

SEARCHing for an answer: The critical role of new literacies while reading on the Internet

Preparing students to read for information in the 21st century means developing new skills and strategies. This article shows teachers how to integrate a "SEARCH" framework with their instructional program, helping students develop the new literacy skills that reading on the Internet requires.

Miguel and Marlene (all names are pseudonyms) sit together at a computer in the back of their sixth-grade social studies classroom. They are working on a project and need to locate information about World War II. They've decided to focus their research on the United States Navy's battles in the Pacific Ocean. After launching Internet Explorer, they go to Google (www.google.com), their favorite search engine.

"What words should we use?" asks Marlene.

Miguel thinks for a second and then says, "How 'bout *war*?"

"OK. Let's try that." Marlene types in *war* and clicks the Google search button. The search engine quickly retrieves over 94 million results and displays them in groups of 10 per page. Marlene slowly reads through the results to the bottom of the first page. Links to website locations such as World War I, The American Civil War, Antiwar, and The Great War appear on the first page. None of the link titles include the words World War II.

"Hmmm. Let's try using World War II instead," Marlene suggests.

"Yeah," agrees Miguel. "That should work better."

Marlene enters the words *World War II* in the text box and clicks the Google search button once again. This has narrowed their results to just over 6 million possible websites on their topic. "I didn't expect to see so many pages."

"Look, this first one's a timeline," Miguel says as he points to the first link on the screen. "That will probably give us all the big events during the war."

Marlene clicks on the first link in their list of search results, labeled World War Two in Europe Timeline, which brings them to The History Place: World War Two in Europe (www.historyplace.com/unitedstates/pacificwar/timeline.htm). Miguel and Marlene spend several minutes clicking on links within this site that bring them to photographs of different events from the war, including pictures of both American and German soldiers in the field.

"Those pictures are pretty cool but not very helpful for our report," mutters Miguel.

"Maybe we can use some of them on our cover page," suggests Marlene. She clicks the Back button several times to return to the Google search results.

"Let's try this next one," Miguel says as he points to the next link in their list.

Marlene clicks on it and they both wait for the page to appear on their screen. This second link brings them to the website for the National WWII Memorial in Washington, DC (www.wwiimemorial.com). The site contains plenty of information about the memorial but very little about the events of the war and has little relevance to their assignment. Miguel and Marlene soon try the third link, which connects them to a site of resources about WWII provided by www.ibiblio.org (www.ibiblio.org/pha), a public library and digital archive offering a

multitude of primary sources. Marlene quickly scans through the listing of items but does not click on any of them before returning to the Google search screen.

These two students continue using this strategy, sequentially checking each link on the search screen for the remainder of the class period. Miguel and Marlene, though on task, walk away without having obtained any useful information for their project assignment. Tomorrow two other students will take a crack at it.

Reading on the Internet

Does this episode sound familiar? Marlene and Miguel have some experience with searching for information using Google, but they lack the new literacies required to read and comprehend the information that appears on a page of results from a search engine. This scenario, repeated in classrooms every day, illustrates an important point: Students require new reading comprehension strategies to effectively use the Internet and other information communication technologies (ICTs).

Improving reading comprehension is a critical issue (RAND Reading Study Group, 2002), especially because academic achievement and learning are dependent on the learner's ability to read and comprehend at high levels (Alexander & Jetton, 2002; Bransford, Brown, & Cocking, 2000). However, issues related to comprehension and learning have typically been framed in terms of conventional printed texts and conventional academic tasks. For too long, too many in the reading community have seen the Internet and other ICTs as a technology issue, not as a reading comprehension issue (Coiro, 2003b). We must begin to rethink that assumption.

As new technologies increasingly become a part of classroom lessons, teachers are discovering that many students do not possess the new literacy skills required to successfully read and write with the many new technologies that regularly appear in today's world (International Reading Association [IRA], 2001). Especially important among these new literacies are the skills and strategies needed to search for and locate useful information efficiently on the Internet (Coiro, 2003a; Eagleton & Guinee, 2002; Eagleton, Guinee, & Langlais,

2003). The report on reading comprehension by the RAND Reading Study Group (2002) acknowledged this central issue: "Accessing the Internet makes large demands on individuals' literacy skills; in some cases, this new technology requires readers to have novel literacy skills" (p. xx). Which new skills are important? A recent International ICT Literacy Panel report, *Digital Transformation: A Framework for ICT Literacy* (Educational Testing Service [ETS], 2002), identified access as a critical component of ICT literacy. *Access* is defined as "knowing about and knowing how to collect and/or retrieve information" (p. 3).

