & Hilligoss, 2008; Shenton & Dixon, 2004).

The effectiveness of the checklist may come with a caveat, however. It is worth noting here the comments made by the classroom teacher in the poststudy interview in which she expressed concern that the checklist may have given students an incorrect sense of the complexity of judgments about credibility. Based on her observations of students during their independent practice time and the comments they made about the Internet sources they found during this time, she felt that the students in the contextualized instruction group were making more sophisticated judgments and gathered more credible sources. While this is anecdotal evidence, it may suggest that these results

may not paint a complete picture of how the checklist helped or even potentially hindered students in evaluating Internet sources.

It is also worth noting here that the fact that while students in the localized group outperformed students in the contextualized group in their use of the checklist, students in the latter group nevertheless showed significant gains in their use of the checklist criteria in defending their choices between the pre- and posttests. When these students were allowed to explore their own search results and select sites from those results, as per the authentic task, they demonstrated significant growth in their use of the checklist criteria to explain their evaluative decisions about credibility as a result of the instruction they received. These gains for this group suggest that the checklist may not be the only method of teaching students to use these criteria. Also, as discussed previously, these gains show that students can learn to use appropriate criteria for making these judgments—an important finding given the current research about how students make these judgments on their own. Motivation may, again, be a factor in explaining why students' accuracy improved with the authentic task where it did not show improvements in the restricted task. By allowing students to engage in a more authentic task where they were in control of which sites they looked at an evaluated, students may have been more inclined to take the time required to make accurate judgments. These motivational issues have been shown previously to have important influences on student learning and reading (Guthrie & Wigfield, 200; Leu, 2000).

Differences in Strategy Use

Since the contextualized group was taught to use the strategies of sourcing and corroborating, the expectation was that students in this group would show an increase in their use of the strategies in defending their judgments in the written defenses. However, the statistical analysis found no significant difference in strategy use on the posttest between the two instructional groups. Although the instructional intervention they had participated in emphasized the strategies of sourcing and corroborating, students in the contextual instruction group were no better able to apply those strategies in the authentic task than were those in the localized instruction group. While there were no significant differences between groups, analysis within the groups showed that students in both the localized and contextualized groups made significant gains in their ability to use the strategies.

One explanation for the lack of differences between groups might come back to the concrete, user-friendly nature of the checklist versus the more abstract complexity of the strategies. Instruction focused on the use of the checklist was apparently picked up quite readily by students and the better performance of students in the localized group suggests that they found it easier to apply the checklist in an authentic situation. The strategies of sourcing and corroborating were more difficult and thus students did not pick up on them as well and did not show significant differences in their performance when compared with the group that did not receive such instruction. The initial difficulty students had with these strategies is connected to research in reading comprehension strategies that has shown the significant amounts of time are often needed to allow students to fully grasp the strategies (Duke & Pearson, 2002; Pressley, 2000). The

constraints in place in this study did not allow for large amounts of time to be spent in the instruction and this may have hampered students' ability to master the strategies as presented.

The subscores for the strategy use allowed for examination of performance for the strategy of sourcing, operationalized in this study as students' discussion of issues of authorship and credentials as well as issues of bias, and the strategy of corroborating, operationalized in the study as students' making comparisons or noting differences between Internet sources and comparing information in a source to what they already knew. The students in the contextualized group performed no better in their use of sourcing than did those in the localized group, a finding which suggests that the contextualized instruction, though it helped students improve compared to the pretest in their use of sourcing, was no better at helping students than instruction with no explicit focus on sourcing as a strategy.

However, a more likely explanation for this lack of difference comes from recognizing the overlap between the two instructional approaches. Both approaches, contextualized and localized, taught students to look for an author or publisher of a web page and both approaches taught students to be sensitive to issues of bias in the way information is presented in an Internet source. The criteria students were asked to focus on from the checklist in this aspect and the criteria students used as part of the strategy of sourcing overlapped significantly. Thus, students in both groups were practicing sourcing, just in different guises: one as a checklist and one as a more abstract concept; consequently, little difference in performance might be expected between the two groups if the instruction was successful.

Where differences in performance might be expected, then, would be in the use of the strategy of corroborating, since making comparisons with prior knowledge or between sources is a unique element of the contextualized instructional approach and one that is not present at all in the checklist used in the localized approach. These performance differences were examined by comparing between groups the scores on the posttest for subscore B. The findings of this analysis showed that, once again, both groups performed equally in their use of corroboration; in point of fact, both groups performed rather poorly (a mean score of 0.62 for the localized instruction group and of 0.65 for the contextualized instruction group). These results show that the instruction targeted on the strategy of corroborating had little effect in increasing students' ability or disposition to apply the strategy when making judgments about the credibility of Internet sources when compared to instruction that did not focus on the strategy at all. In fact it can be argued, since students in the localized group received absolutely no instruction on corroborating, that the instruction provided for the contextualized group was no better than receiving no instruction in the strategy at all.

These findings speak to the challenge that corroborating presents to students. Students in public schools who have been fed a steady diet of teacher-selected texts and who, especially in reading instruction, have often dealt with single, isolated texts, are not going to be familiar with the idea of considering multiple texts at once and making connections between them as part of the process of evaluating these sources (Kinzer & Leander, 2003). A short instructional intervention of this nature is likely only to introduce students to the idea of corroborating (a word, in fact, that many of the students in the contextualized instruction group were not familiar with) rather than effectively teach

them how to apply the strategy. Work done by Nokes, Dole, and Hacker (2007) with teaching similar strategies to students demonstrated more success with the strategy of corroboration; the intervention in that study was longer in nature and allowed for more instruction and practice. This suggests that time may have played a role in the lack of gains seen in corroborating by students in this study.

The inherent complexity of corroborating might also be at work here. Rouet and Levonen (1996), in their work with hypertext and learning, suggested that the myriad possible paths that readers can take in examining these connected texts can create problems for readers as they try to manage the connections between those texts. Such an issue might be part of the difficulty with corroborating on the Internet, even though some browser features—such as multiple tabs and the ability to search for specific terms within a web page—could enhance readers' abilities to keep track of multiple texts.

The apparent difficulty of teaching this strategy suggests that more time and emphasis is needed if students are to improve in their ability to corroborate. Given more time, the strategy of corroborating could be emphasized more and additional teacher modeling and guided practice could help students better apply this strategy. This was brought up in the teacher's poststudy interview comments when she commented on her observations that students seemed to struggle most with this concept. She expressed a desire to focus more time and attention in future instruction to the concept of corroboration since it seems to challenge students but is also an important skill in evaluative decision-making with Internet sources.

The classroom teacher's comments about the difference in the quality of sources located by the two instructional groups during independent practice are also germane

here. The teacher's observations that students in the contextualized instructional group took more time with their decisions and collected higher-quality sources in their practice may suggest that, as a result of instruction focused on strategies, students in this group were more methodical with their decisions. Although the posttest scores suggest that students were not able to explicitly articulate this kind of thinking that may have been behind their decisions, it is possible that improvement was being made.

The Role of Experience

Using students' responses on the Internet Experience Survey, it was possible to look at the role prior experience with Internet searching may have had on their performance on these tests by grouping students into two groups: those with higher levels of self-reported experience (consisting of those who reported searching on the Internet at least once a day) and those with lower levels (those who reported searching the Internet less frequently than once per day). The first area examined in looking at the possible influence of experience was the pretest results for both instruction groups, where no significant difference was found between the high-experience and low-experience groups. The fact that some students reported searching the Internet more frequently, even as much as several times per day, seems to have had no impact on their initial ability to make judgments about the credibility of Internet sources. This result is in line with research that has found that the skills necessary for evaluative reading are not skills that students will learn on their own (Gunn & Hepburn, 2003; Strom et al., 2009). Since students seem unlikely to learn skills of evaluative reading on the Internet through experience alone, it is imperative that focused instruction be developed and delivered that

can teach them these skills; we cannot rely on them to "pick up" these skills just through lots of searching independently, without feedback and correction.

The results of the factorial analysis demonstrated no significant differences between the instructional groups based on their levels of self-reported experience. These results would suggest that prior experience neither helped nor hindered students as they learned the skills of evaluative reading. Students with little self-reported experience with Internet searches were just as likely in this study to grasp the instruction and show growth as those who had more self-reported experience. This finding seems to run counter to initial research done in exploring the role experience might play. Kiili, Laurinen, and Marttunen (2008), for instance, found that the better Internet evaluators in their study spent more of their time reading sources, something they could do because of their facility with key words and search engines; poorer evaluators spent more time searching for sources and less time reading the sources they found. Their findings might suggest that more experience searchers would be better evaluators. However, the fact that students in this study were provided with key words to use in conducting their Internet search may have limited the effect of this experience.

Other research with adolescents' Internet search behaviors (Guinee, Eagleton, & Hall, 2003; Henry, 2006; Hölscher & Strube, 2000) has shown that students who understand how search engines work seem to better be able to anticipate which key words will provide the best results or to use multiple search engines to accomplish a task. This research also shown that inexperienced students tend to click through search results in sequential order, a process that can waste a lot of time, rather than reading excerpts included in the search results list to help them evaluate potential sites before clicking on

the links. Again, these studies would seem to suggest that prior experience that enabled students to better manage search engines and search results would give them an advantage in making evaluative decisions about credibility. The results here show that no such advantage existed for students engaged in these tasks.

In fact, the only area in which self-reported experience with Internet searches could be said to play a role in these results is found by looking at experience as a factor within the instructional groups. In that case, students receiving the contextualized instruction who reported lower levels of prior experience seemed to struggle; all other students showed significant gains between the pre- and posttests except for this group. These results could suggest that a localized instructional approach, with its concrete checklist, may be better suited to students with lower levels of independent experience with Internet searches. They may also suggest that students with higher levels of outside experience are better able to grasp instruction in evaluative reading, regardless of the form it takes.

This should not be interpreted to mean that experience plays no role in how well students will receive and internalize instruction in evaluative reading. The research conducted so far into experience is in its initial stages and a complete picture of the role prior experience plays has yet to emerge. And it is difficult to be overly confident of the results in this study, given the fact that this study relied on students' self-reported levels of experience is significant here and the fact that, once broken down by experience, the numbers of participants in each group became quite small. These results should be seen as contributing to our developing understanding of the role that experience may play but not as delivering a clear verdict one way or the other.

It can be argued from these results that experience does not seem to hinder students at all. While some teachers might worry about teaching something to students that they already know given their supposed experience with Internet searches, this study shows that these students stand to benefit greatly from the instruction. And the fact that this self-reported experience did not benefit students at all based on pretest scores demonstrates that even with this experience, students are not necessarily developing skills of evaluative reading as a result of that experience. This finding is, of course, in line with the research that has shown students rarely engage in evaluative reading and that, even when they do, they rarely use effective criteria to do so (Agosto, 2002; Leu, 2006; Metzger, Flanagin, & Zwarun, 2003; Rieh & Hilligoss, 2008; Shenton & Dixon, 2004; Wineburg, 1991).

Question Two: Students' Emotional Responses to the Instruction

The second research question addresses students' emotional reactions to the instructional interventions they participated in. Students' reactions to the instructional interventions may affect their willingness and motivation to engage in the kind of extensive practice required in learning new skills. The findings discussed here are based on analysis of students' responses to a final question on the posttest asking them to rate the instruction on a Likert scale and explain that rating in writing.

An examination of the frequencies of students' positive ratings shows that a small majority of all of the student participants enjoyed the instruction. This is an important finding given that students who enjoy what they are learning are more likely to be engaged in the learning process, resulting in better outcomes (Stipak, 2004). Further,

some students who reported disliking the instruction stated that they nevertheless saw value to the instruction and felt it was worthwhile, an attitude which may also encourage those students to be involved in the learning even if they do not find it entirely to their liking.