However, it is not just a matter of access or information retrieval. Students need new reading comprehension skill sets to effectively search for information while engaged in learning opportunities with the Internet and other ICTs (Coiro, 2003a; Leu, 2000; Lewin, 1998; Snyder, 2002). We are only just beginning to understand the many new reading comprehension skills required on the Internet, and in many instances students do not know how to approach reading in online environments. For example, instead of reading the short descriptions provided in most search-engine results, students are most apt to begin with the first link provided and systematically work their way through the list (Guinee, Eagleton, & Hall, 2003). Not only is this time-consuming, but also it is not an effective strategy for locating relevant information. This is precisely the method that our two students used in their search for information about World War II. In the end, they walked away from the computer without locating anything that they could use for their project, wasting an important learning experience. Many unproductive hours are spent in classrooms when students like Miguel and Marlene search for information but are unable to effectively find what they need because they lack the new reading comprehension skills the Internet requires.

Internet queries using search engines often turn up far too many results, and "the end user cannot reasonably expect to evaluate and inspect all of these results" (Eliopoulos & Gotlieb, 2003, p. 42). If students do not possess adequate new reading skills to sort through large amounts of information, information overload can occur (Brandt, 1997; Nachmias & Gilad, 2002; Yang, 1997), creating frustration with the search task and ultimately resulting in students being unsuccessful in locating information.

The purpose of this article is to explore an instructional framework that is useful to conceptualize the new literacy skills and strategies required to access information on the Internet successfully. First, I provide an overview of a new literacies perspective (IRA, 2001) and then use it to illustrate how the process of searching for information on the Internet is a complex procedure that uses these new literacy skills. Second, I outline a framework of search skills (SEARCH) important to reading by defining the general principles of searching for information in both traditional and Internet contexts. Third, I show how this SEARCH framework may be used to inform instruction in these new skills, and I present several promising instructional practices to help teachers include skills for searching for information in their classrooms.

A new literacies perspective

As new technologies are brought into the classroom, students must become proficient in the new literacies of ICT (Berkowitz, 2002; IRA, 2001; Sutherland-Smith, 2002). Leu, Kinzer, Coiro, and Cammack (2004) defined these literacies in the following fashion:

The new literacies of the Internet and other ICTs include the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives. These new literacies allow us to use the Internet and other ICTs to identify important questions, locate information, critically evaluate the usefulness of that information, synthesize information to answer those questions, and then communicate the answers to others. (p. 1572)

Of the five functions in this definition (identifying important questions, locating information, critically evaluating information, synthesizing information, and communicating answers) one could argue that locating information is, perhaps, the most important function of reading on the Internet. All other decisions and reading functions on the Internet emanate from the decisions that are made during the search process. If one does not have the ability to locate information in an effective and strategic manner, then all other reading activities are imped-

ed, as the user cannot get beyond this point. Therefore, the ability to search and locate information can be described as a gatekeeper skill in online reading. Students who can quickly read and locate information are then able to use that information for learning and move on to other elements of reading on the Internet; students who cannot are unable to move beyond the search process. Because searching for and locating information are such critical parts of information use on the Internet, they demand our attention.

Searching informational texts

Searching for information on the Internet is a “non-trivial complex skill” (Nachmias & Gilad, 2002, p. 281). “Many users find they are ill equipped to perform a search that will yield high quality information” (Eagleton & Guinee, 2002, p. 39). In her research focused on searching in traditional informational texts, Dreher (1993) argued that the “ever-increasing availability of information requires the development of effective information-seeking strategies” (p. 131). When we turn to the Internet, where the availability of information is increasing at an extremely rapid rate, it becomes apparent that effective strategies for locating information are critical.

In the beginning

Teachers can begin the school year by helping their students learn about Internet searching and the skills and strategies they need to become efficient searchers. One way to start is to develop a common searching metalanguage, knowledge of the searching process, and a basic understanding of the many search engines available to access information (Cummins, 2001). “When students understand that search engines use different algorithms and require different types of data entry, they change search engines to maximize the fit between these characteristics and their current search needs” (Guinee, Eagleton, & Hall, 2003, p. 364). Some search engines use text matching while others are organized by categories. There are even visual search engines, such as KartOO (www.kartoo.com), that provide a visual representation of how words and topics are related and connected.

How do search engines work? Google, for example, uses a complex system of algorithms with two major components. First, it uses a text-matching technique that searches webpages for the frequency and location of the keywords you have selected. Second, it looks at the way pages link to one another. The more frequently a word appears on the page and the more links that exist, the higher the ranking of the page in the search results. In addition, most search engines produce a selection of results that are commercial. These are sites that pay a fee to the search-engine company to have their site listed in the search results. On Google, these commercial sites are found in a column on the right side of the search results screen and are labeled as sponsored links.

Once students have a good grasp of the organization of various search engines, they are much more successful in conducting searches and reading information. Many Internet sites, including Search Engine Watch (www.searchenginewatch.com) and Understanding and Comparing Web Search Tools (www.hamline.edu/administration/libraries/search/comparisons.html) offer descriptions of the many different search engines available for locating information on the Internet. Choose the Best Search for Your Information Need (www.noodletools.com/debbie/literacies/information/5locate/adviceengine.html) provides a cohesive list of search engines matched with various types of information for searching (Abilock, 2004).

What other skills and strategies should we help our students develop? Eagleton and Guinee (2002) suggested that the following additional skills are important:

1. Be specific—Narrow your focus.
2. Be exact—Use the words or phrase you hope to find.
3. Be direct—Search for one focus at a time.
4. Be distinct—Don't repeat your focus.
5. Be succinct—Eliminate unnecessary words.
6. Be concise—Select keywords mindfully.

Teachers can help students be more successful searchers by providing them with opportunities to practice searching for information and analyzing search-engine results to better understand the search process.

To illustrate this concept, let's take another look at Marlene and Miguel as they search for information about World War II. Before they began to search, their teacher might have provided some guidance. She could first instruct the students to pick a general topic to insert in the search bar. The students might select the term *war*, which would return over 97 million results. Their teacher then would show them how to use multiple key terms within the search text box. The students would respond by entering the words *world war* and reduce their initial results to just over 10 million. Miguel and Marlene could be encouraged by their teacher to continue this process of adding focus words to narrow their topic further. They eventually would narrow their topic by using a search string that combines multiple terms (World War II Pacific naval battles American involvement) and reduce their results to the thousands.

Providing an introduction to searching on the Internet at the beginning of the school year gives students fundamental skills that can be further developed as they become more sophisticated with using the Internet to locate information. Efficient searching is one of the most difficult reading skills for students to develop as it incorporates the ability to locate, critically evaluate, and synthesize information. Reading educators need to have strategies and skills to assist their students and teach them how to not only search for information on the Internet but also how to read on the Internet. How can we support students in our reading classroom with Internet searching? One method would be to use an instructional framework such as SEARCH.

SEARCH

While a complete outline of reading skills essential to the efficient location of information in online environments is still being defined by research in this field, there is a body of reading research that presents the skills and strategies that are necessary for locating information in written text. These skills and strategies include forming goals, using categories for narrowing the search focus, extracting information and specific details, integrating information across sources, and repeating these techniques until the goal for searching is reached

(Dreher, 1993; Guthrie & Kirsch, 1987). By combining this important work in reading within traditional print contexts with work from information science (Fidel et al., 1999; Kafai & Bates, 1997; Kuhlthau, 1996) on searching for information on the Internet, a framework of essential search skills emerges with immediate application to the reading classroom:

1. Set a purpose for searching.
2. Employ effective search strategies.
3. Analyze search-engine results.
4. Read critically and synthesize information.
5. Cite your sources.
6. How successful was your search?

Set a purpose for searching

The American Library Association (ALA; 2001) identified an *information literate student* as one who can “define and articulate the need for information” (p. 8). In traditional texts, research has shown that improved performance is likely when students have a specific goal in mind or question to answer (Dreher, 2002; Guthrie & Kirsch, 1987). This goal-setting process is critical to searching for information on the Internet (Leu, Kinzer, et al., 2004; Leu, Leu, & Coiro, 2004). Identifying a purpose or goal helps narrow a topic for research and provides guidance and focus before the start of a search task. Teachers can help students through this initial stage of searching by providing guiding questions, as shown in Figure 1. Presenting students with an opportunity to identify their task at the outset will make them more focused for completing the search task (Eisenberg & Berkowitz, 1990).

Employ effective search strategies

By employing effective search strategies, one can be more efficient and thus more successful in locating information on the Internet. Some of the strategies that teachers can use to help students become more effective searchers include activating prior knowledge and knowing how to use keywords effectively.

Activating prior knowledge is an effective strategy for searching on the Internet. Students who possess prior knowledge of a topic before attempting to locate related information in traditional texts

have increased success (Byrnes & Guthrie, 1992; Symons & Pressley, 1993). Whether a student will find relevant and reliable information on the Internet is also linked to their knowledge about the subject (Brandt, 1997). Providing students with a basic knowledge foundation of the topic to be explored causes searches to become more focused as the selection of appropriate keywords becomes easier. Searches that produce quicker access to a list of relevant sites are more common when specific search terms and focus words are used. Several models of the research process provide students with opportunities to brainstorm and become informed about their topic prior to searching (Eisenberg & Berkowitz, 1990; Kuhlthau, 1997; Stripling & Pitts, 1988). This component of searching for information is even more critical when using the Internet, due to the vast amount of information available.