Nearly two-thirds (65%) of those students who received the contextualized instruction reported enjoying that instruction, versus a little less than half (48%) of the students who received the localized instruction and reported enjoying it. This small preference for the contextualized approach may incline a teacher towards using an approach more centered around the strategies and building background knowledge with students, especially since both approaches were shown to improve students' reasoning abilities in judging web sites. Students with lower reported experience with Internet searches also tended to enjoy both instructional approaches more than those with higher reported levels of experience. One challenge a teacher may face in teaching these skills, then, is to keep high-experienced searches interested and engaged. While they are just as much in need of the instruction, these students may be less likely to see it as interesting or to even see that there is something in this for them to learn.

Students' Likert scale responses and comments also revealed another possible challenge for teachers. One-third of students made a point in their written comments that evaluating Internet sources was a tedious process. Comments made during the instruction, too, reflected students' uncertainty about spending so much time examining and evaluating a web site. These comments imply that students may not be willing to take the time to apply themselves to evaluating a source's credibility. Evaluating credibility can, in fact, be a time-consuming process, a fact exacerbated by the seemingly instant nature

of receiving search results and loading new pages on the Internet. All of this belies the careful, methodical way in which expert readers assess credibility of a source, something which students may not be initially ready to invest in. Teachers must show students the value inherent in this kind of evaluative reading to help them "endure" the process.

Summary of Major Findings

One significant finding from this study is that young people, when involved in direct, focused instruction in evaluative reading skills in an Internet context, can learn these skills and improve their ability to make accurate judgments about the credibility of Internet sources. Just as importantly, this study found that young people can be taught the language of credibility and use that language in discussing the judgments they make. As a result of the localized and contextualized instruction, students showed significant gains in their ability to use effective, reliable criteria to make judgments. These young people showed an increased ability to focus their attention on the author of a source, that author's qualifications, issues of potential bias in a source, and other meaningful attributes of a source. While students may not naturally be skilled in this kind of evaluative reading, the findings here show that they can develop these skills with instruction.

This study also found that the localized instructional approach, with its focus on a checklist, did more for students' ability to use these criteria of credibility than the contextualized instructional approach. This may be due to the fact that the checklist tool used in the localized approach provided a concrete, step-by-step process for students to follow in making and explaining their judgments about Internet sources. The skills

involved in evaluative reading are complex skills, requiring sophisticated behaviors, and having a concrete tool to help remind students of what to pay attention to and how to make judgments seems to be very helpful.

Another important finding from this study is that students did not necessarily pick up the strategy of corroborating very easily. Being willing and able to corroborate information across sources is an important skill, made even more important by the wide variety of sources available and the ease with which they can be accessed on the Internet. While the strategy of corroborating received attention in the contextualized instruction group, students seemed less likely to employ this strategy than they did the strategy of sourcing when they made judgments about credibility for the posttest.

Finally, this study revealed some thought-provoking early ideas about the role that experience might play in how well students receive the instruction. While the results here seem somewhat mixed and do not paint a complete picture, they at the least suggest that student experience may not be a significant hindrance in students' ability to internalize the instruction and make use of appropriate criteria in making judgments about credibility of Internet sources.

Educational Implications

Given the nature of this study as taking place in a high school classroom and being focused on instructional approaches to teaching students reading skills, these findings present some important implications for teachers and schools.

Perhaps the most important implication of this study is that instruction in evaluative reading skills does, in fact, help students become more effective critical

readers on the Internet. Instruction that models these skills for students and allows for practice and feedback on students' use of these skills will help them become more accurate in their judgments and, just as importantly, understand better how to make those judgments. In light of the growing dependence on the Internet as a source of information, the importance of teaching these skills cannot be overemphasized. And while teachers are charged with teaching a wide range of skills to students with limited time, they can take comfort in the fact that time spent teaching these evaluative skills will be rewarded with results.

Schools that have traditionally relied on Internet filters to protect students from questionable Internet material should think twice about using these filters to screen all potentially questionable material from students. Rather than relying solely on the algorithms or blacklists of filtering software, schools should encourage teachers to empower students to make their own judgments about credibility. This study shows that students can, in fact, learn these skills and such instruction can help prepare students for the "real" word of unfiltered Internet access where they will have to make those judgments on their own. Classroom teachers should also reconsider the way allowing access only to pre-selected web sites might cheat students out of authentic opportunities for practicing skills of evaluative reading. Again, by empowering students with the knowledge and skills they need to make such judgments on their own, teachers will better prepare students for the world outside of the classroom.

The results of this study also imply that students tend to do better with a concrete, user-friendly tool. Teachers have long recognized the value of such tools as they serve to remind students of important concepts and keep them focused in complex tasks.

Evaluative reading in the context of the Internet presents a number of challenges for students and certainly qualifies as a complex task. While the strategies of the contextualized approach may allow for more sophisticated judgments about Internet sources, they are abstract and more difficult to grasp early on for students. A concrete tool tied to these strategies might help students make better, more methodical judgments about Internet sources. The results of this study suggest that, regardless of the instructional approach a teacher chooses, formulating a concrete tool similar to the checklist used here will help students internalize and apply the instruction.

Another important implication for educators is that instruction in evaluative reading should first focus on teaching students the elements of sourcing. The results of this study suggest that the concept of sourcing is more quickly acquired by students than other concepts like corroborating. In this study, both instructional approaches incorporated elements of sourcing with focus on the author of a document. In the localized instruction, the checklist criteria of accuracy, authority, and objectivity encourage students to ask questions about the author, his or her qualifications, and the purpose with which the author writes in order to investigate possible ulterior motives or biases in the information in the document. In the contextualized condition, students were encouraged to do the same thing by looking across other web pages in a site for information about the author or conducting Internet searches of the author's name to build a picture of his or her credibility and potential biases. The posttest results showed that both of these instruction groups made solid gains in using these criteria in their evaluative decisions. These findings suggest that instruction in these skills might focus

first on sourcing as a way to help students experience early success with evaluating sources before moving into more challenging ideas such as corroborating.

Since both instructional approaches seemed to help students but the checklist used in the localized instructional approach may have been a more effective tool to aid students' practice and learning, another educational implication from this study involves potential revisions to the instruction. A melding of the best elements of the two approaches might be best. For example, using a checklist or similar user-friendly tool and incorporating elements of the strategy of sourcing (such as analysis of document type) and corroborating (building background knowledge first and comparing across sites) within that tool could yield significant benefits for students. A checklist-like tool could help students better apply the strategy of corroborating especially, a worthy goal given the inherent value of corroborating in this context and the relative ease with which sources can be compared on the Internet. To help facilitate this corroborating, instruction in this revised approach might also consist of teaching students how to use tabs on a browser to help facilitate accessing multiple documents at once.

A final educational implication of this study is that previous experience students have with Internet searching does seem to play a mostly positive role. When experience had an effect on the results, students with lower levels of performance typically benefitted more from the instruction. This group of searchers may feel less confident with Internet searches and be more open and receptive to instruction designed to help them develop skills in this area. High experience learners also seemed to benefit in that, as in the case of those in the contextualized group who showed significant gains in using the checklist criteria, they seemed to be able to grasp concepts about source evaluation that

were not explicitly explained and couple them with what they already knew. While there may be a challenge for teachers with highly experienced Internet searchers who feel instruction may be beneath them, these results suggest that all students, regardless of prior experience, can benefit from this instruction.

Limitations of the Study

This study does have some important limitations. One of the limitations is reflective of the design of the study. Students receiving the contextualized instructional approach did not have the benefit of a concrete, user-friendly tool like the checklist used in the localized approach. Such a tool may have helped students better make use of the strategies presented to them as part of their instruction. The results of the study may have been different if this group of students had been able to use a similar concrete tool to serve as a reminder of the strategies they had been learning and practicing in the instructional intervention.

Another limitation comes from a characteristic of the population used in the study. According to their responses on the initial survey, the vast majority of students in this study reported having access to the Internet in their homes. Having ready access in one's home makes students more likely to use the Internet and thus may give even those students in this study who reported low levels of experience more experience than some of their peers across the country. Recent research has shown that around one-third of homes in this country does not have broadband Internet access; the number of homes without access is even larger for lower-income families or families in rural areas (U.S. Department of Commerce, 2010).

The scoring procedures used in this study represent another limitation. These procedures resulted in small scores for students, and some tasks, like the restricted task had a very low number of points possible. These lower numbers may make progress harder to show and may not give an entirely complete picture of the growth (or lack thereof) exhibited by students as a result of the intervention. Lower numbers may also make it difficult to differentiate between higher-performing students and lower-performing students.

The definition of "prior experience" as used in this study also presents a possible limitation. Without a standard, valid measure of prior experience currently available, students' self-reports of experience levels were the only way available to measure this and to group students. Students may not have been completely honest in reporting these levels of experience or they may have even misunderstood the survey question about experience and unintentionally misrepresented their experience. Given the smaller size of the student population overall, dividing students into these two subgroups of high or low experience also resulted in small groups that limit the amount of generalizing that can be done.

Finally, as mentioned earlier, the amount of instruction in the study might be viewed as a limitation. The study consisted of 400 instructional minutes over a 2-week period. As discussed above, it is possible that a longer instructional period, perhaps spread out in multiple units throughout the year, may result in increased performance.

Implications and Questions for Further Research

The findings of this study have important implications and raise additional questions to be explored in future research.

The results of this study suggest at least three directions for future research. First, this intervention could be studied with other populations, especially populations with lower-income students or rural students who are less likely to have access to Internet connections at home, to see what the results of the intervention might be with these populations. Involving more teachers and more classrooms in future study of these interventions would provide results that would be more generalizable.

Second, the issue of experience discussed above suggests the need for more research on the effects of students' previous experience. Although the findings about experience here are interesting and thought-provoking, they must be taken with a grain of salt since the experience groupings relied on self-reported data. By using a more objective, standardized instrument to measure students' previous experience with Internet searching, we could have greater confidence in these results. Stronger results could help us determine whether a specific instructional approach is better suited for students with less or more prior experience in searching.

A third clear direction for future research is to take the gains shown here and see if they might be improved by creating instruction that spans across instructional units in a classroom and allows students more time for practice and feedback on their use of these skills. The results in this study are promising, but students still struggled in some areas. For example, students seemed to reach a possible threshold in their accuracy and by the end of the instruction, students still struggled with the strategy of corroborating. The

question of what more time and repeated exposure to this instruction would do for students is an important one. Empirical studies of different amounts of instruction, spread out over varying intervals of time, would allow researchers to determine an optimal amount of instruction that would maximize benefit to students while not taking so much time from classroom instruction that other valuable concepts are ignored. This additional study to look at extended amounts of time could also incorporate revisions to the instruction, as described above in the section on educational implications, and could assess the potential impact of those changes.

Continued study of the effectiveness of this revised instruction would further the goal of designing the most effective and most relevant instruction for students in this important area. Altering the instruction this way could address the issue of the lack of difference in performance between these two groups; making the strategies of the contextualized instruction more concrete for students could help bring about better learning results for these students and help them show more improvement in their ability to render sophisticated judgments of Internet sources.

Conclusion

This study was designed in the context of a world where our sources of information are rapidly evolving. Where books like encyclopedias and almanacs and periodicals like newspapers and news magazines were the trusted sources 20 years ago, the growing potential of the Internet has shifted our attitudes and we find ourselves relying more and more on this medium as a primary source of information. These changes have significant implications for schools charged with preparing students for

future employment and civic activity. They present new challenges to schools seeking to teach students to read and engage with this unique medium. One of the greatest challenges comes in how to teach students to evaluate the credibility of the sources they may encounter on the Internet.