Traditional techniques that help activate prior knowledge for students include brainstorming or using a K-W-L chart (Ogle, 1986). In addition, software products that allow students to develop concept maps directly on the computer are a popular and engaging way for students to explore a topic prior to searching for information. Three such products are EDGE Diagrammer (www.pacestar.com/edge/index.html), Inspiration (www.inspiration.com), and SMART Ideas (www2.smarttech.com/st/en-US/Products/SMART+Ideas). These software tools help students to develop a concept map and identify connections between topic nodes. As students locate relevant Internet information, they can go back to their concept map and make changes based on what was learned or discovered. Figure 2 is a concept map on primates developed using Inspiration, which can be viewed at the company website (www.inspiration.com). Once completed, students can print their work and use it as a study guide, or teachers can use it for assessment purposes.

Analyze search-engine results

Searching for Internet information requires the ability to read strategically and concisely to curtail the numerous possibilities that can overwhelm a searcher. Analyzing search-engine results is the first reading strategy that is used. The reader must be able to determine which results will provide the most

FIGURE 1
Elementary organizer developed for the Lower School students at St. Andrew's Episcopal School, Austin, Texas, and linked by the Big6 website (Jansen, 1995)
(www.sasaustin.org/library/assignmentOrganizer.php)



Big6 #1: Task Definition

What am I supposed to do?

What information do I need in order to do this? (Consider listing in question form.)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

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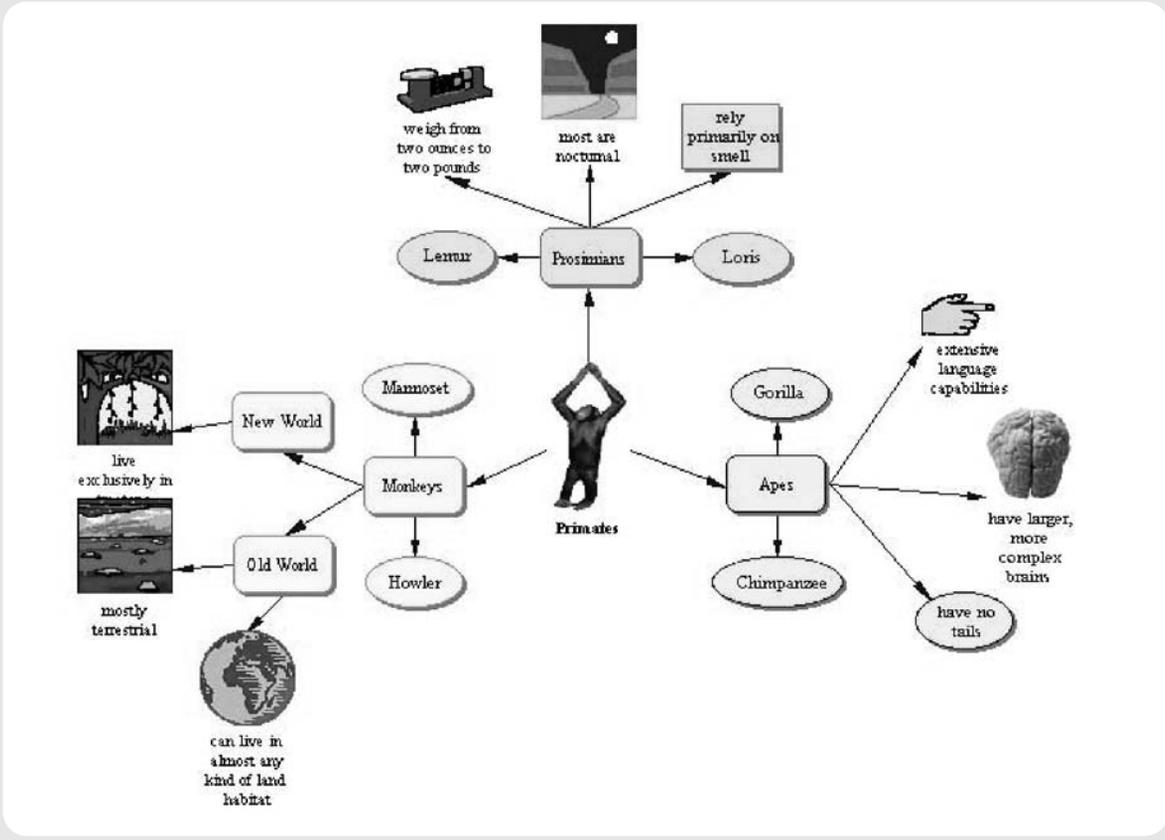
relevant information to the search goal. Once a webpage is selected, skimming and scanning techniques allow the user to determine if the information is relevant to his or her purpose. Proficient Internet readers accomplish this by reading URLs, making inferences, and looking for highlighted terms and their meanings within surrounding text. They constantly move between their search results and webpages until the information they need is located.

Students also need to make judgments about what may be housed at the end of a particular link (Snyder, 2002). When students don't possess prior knowledge about a particular topic, their ability to read search results and make inferences regarding

what kind of information is located at a particular site becomes important. This skill is developed as students practice searching for information, read search-engine results, and develop an understanding of the search process.

In addition, it's important to consider that the unfamiliar structure of online texts can impair comprehension (Coiro, 2003a) and impede a learner's success for locating specific information (Byrnes & Guthrie, 1992). Not only are students faced with the new text structure of search results that do not exist in traditional texts, but also the Internet has the potential to provide an unfamiliar text structure at the end of every link.

FIGURE 2
Concept map for primates



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Read critically and synthesize information

Critical evaluation of webpages is a key component of literacy in online environments. When students read conventional print text, they can be fairly confident that the information is more accurate than what they find on the Web, as the publishing and editing processes of traditional print text often incorporate more rigorous review procedures. Students need to be able to evaluate information on the Internet for its authenticity and for its relevancy (Brandt, 1997). Because anyone can publish anything on the Web, students need to learn how to determine the source of the information and if the source is reliable or reputable. The American Library

Association and Association for Educational Communications and Technology (1998) described the importance of critical evaluation:

The student who is information literate weighs information carefully and wisely to determine its quality. That student understands traditional and emerging principles for assessing the accuracy, validity, relevance, completeness, and impartiality of information. The student applies these principles insightfully across information sources and formats and uses logic and informed judgment to accept, reject, or replace information to meet a particular need. (p. 2)

Teachers can help students learn this important skill by providing them with opportunities to

practice evaluating websites. The best way to do this is to first provide an overview of what information students should look for when reading a website. For example, they should be able to identify the author or institution associated with the website, the purpose for the website, the intended audience, the appropriate copyright data, and whether the information meets the needs of their intended purpose.

Once students have a good understanding of the elements of a website, teachers can then provide guidance in judging the quality and authenticity of the information (ALA, 2001; ETS, 2002; Guinee et al., 2003; Leu, Kinzer, et al., 2004). Several websites are available as resources to help identify the process of evaluating information on the Internet. For example, Howe (2001) provided guiding questions for the evaluation of the quality of information on the Internet, as highlighted in Figure 3.

Students can also visit reputable, well-designed sites, such as the Library of Congress America's Story pages for students (www.americaslibrary.gov/cgi-bin/page.cgi), and other sites that present completely erroneous information. For example, The Pacific Northwest Tree Octopus site

(<http://zapatopi.net/treeoctopus.html>) appears to be a webpage about an endangered species in North America; however, this creature actually does not exist. Figure 4 shows a screen shot from this site, which can be very convincing as it includes photographs, science terminology, habitat information, sightings, and organizations that provide support to the site.

The process of synthesizing information and transforming the relevant details into a suitable response to the original goal is often a difficult task for students (Eagleton et al., 2003). Internet information is often extracted from numerous sources; therefore, synthesis of that information is essential. In addition, incorporating or integrating new information into the current knowledge base about a topic (ALA, 2001) is important to learning and a critical component of comprehension. Even with traditional texts, this difficult task is often overlooked as a part of literacy instruction (Guthrie & Kirsch, 1987). Students need support in developing synthesis skills, especially when reading on the Internet where information is not only extracted from multiple sources but from multiple contexts.

FIGURE 3
Guiding questions to help users assess the quality of information located on websites

There are several questions you should ask yourself to judge the quality of information that you find? If you can't answer these questions, the quality of the information is doubtful. We will consider each of these in turn:

- Is the information accurate?
- Is the author an authority on the subject?
- Does the author bring any biases in posting the information?
- Is the information current and timely?
- How does this information compare with other sources on the same topic?

Used with permission. See www.walthowe.com/navnet/quality.html.