The results of this study demonstrate that students can be taught to more accurately assess the credibility of sources they find on the Internet. Teachers and schools, some of whom may have previously circumvented the need to teach these skills, can take comfort in the fact that students can learn these skills and should implement programs designed to help students learn and practice evaluative reading on the Internet. Given that students are not likely to learn these skills on their own nor are they naturally inclined to make evaluative judgments as they read on the Internet, the classroom plays an important role in helping students develop these critical skills.

The most effective form that this instruction should take is perhaps not yet entirely clear, but this study encourages us to take the best of the dominant checklist approach—with its concrete, user-friendly tool—and revise it to meet the evolving nature of the Internet. By coupling a concrete tool with instruction in strategies that encourage students to take advantage of the Internet's resources so as to fully investigate sources and corroborate information across sources, teachers can help students develop not only a healthy skepticism about the credibility of Internet sources but also the skills they need to make effective evaluations of what they encounter. In a world where the Internet is assuming an increasingly greater role in disseminating information of all kinds, these skills become vital for our students' success in the world outside school.

APPENDIX A

INTERNET EXPERIENCE SURVEY

Do you have a computer in your home? ❑ Yes ❑ No
Do you have Internet access in your home? ❑ Yes ❑ No
If you don't have Internet access in your home, where do you usually access the Internet?
❑ School computer labs ❑ Public library computers ❑ Friend's house

How many hours do you spend on the Internet per day?
❑ None ❑ 2-3 hours
❑ 1 hour or less ❑ more than 3 hours
❑ 1-2 hours

How often do you use an Internet search engine (Google, Bing, Yahoo!, etc.)?
❑ never ❑ a few times each week
❑ less than once a week ❑ once a day
❑ once a week ❑ several times a day

What kinds of things do you use the Internet for on a regular basis (at least once a week)? (choose all that apply)
❑ finding information
❑ completing school assignments
❑ chatting or instant messaging
❑ email
❑ watching youtube videos (or videos from a similar site)
❑ social networking (Facebook, MySpace, etc.)
❑ playing games

APPENDIX B

WEB SITE EVALUATION CHECKLIST

Web Site Title: _____

Web Site Address: http:// _____

1. Accuracy of Web Documents Who wrote the page and can you contact him or her? What is the purpose of the document and why was it produced? Is this person qualified to write this document? Make sure author provides e-mail or a contact address/phone number.
2. Authority of Web Documents Who published the document and is it separate from the "Webmaster?" Check the domain of the document; what institution publishes this document? Does the publisher list his or her qualifications? What credentials are listed for the author(s)? Where is the document published? Check URL domain.
3. Objectivity of Web Documents What goals/objectives does this page meet? How detailed is the information? What opinions (if any) are expressed by the author? Is the page is a mask for advertising? if so, information might be biased.
4. Currency of Web Documents When was it produced? When was it updated? How up-to-date are the links (if any)? How many dead links are on the page? Are the links current or updated regularly? Is the information on the page outdated?

5. Coverage of the Web Documents

Are the links (if any) evaluated and do they complement the documents theme?
Is it all images or a balance of text and images?
Is the information presented cited correctly?
If page requires special software to view the information, how much are you missing if you don't have the software?
Is it free, or is there a fee, to obtain the information?
Is there an option for text only, or frames, or a suggested browser for better viewing?

Putting it all together

Accuracy. If your page lists the author and institution that published the page and provides a way of contacting him/her, and . . .
Authority. If your page lists the author credentials and its domain is preferred (.edu, .gov, .org, or .net), and . . .
Objectivity. If your page provides accurate information with limited advertising and it is objective in presenting the information, and . . .
Currency. If your page is current and updated regularly (as stated on the page) and the links (if any) are also up-to-date, and . . .
Coverage. If you can view the information properly—not limited to fees, browser technology, or software requirement, then . . .

You may have a higher quality Web page that could be of value to your research!

APPENDIX C

PRETEST

Internet Research Task

You have been asked to locate information on the controversy around drilling for oil in the Arctic National Wildlife Refuge in preparation for writing a research paper on this topic. To do this, use the following key words (in any combination) in searching for information:

ANWR drilling controversy oil

Spend some time browsing the sites that come up before proceeding with the tasks. As you browse, consider which sites you would consider trustworthy and which you would consider questionable or untrustworthy.

Your first task is to evaluate the site listed below (you should be able to click on the address to bring the web site up in your browser):

http://planetforlife.com/anwr/index.html

Use the checklist provided on the colored paper to help you evaluate whether or not you could trust the information presented on this site. Then, **circle one number below** to indicate the level of trust you would place in the site:

3 = this site is completely trustworthy, I would have no doubts about using it in a research report

2 = this site trustworthy but I might want to verify some facts on it before using it for a report

1 = this site is not very trustworthy, but might have a little bit of information I could use

0 = I would not trust anything from this site and would not use it at all in a research report

Once you've decided on a score for the site, give your score in the box below and include a written explanation in the space below for why you gave this site the score you did. You may use the checklist to help you in writing this explanation.What score do you give this site? ____

Why do you give that score to this site?

Your second task is to identify two trustworthy and two questionable or untrustworthy web sites from your search results and browsing. In the spaces below, copy and paste the URLs for the each of the five sites and then, in writing, explain the basis you have for evaluating each site.

Trustworthy Site #1

Paste URL here: _____

In the space below, explain your reasons for judging this site as trustworthy:

Trustworthy Site #2

Paste URL here: _____

In the space below, explain your reasons for judging this site as trustworthy:

Untrustworthy Site #1

Paste URL here: _____

In the space below, explain your reasons for judging this site as questionable or untrustworthy:

Untrustworthy Site #2

Paste URL here: _____

In the space below, explain your reasons for judging this site as questionable or untrustworthy:

APPENDIX D

POSTTEST

Internet Research Task

You have been asked to locate information on the controversy around whether nuclear energy is safe for humans and the environment in preparation for writing a research paper on this topic. To do this, use the following key words (in any combination) in searching for information:

nuclear **power** **humans** **environment**

Spend some time browsing the sites that come up before proceeding with the tasks. As you browse, consider which sites you would consider trustworthy and which you would consider questionable or untrustworthy.

Your first task is to evaluate the site listed below (you should be able to click on the address to bring the web site up in your browser):

http://www.world-nuclear.org/info/inf06.html

Use the checklist provided on the colored paper to help you evaluate whether or not you could trust the information presented on this site. Then, **choose one number below** to indicate the level of trust you would place in the site:

3 = this site is completely trustworthy, I would have no doubts about using it in a research report

2 = this site trustworthy but I might want to verify some facts on it before using it for a report

1 = this site is not very trustworthy, but might have a little bit of information I could use

0 = I would not trust anything from this site and would not use it at all in a research report

Once you've decided on a score for the site, give your score in the box below and include a written explanation in the space below for why you gave this site the score you did. You may use the checklist to help you in writing this explanation.

What score do you give this site? ____

Why do you give that score to this site?

Your second task is to identify two trustworthy and two questionable or untrustworthy web sites from your search results and browsing. In the spaces below, copy and paste the URLs for the each of the five sites and then, in writing, explain the basis you have for evaluating each site.

Trustworthy Site #1

Paste URL here: _____

In the space below, explain your reasons for judging this site as trustworthy:

Trustworthy Site #2

Paste URL here: _____

In the space below, explain your reasons for judging this site as trustworthy:

Untrustworthy Site #1

Paste URL here: _____

In the space below, explain your reasons for judging this site as questionable or untrustworthy:

Untrustworthy Site #2

Paste URL here: _____

In the space below, explain your reasons for judging this site as questionable or untrustworthy:

In the space below, please indicate how much you enjoyed learning about evaluating Internet sources these past few weeks. First decide on a score between one and four (one being you absolutely hated this and four being you absolutely loved this), tell us the score you would give and then write a couple of sentences explaining why you gave the score you did.

APPENDIX E

LESSON PLANS FOR THE LOCALIZED CONDITION

Day One

- Discussion of Credibility and Issues of Credibility (15-20 minutes)
    - hand out the anticipation guide on trust and credibility and give students a few minutes to complete it
    - (if appropriate) have students discuss their answers in groups before discussing as a class
    - during the class discussion of their answers, highlight these key points:
        - the author behind a source is an important factor in whether or not we believe/trust the information in the source
        - where information appears (in an encyclopedia, in a newspaper article, in a magazine, on a street placard, etc.) influences whether or not we trust the information/source
        - our amount of trust increases when we see/read/hear the information in multiple places (although it's not a foolproof judge of trust)
        - some authors might have bias in the way they present information and we ought to be cautious about trusting that information without further support
    - once students have discussed these issues, ask them to consider how they use the Internet: Do you use the Internet to help you with research or finding answers? What kinds of questions do you use the Internet to help you answer?
    - follow this with a discussion of what we trust on the Internet: Should we trust everything we find or read on the Internet? Why or why not? How can we tell what to trust on the Internet?
- Introduction to Internet Credibility and the Checklist (5 minutes)
    - explain to students that since they're going to use Internet sources as part of their research, we want to spend some time learning and practicing how to tell the difference between sites we can trust and sites we shouldn't trust
    - hand out a copy of the checklist to students and instruct them to feel free to take notes on this and to bring it with them each day as we work on these elements

    - introduce students to the checklist we'll be using as a way to help our judgments about web sites during our research, explain that we'll bespending some time over the next few class periods with this checklist while they conduct Internet research and gather notes
- Modeling of Checklist: Accuracy (20 minutes)
    - review this section of the checklist with students, the questions we'll be asking ourselves as we look at web sites
    - model how you use these questions to start thinking about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on your topic (with key words **impact deployment iraq families** and answering the checklist questions:
        - look first at the army.mil site and model answering and finding answers to the questions in the accuracy section; bring up the fact that there's no specific way to contact the author, but you can contact the military; the purpose is to talk about ways the Army is helping families, to share this with others (maybe to make the Army look good in the way it's handling the problems that families have); talk about initial judgments about this site based on these answers
    - for guided practice, have students look with you at a couple of sites and answer **each** of the checklist questions with students:
        - look at the npr.org news story; highlight the dual authors (a reporter but also the new organization National Public Radio with editorial processes that might lend some credibility); talk here, too, about purpose
        - review your search by taking out the word "Iraq" from your search and access the hooah4health article in the search results; highlight on this site the authors and their qualifications for writing
- Independent Practice (rest of the period)
    - using the keywords they've already devised for their searches, they can now conduct searches for sources (which they'll put in their google document)
    - they need to analyze two sites according to the accuracy checklist questions, turn that in by the end of their practice time

Day Two

- Review of Accuracy (5-10 minutes)
    - review with students, using the checklist, the content of the previous lesson: looking for author's contact information and qualifications (staying focused on using the web page/web site exclusively)
    - ask for students to share an experiences of sites they found last session
- Modeling of Checklist: Authority of Web Documents (25-30 minutes)
    - before starting the modeling with the computer and projector, review this section of the checklist with students and explicitly review the questions we'll be asking ourselves as we look at web sites:
        - who publishes a document?
        - what credentials do they have?