FIGURE 4

Screen shot from The Pacific Northwest Tree Octopus website (<http://zapatopi.net/treeoctopus.html>), which illustrates the importance of teaching students to critically evaluate websites

About The Pacific Northwest Tree Octopus

The Pacific Northwest tree octopus (*Octopus pararhobis*) can be found in the temperate rainforests of the Olympic Peninsula on the west coast of North America. Their habitat lies on the Eastern side of the Olympic mountain range, adjacent to Hood Canal. These solitary cephalopods reach an average size (measured from arm-tip to mantle-tip,) of 30-33 cm. Unlike most other cephalopods, tree octopuses are amphibious, spending only their early life and the period of their mating season in their ancestral aquatic environment. Because of the moistness of the rainforests and specialized skin adaptations, they are able to keep from becoming desiccated for prolonged periods of time, but given the chance they would prefer resting in pooled water.

An intelligent and inquisitive being (it has the largest brain-to-body ratio for any mollusk), the tree octopus explores its arboreal world by both touch and sight. Adaptations its ancestors originally evolved in the three dimensional environment of the sea have been put to good use in the spatially complex maze of the coniferous Olympic rainforests. The challenges and richness of this environment (and the intimate way in which it interacts with it,) may account for the tree octopus's advanced behavioral development. (Some evolutionary theorists suppose that "arboreal adaptation" is what laid the groundwork in primates for the evolution of the human mind.)

Reaching out with one of her eight arms, each covered in sensitive suckers, a tree octopus might grab a branch to pull herself along in a form of locomotion called tentaculation; or she might be preparing to strike at an insect or small vertebrate, such as a frog or rodent, or steal an egg from a bird's nest; or she might even be examining some object that caught her fancy, instinctively desiring to manipulate it with her dexterous limbs (really deserving the title "sensory organs" more than mere "limbs",) in order to better know it.

Tree octopuses have eyesight comparable to humans. Besides allowing them to see their prey and environment, it helps them in inter-octopus relations. Although they are not social animals like us, they display to one-another their emotions through their ability to change the color of their skin: red indicates anger, white fear, while they normally maintain a mottled brown tone to blend in with the background.

The reproductive cycle of the tree octopus is still linked to its roots in the waters of the Puget Sound from where it is thought to have originated. Every year, in Spring, tree octopuses leave their homes in the Olympic National Forest and migrate towards the shore and, eventually, their spawning grounds in Hood Canal. There, they congregate (the only real social time in their lives,) and find mates. After the male has deposited his sperm, he returns to the forests, leaving the female to find an aquatic lair in which to attach her strands of egg-clusters. The female will guard and care for her eggs until they hatch, refusing even to eat, and usually dying from her selflessness. The young will spend the first month or so floating through Hood Canal, Admiralty Inlet, and as far as North Puget Sound before eventually moving out of the water and beginning their adult lives.



Rare photo of the elusive tree octopus



Map of estimated tree octopus maximum range, including spawning waters.

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Cite your sources

Students often have to present or communicate the information that they have located to others (Eagleton et al., 2003; Leu, Kinzer, et al., 2004; Pappas & Tepe, 1995). At times, a final product, such as a written report or oral presentation, is expected. Thus, students need to be aware of the appropriate procedures for documenting the information that they have located (ALA, 2001). Warlick (2004) developed a free online citation service, Landmarks Citation Machine (<http://citationmachine.net>), which provides citations in both Modern Language Association and American Psychological Association format. Figure 5 shows a sample of this easy-to-use interface. Students simply select the type of resource they want to cite, fill in the corresponding form, and the citation

is provided that can then be copied and pasted into their reference list.

How successful was your search?

Nachmias and Gilad (2002) asserted that as students reflect on the search process through experience, they further develop and hone their searching skills and strategies. However, it is at times difficult not to focus too much on the final product of online research; therefore, it is important for teachers to emphasize the process of searching on the Internet instead of the results of that process (Eagleton et al., 2003). Through reflection, students can learn to identify the strategies they employed that were successful or unsuccessful and how they would approach the search task differently in the future.