        - what credentials does the author have?
    - model how you use these questions to think about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on your topic (with key words **impact deployment Iraq families** and answering the checklist questions:
        - look first at the PDF document linked from the search result "XIII. The **Impact** of **Deployment** on the Military **Family**"
            - before even clicking the link, focus your attention on the URL (green text in the search result) and notice the domain (.gov) and talk about the fact that this is a government web site, that carries weight in terms of credentials (these people know what they're talking about in terms of the military)
            - click through to pull up the document, look at the list of authors under the title; explain how these people all seem to be military personnel (colonels) from the Marine Corps, they would likely have some expertise on the subject since they may have experienced deployment, would have access to people who have experienced deployment, etc.
            - discuss too the publisher (seen at the bottom of each page), the Dept. of Veterans Affairs; this is a reputable group, government agency that tries to help veterans and their families
            - points may come up about possible bias, acknowledge those and explain that we'll discuss those in more detail later
    - for guided practice, have students look with you at a couple of sites and review the checklist questions with students:
        - go to the second page of search results, visit the CNN story **Experts: Parents' deployment puts kids at high risk for problems**
            - ask students who the author of this page is (they should find the story's byline, Adam Levine: CNN Pentagon Supervising Producer); ask if he has any qualifications to write about this subject (he works with the Pentagon, he's a CNN producer, all this lends him some credibility)
            - ask students who published this site and if that's different from the author (yes, CNN publishes the site); does the publisher here have qualifications for writing about this subject? (as a news organization, they have access to lots of people and sources, people trust them, etc.)
            - students might bring up that CNN could be biased, general bias of all news organizations, etc.—acknowledge this point but explain that it's one we'll deal with more in depth later
- Independent Practice (rest of the period)

- using the keywords they've already devised for their searches, they can now conduct searches for sources (which they'll put in their google document)
- add annotations to each source regarding the accuracy and authority (based on the things we've looked at on the checklist today)

Day Three

- Review of Authority (5-10 minutes)
  - review with students, using the checklist, the content of the previous lesson: looking for author's contact information and qualifications (staying focused on using the web page/web site exclusively)
  - ask for students to share an experiences of sites they found last session
- Explain the annotated bibliography assignment (5-10 minutes)
  - Preface this however you want to, based on what you've noticed with the students and the progress they're making
  - They'll need six sources, with annotations, by the end of the period next time (on Friday); they should be able to get a good start on this today if they stay focused. (Maybe you want to split this up into three sources today and three on Friday, that's up to you.)
  - Pass out the model, talk about one or two of the examples and notice the way the annotation uses language found on the checklist and what we've talked about in class. (I will have copies made of the model.)
- Modeling of Checklist: Objectivity of Web Documents (25-30 minutes)
  - before starting the modeling with the computer and projector, review this section of the checklist with students and ask them first to define the word "objective"; discuss their answers a bit to explore this idea, connect it to the questions on the checklist where possible
  - explicitly review the questions we'll be asking ourselves as we look at web sites:
    - what is the site's purpose? why did this author publish this information?
    - what opinions are expressed on this page?
    - is the page a vehicle for advertising?
  - caution students that what we're talking about here is a bit more challenging—deciding a site's purpose and looking at opinions versus facts requires more critical thinking than some of the other things we've talked about so far
  - model how you use these questions to think about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on your topic (with key words **ANWR drilling**) and reviewing the checklist questions in you think-aloud:
    - look first at http://www.anwr.org/(Arctic Power - Arctic National Wildlife Refuge) and describe how you determine a purpose for this site:

- look at the list of popular articles (upper right of the screen) and you'll see a few that give the sense this site might be in favor of drilling in the ANWR
- the quote in the blue square from Sen. Murkowski is certainly in favor of drilling in ANWR
- click on the "About Us" link (kind of hidden, under the video still in a list titled "Menu") and this confirms that the purpose of this site is to convince people to support drilling in ANWR; I need to recognize that this site will be biased that way, but it doesn't mean I don't trust it just that I need to recognize this
- click through a couple of articles and talk about the level of detail (there's good detail here, the site looks well researched, etc.)
- discuss advertising—there are some Google ads but they're pretty minor, don't dominate the page
- as for opinions, click the "Today's drilling leaves a small footprint" and read through it with students, talking about the facts (drilling platforms are smaller, less space) but also the opinion that we're still looking at lots of acres used up in drilling and that might be a problem still
- overall, you'd judge the site as trustworthy but biased in one direction—you'll want to find sources from the other side of the argument for a research paper

  - for guided practice, have students look with you at the Wikipedia entry on ANWR drilling (http://en.wikipedia.org/wiki/Arctic_Refuge_drilling_controversy):
    - ask students to talk with you about the purpose of this page (to share information, to present both sides of the argument—notice the links in the contents box, to educate people about the issue); does the fact that the site presents both sides of the argument make this a more trustworthy source? This is an online encyclopedia—do we trust print encyclopedias? (you can share here that research shows that "false" edits on many Wikipedia pages have been shown to be cleared and corrected rather quickly—within a matter of a few hours or minutes)
    - ask students to judge the detail of the source (based on their brief glances at it); this might include a discussion of the citations and sources included at the end—what do these tell us about trustworthiness?
    - read a bit of the site with students and ask if they hear more opinions or facts from this source (likely to lean towards more facts, less opinion)
    - finally, ask students to talk about advertising on this site and how that might influence the way we feel about this source

- Independent Practice (rest of the period)

- work on finding reliable sources and annotating each source with explanations for the credibility of the source
- record notes and defense of sites being chosen in the google doc shared with the teacher

Day Four

- Review of Objectivity (5-10 minutes)
  - review with students, using the checklist, the content of the previous lesson: judging the objectivity of a web site
  - ask for students to share an experiences of sites they found last session
- Review the annotated bibliography assignment (as appropriate)
  - review due date, how to share with you, etc.
- Modeling with Checklist: Currency and Coverage (25-30 minutes)
  - before starting the modeling with the computer and projector, review these sections of the checklist with students, highlighting some that may be confusing:
    - where to look for last-updated information (usually at top or bottom of page)
    - "dead links" are those that give errors, we can check for these by following the links on a page
    - link's that are evaluated are those that the author comments on or critiques; if they complement the theme, that means they're related to the information presented on the site
    - ask if students have come across any information they have to pay for or that requires special software (sometimes links to journal articles may require payment—does that make them more or less credible? likely more credible, but might mention to students the ways we have of getting that information)
  - go back to the Wikipedia entry for ANWR drilling to model what we might pay attention to (http://en.wikipedia.org/wiki/Arctic_Refuge_drilling_controversy):
    - find the last-updated info at the bottom of the screen (likely to be very recent, which means that the information here is more likely to be complete and include recent happenings)
    - play with some of the links to see if they're "alive" or "dead" (this means that someone is taking care of the site, again helps me access recent information)
    - look at the balance of images and text—these aren't advertising images, they complement the text, but there's mostly text so there's lots of information here
    - citations look correct and even link to other articles or sites with additional information, so I think the page looks trustworthy
    - it's all free and I don't need special software, no one is using the site to sell me something or have me install software that could be dangerous
- Guided Practice

    - practice how you use these questions to think about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on your topic (with key words **ANWR drilling**) and reviewing the checklist questions in you think-aloud:
        - look at the NRDC site (http://www.nrdc.org/land/wilderness/arctic.asp) and ask students first what they think about author and bias (there's a mission statement at the top and some slogans that should clearly indicate this is a site with a bias against drilling)
        - find the last-updated information at the bottom of the page, ask students if they think this date poses and problems for the validity of the information on this page? (maybe, new things might have happened in the recent years that wouldn't be noted on the page)
        - look at the links—are these active links (click on them); are they recent? (yes, especially the press releases)—what does this mean in terms of whether or not we trust this site?
        - do the links seem related to the topic of drilling in ANWR?
        - what about citations? there aren't any here, so does that color the way I view the site (might note that lots of news articles don't include citations so their absence is not a guarantee of falsity—it's a bonus to find these, but not the only thing we should use in judging validity)
- Independent Practice (rest of the period)
    - Work on finding reliable sources and annotating each source with explanations for the credibility of the source
    - turn in their annotated bibliographies

Day Five

- Review of Currency and Coverage (5-10 minutes)
    - review with students, using the checklist, the content of the previous lesson: judging the objectivity of a web site
    - ask for students to share an experiences of sites they found last session
- Review the annotated bibliography assignment (as appropriate)
    - review due date, how to share with you, etc.
- Remind about the test on Thursday, how important it is to be here
- Guided Practice with Checklist (25-30 minutes)
    - explain that today you want to practice with them how to use the checklist as a whole, using all the pieces together in a more authentic and natural way as you research and find/evaluate sources
    - review major components of the checklist:
        - **accuracy and authority**: who wrote and published this? what qualifications do they state on the page? what's the URL?
        - **objectivity**: what purposes does the page meet? is this advertising? is the page detailed? does it provide opinions and/or facts?

        - **currency and coverage**: is it recent? are the links maintained? is there a balance of text and images? is the information cited correctly?
    - practice using the checklist to think about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on a new topic (**cell phones cause cancer**); strive to have the students tell you what to do and how to evaluate a couple of sites:
        - look at the cancer.org site and make sure students talk about:
            - the author/publisher (American Cancer Society, probably qualified to write about this stuff)
            - the purpose of this site (largely to inform, to summarize the research)
            - level of detail
            - lack of images
            - citations/sources at the bottom of the page
        - next look at the naturalnews site and make sure students discuss:
            - the lack of credentials for the writer (staff writer, doesn't mean he's qualified)
            - look at the publisher (naturalnews) is this a site that might have an interest in presenting only one side of the story?
            - recent story (just this past February)
            - it's purpose (basically to report on some research, but just one study so it's not telling the whole story)
            - notice lots of images and ads, might influence the purpose of the site (more to sell something than really give a full picture of the issue)
- Independent Practice (rest of the period): Work on finding reliable sources and annotating each source with explanations for the credibility of the source

APPENDIX F

LESSON PLANS FOR THE CONTEXTUALIZED CONDITION

Day One

I. Discussion of Credibility and Issues of Credibility (15-20 minutes)
   a. hand out the anticipation guide on trust and credibility and give students a few minutes to complete it
   b. (if appropriate) have students discuss their answers in groups before discussing as a class
   c. during the class discussion of their answers, highlight these key points:
      i. the author behind a source is an important factor in whether or not we believe/trust the information in the source
      ii. where information appears (in an encyclopedia, in a newspaper article, in a magazine, on a street placard, etc.) influences whether or not we trust the information/source
      iii. our amount of trust increases when we see/read/hear the information in multiple places (although it's not a foolproof judge of trust)
      iv. some authors might have bias in the way they present information and we ought to be cautious about trusting that information without further support
   d. once students have discussed these issues, ask them to consider how they use the Internet: Do you use the Internet to help you with research or finding answers? What kinds of questions do you use the Internet to help you answer?
   e. follow this with a discussion of what we trust on the Internet: Should we trust everything we find or read on the Internet? Why or why not? How can we tell what to trust on the Internet?

II. Introduction to Internet Credibility and the Strategies (5 minutes)
   a. explain to students that since they're going to use Internet sources as part of their research, we want to spend some time learning and practicing how to tell the difference between sites we can trust and sites we shouldn't trust
   b. explain to students that we'll be looking at three strategies we can use to help us be more critical or the web sites we encounter as we research on the Internet: contextualizing, corroborating, and sourcing (you can list these on the board if desired);these three strategies, like any reading

strategy we might use, will allow us to make better judgments about whether or not to trust information contained on the Internet we'll take some time each day to look at a specific strategy and practice its use while you're researching your topic that you've chosen for the research project

III. Modeling of Contextualization (20 minutes)
   a. Begin by explaining the purpose of contextualization: we want to build some basic background knowledge about our topic so we have solid, trustworthy information to use in judging the quality of what we read on the Internet; explain that we want to do this step before we conduct a Google or Bing search on our topic so we have this background knowledge to compare with what we encounter on the Internet
   b. Hold up copies of major news magazines: Time, Newsweek, an issue of the New York Times, etc.; ask students if they would trust the information they read in one of these sources (most should agree that they would); ask them to explain why (they should make comments about reports finding facts, trying to be objective, the editorial process, etc.; any comments that you can add about why these sources are trustworthy would be helpful, too); issues about potential author bias in these magazines/journals may come up and should be addressed here, in the sense that any person can have an opinion or bias but that those are always to be questioned regardless of the source—these sources provide more reliable information because of the editorial processes in place
   c. Explain that when we engage in contextualizing, we want to do a similar thing—build some background knowledge—before we do an Internet search (emphasize throughout the modeling that we contextualize very first, before we do anything—keep stressing this throughout the models and practice today and the next few days)
   d. Explain that one way to do this is to use the Internet to help us first look at sources that we know and trust (like Time, Newsweek, NY Times, etc.); one good source for this is the Pioneer Online Library, and I want to model for you how I would contextualize by using this trustworthy source
   e. Explain that you will now model for students how to contextualize their research topic with Internet-based, trustworthy sources. Open a browser window and go to the Pioneer Online Library, select the Ebsco link (because you know that this database indexes lots of reliable print sources), and then select the Student Research Center; enter your keywords into the search box (**impact deployment Iraq families**) and model browsing through the results, choosing articles that are related to your search interest, and reading through those articles to gain some information about the topic.
   f. Also, show students the EBSCO full database search, modeling how to select appropriate databases in the first step and then entering keywords and reviewing results to read about the topic (at this point, reading abstracts might be better given the complexity of some sources).

IV. Guided Practice with Contextualizing (10-15 minutes)

a. Select a student and ask him/her to share the research topic and keywords he/she is planning to use. Walk though the process with these keywords and (interactively) work through finding some articles/abstracts to read with students.

V. Independent Practice with Contextualization (30 minutes)
   a. Have students write an exit slip about what they learned about their topic from their searching today.

Day Two

I. Review of Previous Content (5-10 minutes)
   a. ask students to share what they remember discussing from last time; stress that they learned that we should first search in trusted, reliable sources to build some background knowledge for our search
   b. ask them to talk about how their initial searches went, what they learned about their topic that they think will help them in their general search
   c. explain that now, with some background knowledge built, we're ready to go out to the Internet for a general search: perhaps ask students why we'd want to do that (to pull from a variety of sources, different kinds of information like blogs, much wider net we can cast to see what information is out there, etc.)
   d. we're going to look at our first major strategy for determining the trustworthiness of a source: sourcing

II. Modeling of Sourcing (15-20 minutes)
   a. Define sourcing for students: when we engage in sourcing, we're going to look at the source itself and the author to gather some information to help us make a decision about trustworthiness: who is the author? how are they qualified to write about this? what biases or prejudices might they have?; we do this because understanding who wrote something and what qualifications they have for writing can help us determine the source's credibility
   b. Explain that you will now model for students how to engage in sourcing while searching on the Internet; open a browser and enter your keywords into the search box (**impact deployment Iraq families**) and model sourcing using the army.mil site
      i. talk first about the author of this site, Jennifer Clampet (USAG Wiesbaden); on the site itself, we don't learn much about her; if I click her name, that brings up a list of articles she's written for the site; if I google her name (show how to do this), I pull up some other articles that she's written (browse through a few of these); if I google USAG Wiesbaden, I see this is a US Army garrison in Germany which she must be associated with
      ii. so, conclusions: she seems to write lots of articles about the military, which tells me that she could be an expert in this, she seems to be in the military herself which also lends her some credibility

iii. I also want to consider potential attitudes of the author: the fact that she's a member of the military may also mean she wants the military to look good or may not want to speak out against things she doesn't agree with in the military, so I might want to be careful about trusting that she'll give me the whole picture

III. Guided Practice with Sourcing (10-15 minutes)
   a. look next at the npr.org news story; highlight the dual authors, there's a reporter named as author, BELLAMY PAILTHORP, but the story is published on National Public Radio—ask students how we might find out more about Pailthorp (we could google her); doing so pulls up a number of links to her, we can explore a couple of those (make sure to visit the KPLU beats and bios page to find out about educational background, etc.; ask students some questions to help them engage in sourcing:
      1. **so what do we learn about this reporter?** (she has some good credentials for writing stories and has been around for a while doing this)
      2. **why might she want to write a story like this? could she have some biases we want to be careful of?** (hard to see any right off the bat)
      3. **does the fact that this is published by NPR mean anything in terms of bias or qualifications?** (they gather lots of news stories, have a wide audience to be sensitive to, some editors will screen stories)
   b. **throughout this practice, make strong connections with students to the idea of sourcing, the kinds of questions we ask about the author, how we use google to find additional information about the author, etc.**

IV. Independent Practice with Contextualization (rest of the period)
   a. students will now go to the lab to continue their own research with individual topics
   b. instruct them to make notes, compile sources, etc. in their google doc and to annotate each source with notes about the author/publisher and qualifications as well as potential biases

Day Three

- Review of Previous Content (5-10 minutes)
  - ask students to share what they remember from our discussion of sourcing
  - ask them to share any sources they found, the results of their sourcing activities, etc.
  - explain that now they have more concrete topics, we're going to revisit the idea of sourcing and ask them to more explicitly practice this with the annotated bibliography
  - would this be a good time to pass out the handout on the strategies? Might help with the independent practice and the annotated bibliography assignment
- Explain the annotated bibliography assignment (5-10 minutes)

- Preface this however you want to, based on what you've noticed with the students and the progress they're making
- They'll need six sources, with annotations, by the end of the period next time (on Monday); they should be able to get a good start on this today if they stay focused. (Maybe you want to split this up into three sources today and three on Monday, that's up to you.)
- Pass out the model, talk about one or two of the examples and notice the way the annotation uses language found on the handout and what we've talked about in class. (I will have copies made of the model.)

- More Guided Practice with Sourcing (15-20 minutes)
  - Remind students about sourcing (have them refer to the handout): when we engage in sourcing, we're going to look at the source itself and the author to gather some information to help us make a decision about trustworthiness: who is the author? how are they qualified to write about this? what biases or prejudices might they have?; we do this because understanding who wrote something and what qualifications they have for writing can help us determine the source's credibility
- Guided Practice with Sourcing (10-15 minutes)
  - Switching the search terms we've been using, look at the site http://science.howstuffworks.com/anwr4.htm ; look at the site to find the author's name
    - click on his name to reveal some information about him and ask students what this tells us about his qualifications to write about the ANWR issue (the PhD and post-doc work means he's a solid researcher)
    - now, google his name to find out more about him, notice his publications in AP environmental science, his bio at Simon Schuster, etc.
      - **so what do we learn about this author?** (he has some good qualifications for writing stories and has been around for a while doing this)
      - **why might he want to write a story like this? could he have some biases we want to be careful of?** (hard to see any right off the bat)
      - **who published this web site? (howstuffworks.com) What might this tell you about the credibility of this information?**
  - **throughout this practice, make strong connections with students to the idea of sourcing, the kinds of questions we ask about the author, how we use google to find additional information about the author, etc.**
- Independent Practice with Sourcing (rest of the period)
  - students will now go to the lab to continue their own research with individual topics

- instruct them to make notes, compile sources, etc. in their google doc and to annotate each source with notes about the author/publisher and qualifications as well as potential biases

Day Four

- Review of Previous Content (5-10 minutes)
  - Talk to students about what you're noticing on their annotated bibliographies in terms of sourcing, provide positive and constructive feedback
  - Ask students to talk about their experiences in the lab with their research
- Modeling & Guided Practice with Corroboration (20-25 minutes)
  - Referring to the handout, have students look with you at the definition of corroborating and discuss the ways they can take advantage of the web (especially Googling things they're unsure of) to help with corroborating
  - Ask why it's important to contextualize, given what we know about corroborating? (it helps to first look at trustworthy sources so we have something to use as a reference while we search the general Internet)
  - Explain that corroborating is a process that takes some time and requires that we read through sources in order to be able to judge them; we might want to corroborate a source with an author that we're not sure of or a source we think might be biased, just to be sure that we've got a source that's trustworthy (not all biased sources are bad and on the Internet, not all source information is readily available, so we can fall back on corroboration to help)
  - As a model, talk with students about your topic of drilling in ANWR
    - have these sites pulled up in separate tabs on your browser:
      - http://science.howstuffworks.com/anwr3.htm
      - http://en.wikipedia.org/wiki/Arctic_Refuge_drilling_controversy
      - http://www.nrdc.org/land/wilderness/arctic.asp
      - http://www.anwr.org/Technology/Today-s-drilling-leaves-a-small-footprint.php
    - Let's say I've been searching for a while and have found a few sites
    - I'm wanting now to compare information that's presented on these sites to see if I can trust them, so watch me as I read through and make connections between the sites
    - I see on the Wikipedia site (under Supporting Views, in the first and second paragraphs) that drilling would have a small footprint, thanks to new technology; I see the same thing on the Arctic Power website (show the image and highlight words); the fact that I see this site on both sites lends some credibility to both of them and to this information
    - Now, when I go back to the Wikipedia site (under Opposing Views, in the fourth paragraph) I see that this footprint isn't the whole story, but there would be roads and airports and gravel pits,

too; on the NRDC site I can click on this map (click image on the page) and see a projection of this network and it looks like the footprint might be bigger than just the drilling platforms
        - If I look at the howstuffworks page, I see a reference to the "directional drilling" that I saw on Wikipedia and on the Arctic Power site—this is technology that helps reduce the impact of drilling platforms; I also see (in the bottom couple of paragraphs) more about roads and pipelines and things like this that could also have an impact
        - So … do I trust these sources that I've pulled up? I trust Wikipedia, because it's presenting both sides, has lots of citations and there are good controls on the editing (maybe revisit this with this class as they didn't have the same discussion?); I see similar facts on all of these sites, so I think they're all trustworthy in terms of the facts they share in common; what the Arctic Power site seems to leave out is the network of roads and pipelines and airports—every other site talks about those, but I know the Arctic Power site supports drilling, so I'm not surprised they'd leave those facts out; that might lower the Arctic Power site a bit in my opinion because it's pretty biased, but they still have information I want to use, I'll just need to use it along with the information from other sites
        - If I want to do more investigation here, I could use the terms "ANWR drilling impact" to find more sites that might help me corroborate information even more
    - For guided practice, have students look at the Tree Octopus web site (http://zapatopi.net/treeoctopus.html) and assume that we're doing some research on endangered species and we come across this site
        - now, as we've researched, we know that some species of octopus are endangered but we've never come across a tree octopus—are there some things on this site that might make it trustworthy? (see what students say in terms of images/photos, lots of text and links, etc.)
        - sometimes we'll encounter a site like this that says things we're not seeing anywhere else—how could we corroborate this information (someone should suggest looking up the author or, even better, looking up "northwest tree octopus" keywords); looking at the results of this search, we can see that this site is a hoax and the creature doesn't exist
        - if you see anything that you're not sure of or doesn't match what you read during contextualizing or doesn't match your own experience, do some additional Internet searching to see if you can corroborate it
- Independent Practice with Sourcing (rest of the period)
    - students will now go to the lab to continue their own research with individual topics

- ask students to note down something in their google doc about the information they're corroborating through their research