FIGURE 5

Warlick's Citation Machine (www.citationmachine.net) makes it simple for students to create references

The screenshot shows the 'Landmarks Citation Machine' interface. On the left, there are navigation links: 'Learn More about Citation Machine', 'Read the Growing FAQ (Frequently Asked Questions)', 'Print Resources' (with radio buttons for Book, Work in an Anthology, Encyclopedia Article, Journal or Magazine Article, Newspaper Article, Interview, and Presentation), and 'Electronic Resources' (with radio buttons for Web Page, Encyclopedia (CD-ROM), Internet Journal or Magazine Article, Internet Newspaper Article, Online Subscription Database, Interview (published or recorded), Interview (conducted by researcher), Online Forum Posting, Broadcast & Multimedia Productions, and Personal E-mail Message). The main form is titled 'Internet Journal or Magazine Article' and includes radio buttons for 'Magazine', 'Journal', and 'Stand-Alone'. It has input fields for 'First Name' (with 'John D.' as an example), 'Last Name' (with 'Doe' as an example), 'Extra Author Names (+)', 'Article Title', 'Periodical Title', 'Volume Number (Journal):' (with '5, 4, 3, etc.' as an example), 'URL:', 'Published Date:' (with 'Day', 'Month', 'Year' labels and '(if available)' note), and 'Retrieved Date:' (with a date picker showing '12 Sep 2004'). A 'Make Citations' button is at the bottom right. A footer note mentions consulting the 'MLA Handbook for Writers of Research Papers: 6th Edition' or 'Publication Manual of the American Psychological Association: 5th Edition' for more information.

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SEARCH in action

How would the search session with Miguel and Marlene turn out if they employed the SEARCH framework? Let's take another look.

Miguel and Marlene are working on a project for their sixth-grade social studies class. They Set a purpose for their research and decide to focus on the role of the United States Navy in battles in the Pacific Ocean. They go to Google (www.google.com), and Employ effective search strategies by typing the search string "World War II Pacific naval battles and American involvement" in the search bar. The search engine quickly retrieves 174,000 results and displays them in groups of 10 per page. Marlene and Miguel Analyze search-engine results by carefully reading the descriptions that follow each website link.

"This one for Pacific Naval Battles looks good," Marlene suggests as she points to the second link in the search results. "It says right here 'Pacific Naval Battles in World War II' and gives some more information."

"Yeah, but it says, 'I think,' too," objects Miguel. "It's probably just someone's opinion."

"You're right. It's also a commercial site. See, it ends with dot com," confirms Marlene as she points to the URL.

The two students continue to read through the list of results, analyzing the descriptions and URLs.

"OK, let's try this one titled Guadalcanal. It's a military site—see the URL—and it says that Guadalcanal was a four-day naval battle." Marlene clicks on the link (www.army.mil/cmh-pg/brochures/72-8/72-8.htm).

Miguel and Marlene spend several minutes reading the information presented on this site.

“There’s a lot more information here about the Army but the strategic information about the battle talks about the Navy’s role,” Miguel reports.

“Let’s take down some notes, and then we can look at some of the other sites in our list,” suggests Marlene.

The two students jot down some notes in their notebook. Marlene clicks the Back button to return to the Google search results.

“Let’s try this next one,” Miguel says as he points to the next link in their list. “It’s a dot org and looks like it must be some kind of library because the letters l-i-b are in the URL.”

Marlene clicks on it and they both wait for the page to appear on their screen. This link brings them to the Multnomah County Library Homework Center in Oregon (www.multcolib.org/homework/warwldhc.html). The site contains a collection of resources on wars and world history.

“Here. There’s a link to information about World War II,” Marlene says as she clicks one of the category links at the top of the page.

Marlene and Miguel scan through the list of resources until they find one titled World War II in the Pacific. They click this link, which brings them to The History Place: World War Two in the Pacific (www.historyplace.com/unitedstates/pacificwar/index.html). The two students carefully read through the information on the page and look at some of the photographs. They read critically and synthesize information from this site by comparing it to the previous site they visited.

Miguel refers to his notes, “The battle of Guadalcanal began on August 7 of 1942 and ended February 21 of 1943.”

“That means some of these events happened before the naval battle of Guadalcanal and others happened after it started,” chimed in Marlene.

“Yeah, and these others were after the battle at Guadalcanal ended. See? They’re later.” Miguel points to entries referring to the Solomon Islands and Gilbert Islands.

These two students record notes from this website in their notebooks. Class is nearing an end, and their teacher announces, “OK, everyone, you have about five minutes left. Don’t forget to Cite your sources.”

“Oh yeah,” says Marlene. “I almost forgot. Let’s see. First we need the URL and title of the page.”

“Right. Then we need to find out who created the page and the copyright info,” adds Miguel. “We need to go back to the other page on Guadalcanal and get the info from there, too.”

Marlene and Miguel write the necessary information in their notebook for each of their sources. Their teacher comes to the back of the room where they have been working and asks, “How successful was your search?”

“It was great. We found some information about several different battles, including Guadalcanal,” says Miguel.

“Yeah,” confirms Marlene. “Hey, let’s write down the search terms we used so we can get back to these results tomorrow.”

“That’s a good idea.”