Day Five

- Review of Corroboration (5-10 minutes)
  - review with students, using the handout, the content of the previous lesson: what do we mean by corroboration? how do we do that?
  - ask for students to share an experiences of sites they found last session
- Review the annotated bibliography assignment (as appropriate)
  - review due date, how to share with you, etc.
- Remind about the test on Friday, how important it is to be here
- Guided Practice with Strategies (25-30 minutes)
  - explain that today you want to practice with them how to use the together, using all the elements together in a more authentic and natural way as you research and find/evaluate sources
  - review major components of the strategies:
    - **contextualizing**: what do I do first when I start a research project? why do we look to trusted, print-based sources first?
    - **sourcing**: what do we want to find out about an author? how can we find out more about authors or publishers (emphasize using additional Internet searches for this)
    - **corroborating**: why is this strategy so important?
  - practice using the strategies to think about whether a source is trustworthy or not; using the computer and LCD projector, model conducting a search on a new topic (**cell phones cause cancer**); strive to have the students tell you what to do and how to evaluate a couple of sites:
    - what do we do first? (build a context by going to EBSCO or another online database with trusted, print sources)
      - model this for students, look at a few articles and talk about reading through them to build some background
      - mention that then we can go to the web in general, with its much wider set of sources, but we have to be very careful as we evaluate trustworthiness
    - look at the cancer.org site and ask students to help with:
      - sourcing: who wrote this? how can I find out more about the American Cancer Society? What qualifications might this group have? what motives might this group have for putting this information out there?
      - corroborating: how will we be able to compare information here to other sites? (draw attention to the part of the document talking about no real connection between cell phones and cancer in preparation for looking at the next site)
    - next look at the naturalnews site and make sure students discuss:

        - who wrote this? how can we find out more about David Guitierrez? what about naturalnews? what qualifications do these people have? what might be the purpose of this site?
        - let's corroborate: does this site seem to agree with the Cancer Society site? how can we resolve the conflict?
    - finally, visit the medline plus government site and discuss:
        - who is the author here? what is the NLM or NIH (can search to find this)? are they qualified? what purposes might they have for putting this information out there?
        - notice the first line about no link between cell phones and cancer—how does this corroborate with our other sites? so what do we think now about naturalnews?
- Independent Practice (rest of the period): Work on finding reliable sources and annotating each source with explanations for the credibility of the source

APPENDIX G

SCORING SHEET

Critical Evaluation Scoring Sheet Student No: _____

Restricted Task

Site Score: 0 1 2

Checklist Use	Tally of occurrences	Total
Accuracy		
Authority		
Objectivity		
Currency		
Coverage		
TOTAL SCORE (CHECKLIST)		

Authentic Task

Trustworthy Site Choice #1: 0 1 2

Checklist Use	Tally of occurrences	Total
Accuracy		
Authority		
Objectivity		
Currency		
Coverage		
TOTAL SCORE (SITE 1 CHECKLIST)		

Strategy Use	Tally of occurrences	Total
author's/publisher's position/qualifications		
author's/publisher's motives		
awareness of bias		
SUBSCORE A		
type of document		
direct comparison to sources		
direct comparison to knowledge		
SUBSCORE B		

TOTAL SCORE (SITE 1) _____

Trustworthy Site Choice #2: 0 1 2

Checklist Use	Tally of occurrences	Total
Accuracy		
Authority		
Objectivity		
Currency		
Coverage		
TOTAL SCORE (SITE 2 CHECKLIST)		

Strategy Use	Tally of occurrences	Total
author's/publisher's position/qualifications		
author's/publisher's motives		
awareness of bias		
SUBSCORE A		
type of document		
direct comparison to sources		
direct comparison to knowledge		
SUBSCORE B		

TOTAL SCORE (SITE 2)

Questionable Site Choice #1: 0 1 2

Checklist Use	Tally of occurrences	Total
Accuracy		
Authority		
Objectivity		
Currency		
Coverage		
TOTAL SCORE (SITE 3 CHECKLIST)		

Strategy Use	Tally of occurrences	Total
author's/publisher's position/qualifications		
author's/publisher's motives		
awareness of bias		
SUBSCORE A		
type of document		
direct comparison to sources		
direct comparison to knowledge		
SUBSCORE B		

TOTAL SCORE (SITE 3)

Questionable Site Choice #2: 0 1 2

Checklist Use	Tally of occurrences	Total
Accuracy		
Authority		
Objectivity		
Currency		
Coverage		
TOTAL SCORE (SITE 4 CHECKLIST)		

Strategy Use	Tally of occurrences	Total
author's/publisher's position/qualifications		
author's/publisher's motives		
awareness of bias		
SUBSCORE A		
type of document		
direct comparison to sources		
direct comparison to knowledge		
SUBSCORE B		

TOTAL SCORE (SITE 4)

APPENDIX H

SCORING INSTRUCTIONS

General Instructions
Begin the scoring by noting the student number on the scoring sheet; use one sheet (both sides) per student. While reading student responses, you may encounter misspellings, misused words, or confusing language. You may infer a student's original meaning to the best of your ability. If it is too difficult to infer the proper meaning, simply ignore the confusing language.

Scoring the Checklist Task
For the site choice, score the student's response in this fashion:

If the student gave the chosen site a …	You should circle this number on the scoring sheet:
3	1
2	2
1	0
0	0

In the written defense of their score, students should show evidence of their use of the checklist. Largely, this is reflected in using language and ideas presented on the checklist. When the student demonstrates evidence of checklist use as described below, make a mark (award a point)in the "tally of occurrences" column. **Please note that credit should be awarded if students make mention of the presence or lack of these elements; either type of move should be scored**. After completing the scoring, count the tally marks and write the total in the "total" column.

Points (tally marks) should be awarded in each category for:

- **Accuracy**: any mention of the absence or presence of an author's name, of contact information for the author, of the author's qualifications, or the purpose of the document; in discussing a Wikipedia entry, the student may discuss the fact that any person can edit the entry, a move which should be scored here
- **Authority**: any mention of the absence or presence of a publisher and the publisher's qualifications or contact information, or mention of the URL or domain (.edu, .com, .net, etc.) of the site (this does not include discussion of the type Internet document—blog, wiki, message board, etc.)
- **Objectivity**: mention of the purposes of the web site and how that might influence credibility, the level of detail in the site, whether facts or opinions are part of the site, and if there is advertising present

- **Currency**: any mention of when the site was last updated, whether or not links from the site are active or not, or whether information on the site is current or outdated
- **Coverage**: any mention of the links on the page being related to the topic as opposed to being unrelated or distracting from the topic, whether images or text is more dominant on the page, whether citations of sources are present, or whether special software or a fee is required to view the page

Scoring the Choice Task
There are two steps to scoring each chosen site: score the site choice and score the written response.

Site Choice Scoring
The site choice is scored by comparing the student's site choice to the established, scored list of sites. For the two chosen trustworthy sites, compare the scores in this fashion:

If the score on the established list is a …	You should circle this number on the scoring sheet:
2	2
1	1
0	0

For the two chosen untrustworthy sites, compare the scores in this fashion:

If the score on the established list is a …	You should circle this number on the scoring sheet:
2	0
1	1
0	2

Written Response Scoring
This step consists of two phases and each written response will be scored twice, once according to the checklist rubric from the Checklist Task (above) and a second time according to the Strategy Use rubric presented below.

For the strategy use, you will keep a tally of the number of times a student uses strategies of critical evaluation in answering the follow-up questions for each trustworthy or questionable site the student chose. When the student demonstrates evidence of critical evaluation behaviors (as described below), make a mark in the "tally of occurrences" column for the appropriate category.

Please note that, where appropriate, credit should be awarded if students make mention of the presence or lack of these elements; either type of move should be scored. For example, a student should receive credit for either (a) discussing the qualifications of the author as presented on the page itself or from search results, or for (b) discussing the lack of information on the site or the failure to find information about an author from an Internet search.

Make marks as you evaluate the students' answers to the follow-up questions. After completing the scoring, total the scores for the first three categories in the SUBSCORE A box; total the

scores for the last three categories in the SUBSCORE B box; write the sum of the two subscores in the "TOTAL SCORE (SITE X)" column.

- **Author's or Publisher's Position or Qualifications**: The student makes a reference to an author's (or publisher's) occupation, profession, or any other credentials or qualifications for writing on the Internet about this topic (or the absence of any information about these things). This goes beyond simply talking about the presence of an author's name or of contact information but should include discussion of the author's or publisher's qualifications. For example:
    - A student might write "since she works for an oil company, she would know a lot about this topic" or "he doesn't provide any information about who he is, so I can't be sure he knows a lot about the topic" or "in searching for information about this group, I found nothing about them."
    - A student may also discuss the use of citations or clear reference to the sources used by a web author (or the lack of such references); the student might write "this author lists (or cites) the sources used for the writing" or "the author doesn't cite her sources" or "I have no idea what sources the author used for this article" when discussing the credibility (or lack thereof) of the author.
    - A student may discuss the publisher and its editorial processes; the student might write "there are people hired to check the facts for this site" or "because this site has a big reputation, they will make sure that things are true on the site."
    - A student may write, in reference to a Wikipedia entry, that anyone can edit the information in the entry (in discussing its lack of credibility) or that Wikipedia entries are carefully screened by other authors acting as editors (in discussing its credibility). Note that these specific references to Wikipedia should also be scored with a tally mark in the "type of document" category.

- **Author's or Publisher's Motives**: The student makes a reference to any potential reasons, underlying agendas, or motivations for an author or publisher to post this information to the Internet. For example:
    - A student might write "since the author works for the oil companies, she might want people to think the best about oil companies" or "this is a Fox News site and they're a conservative web site" or "they want to see people invest in oil drilling so they would ignore bad things."
    - Comments about the advertising present on a page (or absent, as the case may be) would also qualify under this category; a student may write, "there are lots of ads on this page" or "I think this site is just out to make money because there are more ads than anything else on the site."
    - Students might comment on the potential audience for a page and how that may change their interpretation of information on the site: "this site is written to persuade an audience and so the author may not tell about the bad things about the issue" or "this site is really just informing people about the issue and doesn't want to persuade or sell anyone anything so it's more trustworthy."

- **Awareness of Bias**: The student demonstrates an understanding that the material presented in the source could be biased or that an author or publisher may be trying to avoid bias and present a neutral viewpoint. For example:
    - A student may mention that a site shows bias in that it presents largely opinions instead of facts (or vice-versa) or the student may praise a trustworthy site for presenting a balanced view supported by facts: "I trust this site because it seems

like the author presents both sides of the issue" or "This author only focuses on the good things about the issue and doesn't discuss anything negative."
    - This may also take the form of a student noting language or word choice that is intended to excite or anger an audience. A student may list specific words that reflect bias or will discuss, in general, the use of biased language: "she uses words that not everyone would agree with and it seems like she's trying to make people mad about rising gas prices so they'll support drilling" or "the words this site uses makes those who support drilling sound like hateful, mean people."
    - This awareness of bias may also take the form of the student making reference to perspectives that are missing from a source, how a source is one-sided, or that a source is not including complete or important facts. A student may write "this site doesn't even talk about objections to drilling in ANWR and just seems to assume that everyone will agree."

- **Type of Document**: The student mentions the kind of web site under consideration and its appropriateness to the research topic. In this sense, the student is identifying the kind of site under consideration and making inferences about the quality of the site or information on the site in relation to the kind of site. For example:
    - A student may write, "this is a blog and so I won't trust it fully" or "this site is a message board that just contains people's opinions" or "this is a news article from a news site so I trust it."
    - Some students may develop the thought and reasoning more (i.e., "this is a blog and I know that blogs are typically written by people and contain just their opinions so I won't trust this") or may just make mention of the document type, assuming the underlying reasoning. Either move should be given credit.
    - Other web sites types that students may mention include news site, personal blog, educational web site, informational site, message board or web forum, commercial site, youtube or video sharing site, wiki site, review site, school site, or social networking site.
    - Note, however, that students should differentiate between a generic wiki site (like wikianswers.com) and the more reputable Wikipedia (with its listing of sources, generally balanced presentation on controversial issues, and tighter editorial controls); this may also hold true for other document types like a personal blog as opposed to the blog of a CNN.com news reporter (where more editorial controls may be in place).
    - Students making reference to the fact that a Wikipedia entry can be edited by anyone or that these entries are often carefully monitored by people serving as editors should receive credit in this category for highlighting the type of web site and credit in the "author's position" category.

- **Direct Comparison to Other Sources**: A student makes a direct comparison between two sources, using this comparison to establish trustworthiness (or lack thereof) of the information presented in one or both (or more) of the sources. For instance:
    - A student may write, "the information in this site agrees with what I found in the encyclopedia site so I'm thinking it's trustworthy" or "almost every site I looked at said that Republicans support drilling in ANWR, I think this source might be biased since it's written by a Republican and he may not consider both sides" or "this site has information on it that I haven't seen anywhere else so I'm not ready to trust it."
    - This behavior might be indicated by a student comparing or contrasting a site to one that is known to be reputable or trustworthy. A student may write, "this site's

facts are the same as those I found in the *Time* magazine article" or "I don't see any of the facts from the EBSCO article on this site."

- **Direct Comparison to Prior Knowledge**: A student makes a comparison to what he or she knew before engaging in the search activity (but not to something he or she learned/read about while conducting the search). For example:
    - A student may write, in defending an untrustworthy site, "I have never heard anything about this before, so I don't trust this source" or, in defending a trustworthy site, "this article says things that I've heard before and so I trust it."
    - Students may make reference to things they've studied at other times or learned in other classes. They may write, "this site totally disagrees with what we talk about in my US History class about this issue" or "I remember hearing these things when we talked about drilling in ANWR in Current Issues so I trust this site."

APPENDIX I

URL SCORING INSTRUCTIONS

Click the URL link to visit each website. After examining each site for a short time, rank its credibility or trustworthiness according to the following rubric. If you can't rate the site (i.e., it's not really an informational site or its trustworthiness isn't really reviewable), then write "N/A" in the score box by the URL.

2	**Trustworthy: I would consider this site as a trustworthy source and am confident that the information presented on it is accurate and credible** • Information on the site seems accurate, in agreement with what you know or have read from other trusted sources (possibly including citations for sources) • The site shows a balanced view of the issue in question, presenting both sides of the issue • This site is one that I've know to be trustworthy in the past (e.g., Time.com or CNN.com) and/or by its nature (e.g., an online news site or the government or well-known institution) is likely to have solid editorial filters in place • The publisher or author has good credentials, a reputation for credibility or good knowledge of the issue in question • The site doesn't have a commercial purpose or a skewed motivation for publishing the information (i.e., to convince rather than to inform) • The kind of site (e.g., a Wikipedia entry or news site versus a blog or message board) implies a certain amount of credibility
1	**Questionable: The site may not be completely trustworthy, but may contain some information that I'd consider credible; there are enough questions with this site that I'd want to do more research before considering it completely trustworthy** • It's unclear if the site's information is accurate; it seems like it may be correct, but the authors use questionable sources or no sources at all or the site may mix a few incorrect or questionable facts but on the whole presents an accurate picture • The site is biased one way or the other but is clear about that bias or the bias doesn't mean the information presented is wrong or misleading • It's difficult to know who the author/publisher is, you might have questions about their qualifications although you don't feel this invalidates the information being presented • The site may feature some advertising (especially something like Google's

	AdWords or something rather innocuous like that) but its primary purpose does not seem to be to mislead, proselytize for a certain position, sell a product, etc.
0	**Untrustworthy: Due to numerous problems with credibility, I would not trust this site and would hesitate to reference information that it contains** • The information on the site is clearly incorrect, "facts" presented clearly do not correspond to what you know or have read from other, trusted sources • The site is clearly biased and this influences the quality of information that's presented in the site, the words chosen, and the general tone of the website • The author or publisher is clearly unqualified to write/publish about this issue; this is an author or publisher who you know from previous experience cannot or should not be trusted • The site has a purpose that damages its credibility: it seeks to push a commercial item, is clearly trying to convince you to feel a certain way about an issue (and skews facts or presentation towards that bias); the site may feature abundant advertising (i.e., is just a front for ads or exists solely to put ads in front of eyeballs)

APPENDIX J

URL SCORES

Pretest URL Scores

Score (2 / 1 / 0)	Website (CTRL-click to open)
1	http://www.anwr.org/Headlines/Alaska-Oil-and-Gas-Ignored-in-Washington-Mega-Legislation-Battles.php
1	http://www.foxnews.com/story/0,2933,179005,00.html
1	http://www.house.gov/stupak/issues_anwr.shtml
2	http://www.snopes.com/politics/gasoline/anwr.asp
2	http://arctic.fws.gov/
1	http://www.savebiogems.org/arctic/
2	http://www.arcticwebsite.com/santorumalaskaoil.html
1	http://www.oilonice.org
1	http://www.nrdc.org/land/wilderness/arctic.asp
1	http://www.anwr.org
2	http://www.buzzle.com/articles/effects-of-oil-drilling-in-alaska.html
2	http://www.jobmonkey.com/oilindustry/html/anwr_drilling.html
2	http://www.policyalmanac.org/environment/archive/crs_anwr.shtml

2	http://www.adn.com/anwr/
2	http://arcticcircle.uconn.edu/ANWR/anwroilhistory.html
2	http://energy.usgs.gov/alaska/anwr.html
0	http://www.mdandb.com/about_locations.cfm
2	http://www.msnbc.msn.com/id/4542853/
2	http://alaska.fws.gov/
1	http://www.defenders.org/programs_and_policy/habitat_conservation/federal_lands/national_wildlife_refuges/threats/arctic/
0	http://printable-coupons.blogspot.com/2005/12/olay-coupons.html
0	http://www.controversysells.com
1	http://heliogenic.blogspot.com/2009/01/democrats-move-to-lock-up-anwr-oil.html
1	http://www.alyeska-pipe.com/Default.asp
2	http://www.asee.org/publications/connections/sep1003.cfm
2	http://www.govspot.com/issues/anwr.htm
2	http://www.balancedpolitics.org/anwr_drilling.htm
2	http://cbs13.com/local/On.The.Money.2.1429911.html
2	http://www1.american.edu/ted/alaska.htm
2	http://www.ecoworld.com/energy-fuels/oil-drilling-in-alaska.html
2	http://science.howstuffworks.com/oil-drilling.htm
2	http://www.deseretnews.com/article/700014291/Grouse-decision-could-dampen-oil-drilling.html
2	http://www.usnews.com/articles/news/energy/2009/03/24/oil-drilling-debate-rages-on-20-years-after-the-valdez-spill.html
1	http://www.oilfielddirectory.com/article/detail.php?id=175
1	http://blog.skytruth.org/.../offshore-**drilling**-nobodys-perfect.htm

2	http://portal.acm.org/citation.cfm?id=1488146
2	http://www.rw.ttu.edu/2302_phillips/Debatearticles/ANWR/ANWRPro1.pdf
2	http://politicsandgovernment.illinoisstate.edu/downloads/icsps_papers/2005/Brown2005.pdf
1	http://www.answerbag.com/q_view/785660
2	http://www.cnn.com/2008/POLITICS/07/17/congress.oil/index.html
2	http://www.reuters.com/article/idUSTRE51R0Z120090228
1	http://www.articlediscovery.com/blog/2009/04/14/anwr-oil-drilling/
1	http://mises.org/daily/3047
1	http://www.freerepublic.com/focus/f-news/1329899/posts
2	http://debatepedia.idebate.org/en/index.php/Debate:Drilling_in_the_Arctic_National_Wildlife_Refuge
1	http://blogs.edf.org/climate411/2008/09/11/anwr_oil_drilling/?s_src=ggad&s_subsrc=anwr&gclid=CLXOsZXGwKACFRJOgwodZkcYTA
1	http://whitmanpioneer.com/opinion/2009/02/26/oil-drilling-in-alaska-will-help-save-economy/
1	http://www.elon.edu/e-web/pendulum/Issues/2005/03_03/opinions/alaska.xhtml
0	http://www.techimo.com/forum/debateimo-politics-religion-controversy/208793-anwr-drilling-doe-issues-crude-oil-savings-forecast.html
2	http://archive.newsmax.com/archives/articles/2005/9/19/123914.shtml
can't find	http://www.greenecofriend.co.uk/the-drilling-in-anwr-pros-and-cons_190.htm
1	http://www.americasdebate.com/forums/simple/index.php/t6025.html
2	http://thehill.com/blogs/e2-wire/677-e2-wire/85039-lieberman-anwr-drilling-a-deal-breaker-in-climate-effort
2	http://www.marketwatch.com/story/crude-oil-futures-add-to-gains-as-dollar-slumps-2010-03-17
2	http://planetforlife.com/anwr/index.html#top
2	http://www.theworldoutdoors.com/trips/arcticcruise.html
2	http://media.www.vanderbiltorbis.com/media/storage/paper983/news/2002/04/17/UndefinedSection/Bush-Contradicts.Everglade.Preservation.With.Arctic.Refuge.Drilling-

	2471358.shtml
1	http://www.earthjustice.org/about_us/offices_staff/offices/alaska/?gclid=CNLyvcPnvaACFQ2lagodfHne0Q
2	http://en.allexperts.com/e/a/ar/arctic_refuge_drilling_controversy.htm
2	http://www.scienceclarified.com/Mu-Oi/Oil-Drilling.html
2	http://www.whatsupwithgas.com/oilcomefrom.htm
2	http://www.priweb.org/ed/pgws/systems/source/source.html
2	http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/arctic_national_wildlife_refuge/html/overview.html
1	http://www.panda.org/what_we_do/where_we_work/arctic/
2	http://www.eoearth.org/article/Management_and_Conservation_of_Wildlife_in_a_Changing_Arctic_Environment
1	http://www.visionsofthewild.com/
1	http://www.peta.org/actioncenter/testing.asp
2	http://www.nationalgeographic.com/adventure/0508/alaska_wilderness_01.html
1	http://www.sibelle.info/oped15.htm
2	http://www.newscientist.com/article/dn14529-offshore-oil-drilling-in-the-us-whats-at-stake.html
0 ?	http://www.anwr-band.com
1	http://forums.treehugger.com/viewtopic.php?f=1&t=13615
2	http://www.cato.org/pub_display.php?pub_id=3052
0	http://www.trapperman.com/forum/ubbthreads.php/topics/1855643/Very_interesting_living_in_Ala.html
0	http://www.free-press.biz/7-2006/ANWR-info-tours.html
0	http://www.thepetitionsite.com/1/NO-Sarah-Palin
0	http://www.desertconservative.com/2010/03/14/in-a-word-obama-untrustworthy/