Miguel and Marlene write the search terms they used in their notebooks. By employing the SEARCH framework, Miguel and Marlene obtained some useful information for their project assignment. Their teacher is pleased that they were productive and were able to locate information they needed. She is confident that other students in the class will experience the same success.

Instructional practices for the classroom

Teaching students how to search and how to read on the Internet needs to be a focus of classroom pedagogy for the future. What may seem like a simple act of looking for information in an online index is a complex process. Students often possess the basic skills needed for information retrieval and formulation of a search; however, they typically possess a mental model of information retrieval not as a process but a means to an end (Brandt, 1997). Educators need to assist students in the development of essential strategies for manipulating the Internet effectively and also help them to develop a mental model of that process by connecting to models that are already in place. “Web reading is a new skill, but familiar reading strategies can ease the transition” (Martin, 2003, p. 737). However, merely turning students loose to surf the Web will not necessarily help them make the required connections to develop a mental model of the process of Internet searching (Brandt, 1997). Teachers can provide students with strategies for

successful online research (Eagleton & Guinee, 2002) through structured Internet Workshops (Leu, Leu, & Coiro, 2004), Internet Scavenger Hunts (Eagleton & Guinee, 2002), or less structured opportunities for exploration.

Internet Workshops

Internet Workshop is a popular instructional model that helps teachers bring the Internet into the classroom. The Workshops have many variations, but most consist of a Web-based activity requiring students to explore a selected website related to a classroom unit of instruction (Leu, Leu, & Coiro, 2004). Internet Workshops that focus on search strategies on the Internet can help develop students' skills and strategies for searching. Examples include the following:

- What Is the Internet? (www.rtsd26.org/trails/parent_workshop/parent_inservice.htm)
- Harnessing the Power of the Internet (www.tsof.edu.au/resources/atoz/Woodside/index.asp)
- Finding Information on the Internet: A Tutorial (www.lib.berkeley.edu/TeachingLib/Guides/Internet/FindInfo.html)
- Searching the Internet Workshop (www.ci.keene.nh.us/library/srchedemo.htm)
- Untangle the Web! (<http://library.ucf.edu/Reference/Instruction/Internet>)

Internet Scavenger Hunts

Internet Scavenger Hunts are designed to introduce or review navigation skills on the Internet (Eagleton et al., 2003). They provide a structured platform with a set of tasks that require students to locate pieces of information. Teachers can use Internet Scavenger Hunts to give students practice in selecting effective keywords and using different search engines (Eagleton & Guinee, 2002). Some examples are as follows:

- Internet Treasure Hunts for ESL Students (<http://iteslj.org/th>)
- Scavenger Hunts: Searching for Treasure on the Internet! (www.education-world.com/a_curr/curr113.shtml)
- Black History: Past to Present (www.kn.pacbell.com/wired/BHM/bh_hunt_quiz.html)

New reading challenges in the 21st century

Many new technologies for information and communication have infiltrated our lives. We type and click our way through our daily routines from morning to night. We use cellular telephones, electronic mail, instant messaging, and web logs to communicate with one another. We no longer need to make a trip to the local library, travel agency, or even the corner bank because access to those services is available through the Internet. In order to provide our students with an adequate education, it is necessary to address these changes in society through preparation in the new forms of reading these technologies require.

The Internet adds new reading challenges for all of us, especially as students conduct research and inquiry, thus posing new challenges for the formal education system (Nachmias & Gilad, 2002). The International Reading Association and the National Council of Teachers of English *Standards for the English Language Arts* (2000) stated that students should be able to conduct research using “a variety of technological and information resources.” It is clear that the advancement of technology will remain an integral part of our society and that our education system is expected to address these changes directly through classroom instruction. Teachers can turn to new instructional models, such as Internet Workshop, Internet Scavenger Hunts, and the SEARCH framework, to prepare their students for these changes.

The impact that the Internet is having on society and education cannot be ignored, and “we as teachers must weave the expanding web of technology into our classroom practice” (Sutherland-Smith, 2002, p. 664). “By teaching students how to be more skillful Web navigators and critical readers, we increase the effectiveness of the Web as a resource that delivers solid, up-to-date educational information and produce students who can ‘tame the Web’ no matter what subject they are studying” (Lewin, 1998, p. 52). It is imperative that teachers of today understand the new literacies evolving in their classroom so that students are prepared for life in the 21st century; let’s not leave them trapped on the Internet searching for an answer.

Henry is a doctoral candidate at the University of Connecticut. She may be contacted at 30 Senexet Road, Woodstock, CT 06281, USA. E-mail to lahenry@charter.net.

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