Posttest Scores

Score (2 / 1 / 0)	Website (CTRL-click to open)
2	http://ngm.nationalgeographic.com/2006/04/nuclear-power/petit-text/3
2	http://en.wikipedia.org/wiki/Nuclear_power
1	http://timeforchange.org/pros-and-cons-of-nuclear-power-and-sustainability
1	http://circulartimes.org/Nuclear%20Energy%20Radiation%20Toxicology%20Human%20Chromosomes%20Helen%20Caldicott%20Circular%20Times.htm
2	http://en.wiktionary.org/wiki/power
2	http://www.physics.isu.edu/radinf/np-risk.htm
1	http://www.greenfacts.org/en/Chernobyl/
2	http://www.pollutionissues.com/A-Bo/Antinuclear-Movement.html
2	http://www.brighthub.com/environment/science-environmental/articles/15929.aspx
1	http://www.reachingcriticalwill.org/technical/factsheets/health.html
2	http://www.ccnr.org/ceac_B.html
1	http://www.nei.org/keyissues/protectingtheenvironment/
1	http://www.ehow.com/how-does_4566966_nuclear-energy-affect-environment.html
1	http://www.informaction.org/cgi-bin/gPage.pl?menu=menua.txt&main=nuclear_gen.txt
2	http://www.energy.gov/safetyhealth/nuclearsafety.htm
2	http://www.ucsusa.org/nuclear_power/
2	http://www.umich.edu/~gs265/society/nuclear.htm
2	http://en.wikipedia.org/wiki/Nuclear_energy
2	http://alternativeenergy.procon.org/view.answers.php?questionID=001270

1	http://www.associatedcontent.com/article/103798/nuclear_power_safe_for_the_environment.html
1	http://www.c-10.org/pdf/safety_overview.pdf
1	http://ipta.demokritos.gr/Documents/PAPATHEODOROU.pdf
2	http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html
0	http://answers.yahoo.com/question/index?qid=20080223124103AA0uruL
1	http://wiki.answers.com/Q/Do_nuclear_power_plants_create_serious_hazards_to_public_health_and_the_enviroment
won't load	http://www.aboutnuclear.org/erc/
2	http://www.rasmussenreports.com/public_content/politics/current_events/environment_energy/energy_update
2	http://www.brighthub.com/environment/science-environmental/articles/13602.aspx
1	http://library.thinkquest.org/3471/nuclear_energy.html
2	http://web.mit.edu/nuclearpower/
2	http://nuclear.energy.gov/neri/neNERIresearch.html
2	http://www.darvill.clara.net/altenerg/nuclear.htm
1	http://www.experiencefestival.com/nuclear_power_plant_-_advantages_and_disadvantages
0	http://www.sullivan-county.com/immigration/e1.htm
2	http://www.psiee.psu.edu/news/2007_news/feb_2007/nuclear_power.asp
2	http://www.goshen.edu/bio/Biol410/BSSPapers98/schrock/schrock.html
2	http://www.eia.doe.gov/cneaf/nuclear/page/nuclearenvissues.html
2	http://www.iaea.org/Publications/Booklets/Development/index.html
2	http://www.worldpublicopinion.org/pipa/articles/btenvironmentra/227.php
1	http://www.avantrex.com/policy/nuclearmodel.html
1	http://www.nuclearsafety.org/

2	http://www.nrc.gov/reactors.html
1	http://www.igcar.ernet.in/nuclear/safety.htm
2	http://www.nae.edu/Publications/TheBridge/Archives/V31-3TheFutureofNuclearEnergy/TechnologySafetyHumanResourcesandNuclearPower.aspx
0	http://www.knowledgesutra.com/index.php/nuclear-power_t57180.html
2	http://www.universitycollege.du.edu/grad/epm/degreeplan.cfm/degree/environmental-assessment-of-nuclear-power-masters/degreeID/370
2	http://www.scienceclarified.com/Mu-Oi/Nuclear-Power.html
2	http://www.lenntech.com/environmental-disasters.htm
2	http://www.cosmosmagazine.com/node/1955
2	http://www.environmentalleader.com/2009/07/30/us-renewable-energy-exceeds-nuclear-power/
1	http://www.buzzle.com/articles/nuclear-power-pros-and-cons.htm
2	http://www.teachablemoment.org/high/chernobyl.html
2	http://books.google.com/books?id=Ceuq9P4hLJMC&pg=RA1-PT107&dq=safety+of+nuclear+power+for+humans+and+environment&cd=1#v=onepage&q=safety%20of%20nuclear%20power%20for%20humans%20and%20environment&f=false
1	http://www.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions/nuclear_power/
2	http://www.epa.gov/rdee/energy-and-you/affect/nuclear.html
1	http://www.takepart.com/news/tag/nuclear-power-plant
2	http://www.wired.com/wired/archive/13.02/nuclear.html
2	http://www.independent.co.uk/environment/green-living/nuclear-power-yes-please-1629327.html
2	http://ehp.niehs.nih.gov/docs/2005/113-11/editorial.html
2	http://www.nucleartourist.com/basics/environ1.htm
2	http://www.howstuffworks.com/nuclear-power.htm
1	http://fubini.swarthmore.edu/~ENVS2/S2003/Guy/nukepres.html

1	http://www.scidev.net/en/opinions/the-pros-and-cons-of-nuclear-power-in-the-south.html
only links (n/a)	http://danielrscience.blogspot.com/2007/12/nuclear-power-plants-pros-and-cons.html
1	http://www.world-nuclear.org/John_Ritch_speeches/The_Necessity_of_Nuclear_Power_Madrid_270208.html
1	http://www.consortiumnews.com/2010/022710a.html
1	http://www.ehow.com/how-does_4566966_nuclear-energy-affectenvironment.html
1	http://www.edf.org/article.cfm?contentid=4470
2	http://www.msnbc.msn.com/id/8120563/
0 (n/a)	http://www.merriam-webster.com/dictionary/nuclear
0 (n/a)	http://www.onlineconversion.com/power.htm
1	http://www.sustainable-environment.org.uk/Environment/Radioactivity.php
1	http://www.space.com/scienceastronomy/solarsystem/nuclearmars_000521.html
1	http://www.ecolo.org/lovelock/nuclear-safe-choice-05.htm
2	http://www.grist.org/article/fallingout/
1	http://www.pilgrimwatch.org/environ.html
1	http://www.powerscorecard.org/tech_detail.cfm?resource_id=7
2	http://www.time.com/time/magazine/article/0,9171,903125-1,00.html
only links (n/a)	http://environment.about.com/od/nuclearenergywaste/Environmental_Issues_Nuclear_Energy_Nuclear_Waste.htm
1	http://www.wagingpeace.org/menu/issues/nuclear-energy-&-waste/nuclear-energy-fact-sheet.htm
can't access	http://nuclearinfo.net/Nuclearpower/FullSummaryc
1	http://scienceray.com/technology/applied-science/the-effects-and-influences-of-technology-on-society-and-human-kind/
0	http://sayiamgreen.com/blog/2009/10/cutting-through-the-anti-environment-propaganda/

1	http://www.willyoujoinus.com/discussion/topics/?d=23&gclid=CMym3OOB5qACFQ5biAod8ljsHg
0	http://www.foe.ie/environment/nuclear.html
2	http://www.bmartin.cc/pubs/07sa.html
1	http://articles.latimes.com/1999/oct/13/local/me-21732
(n/a)	http://climate-shift.blogspot.com/2010/01/international-nuclear-safety-center.html
1	http://www.motherearth.org/uranium/summary_en.pdf

APPENDIX K

ASSENT AND CONSENT FORMS

Assent to Participate in a Study

Purpose of the Research
We are asking you to take part in a research study because we are trying to learn more about how to help high school students be better readers on the Internet.

Procedure/Intervention/Method
If you agree to be in this study you will be asked to use the Internet to find sources and answers specific research questions. You will be asked to explain why you chose the Internet sources you did and to judge the quality of those sources. All of your work on the Internet will take place on school computers using the school's Internet connection. While you use the Internet for these tasks, your actions on the Internet will be recorded.

Risks
There are no risks associated with being a participant in this study.

Benefits
Being in this study will help us to understand the best methods for teaching high school students to be better readers when they use the Internet. There will be no direct benefits to your from participating in this study.

Alternative Procedures and Voluntary Participation
If you don't want to be in this study, you don't have to be in it. Remember, being in this study is up to you and no one will be upset if you don't want to participate. You can change your mind later if you want to stop. Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still decide not to do this.

Confidentiality
All of your records about this research study will be kept locked up so no one else can see them. Any records will collect will have your name removed from them and

all digital recordings will be kept in an encrypted folder on a password-protected computer.

Person to Contact

You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me (801-362-4864) or email me (jostenson@gmail.com) or ask me any time I'm here in the classroom.

Consent

Signing my name at the bottom means that I agree to be in this study. My parents and I will be given a copy of this form after I have signed it.

Printed Name of Child

Signature of Child | Date

Printed Name of Person Obtaining Assent

Signature of Person Obtaining Assent | Date

Parental Permission Document

BACKGROUND

Your child is being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in this study.

The purpose of the research study is to help educators understand the best methods for teaching young people the skills of critical evaluation when they are reading or researching on the Internet. The study is being conducted by Jon Ostenson, a doctoral candidate at the University of Utah.

STUDY PROCEDURE

Before the study begins, your child will complete a brief survey regarding his or her use of the Internet and perceived confidence in the material he or she encounters on the Internet. To begin the study, your child will be asked to locate and judge the trustworthiness of a few Internet sites related to a research topic; this task will be completed in the school computer lab. During the next two weeks, your child's classroom teacher will provide specific instruction in how to evaluate the reliability and trustworthiness of information on the Internet. After this instruction, your child will be asked again to locate and judge a number of Internet sources related to a specific research topic; again, this task will be completed in the school computer lab.

RISKS
There are no risks associated with this study. Talking about and practicing critical thinking skills and using the Internet in controlled research environments is part of the regular environment of your child's classroom. Your child's name and any other identifying characteristics will be removed from all data collected during the study.

BENEFITS
We cannot promise any direct benefit to your child for taking part in this study. However, we hope that your child will develop increased awareness of the need to use skills of critical evaluation on the Internet and the ability to use these skills. We also hope to understand better the techniques that educators can use to help all young people better use critical evaluation skills when reading on the Internet so they might better judge the trustworthiness and reliability of information they encounter online.

ALTERNATIVE PROCEDURES
If you do not want your child to be in the study, you may choose not to allow your child to participate in this study. He or she will receive the instruction and complete the tasks, because this is part of his or her regular class work. But his or her results will not be included in our study.

CONFIDENTIALITY
Your child's data will be kept confidential. Data and records will be stored in a locked filing cabinet and on an encrypted folder on a password protected computer located in the researcher's work space. Only the researcher and members of his/her study team will have access to this information.

PERSON TO CONTACT
If you have questions, complaints or concerns about this study, you can contact Jon Ostenson at 801-362-4864 or by email at jostenson@gmail.com.
If you feel your child has been harmed as a result of participation, please contact Dr. Lauren Liang at 801-455-5364 between 9:00am and 5:00pm, or by email at lauren.liang@utah.edu.

Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your child's rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

VOLUNTARY PARTICIPATION
It is up to you to decide whether to allow your child to take part in this study. Refusal to allow your child to participate or the decision to withdraw your child from this research will involve no penalty or loss of benefits to which your child is otherwise entitled. This will not affect your or your child's relationship with the investigator or the school.

COSTS AND COMPENSATION TO PARTICIPANTS
There are no costs to your child to participate in this study. Your child will not be compensated for participation in this study.

CONSENT
By signing this consent form, I confirm I have read the information in this parental permission form and have had the opportunity to ask questions. I will be given a signed copy of this parental permission form. I voluntarily agree to allow my child to take part in this study.

_____
Child's Name

_____
Parent/Guardian's Name

_____ _____
Parent/Guardian's Signature Date

_____
Relationship to Child

_____
Name of Researcher or Staff

_____ _____
Signature of Researcher or Staff Date

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