MAKING CONNECTIONS: AN ANALOGY BETWEEN TRADITIONAL AND ONLINE TEXT

CHRISTIE BLEDSOE, JODI PILGRIM, SHERI VASINDA, AND ELDA MARTINEZ

ABSTRACT

Today's student must be able to work in an online environment. This often presents unique challenges for elementary students as they develop and extend fundamental literacy skills to various media. Many text features such as titles, headings, authors, and copyrights are easily transferable from paper to an online format; however, orientation and navigation of text differ in online environments where text offers dynamic features not possible in traditional print resources. We present a parallel comparison of traditional and online text to illustrate how online texts mimic their analog counterparts and highlight ways in which they differ. This offers teachers a way to make learning about text features of both formats more concrete for their students.

As with many things we use every day, from our cars, to microwaves, to the internet, we know how to work them, but we do not always know how they work. When Google launched their web browser, Chrome, they conducted a random, on-the-street survey in Times Square, asking the question, "What is a browser?" Only 8% of those surveyed could accurately explain a browser's function, confusing most often with a search engine (Buckler, 2009). Ten years later, in our research efforts to promote online reading and searching, we found elementary students continue to misunderstand concepts regarding browser and search engine functions, as well other features specific to the internet. For example, in a study of student knowledge about concepts of online text, we found students lacked an understanding of hyperlinks and URLs (Pilgrim, Vasinda, Bledsoe, & Martinez, 2018). In general, young children exhibit varying understanding of traditional research practices versus online research practices. Piaget and Inhelder (1972) explain that children develop and use concepts and categories to make sense of their environment. To assist students with understanding online environments, we created an analogy to highlight skills required for searching the internet.

THEORETICAL PERSPECTIVE

A focus on the features of web-based text is grounded in a multiliteracies perspective. Multiliteracies delineate multiple ways of communicating and making meaning, including visual, audio, spatial, behavioral, and gestural modes (New London Group, 1996). Digital literacy skills, a

broad term related to knowledge required in an age of technology, includes the use of multiliteracies (Pilgrim & Bledsoe, 2015). Jones-Kavalier and Flannigan (2008) narrowed the definition of digital literacy as ". . . the ability to read and interpret media (text, sound, images), to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments" (p. 14).

When conducting online searches, readers must navigate a hypermedia, three-dimensional reading experience in which they can click on images and words that lead to additional hyperlinked pages of texts. This enriched text option may provide additional related information and resources but "can also lead to unrelated content that deflects us from our goals" (Warlick, 2009, p. 22). The integration of visual and audio modes of communication presented through print, photos, videos, or graphs provide a multimodal text experience (Kress, 2010). Multi-modal texts afford readers increased control of how they approach and read text involving more "open-ended cycle[s] of linkages" (Mills, 2016, p. 87). The dimensions of multimodal, networked information environments add to the complexity of online learning and expand the ways readers acquire information and comprehend concepts.

TRANSLITERACY

Although traditional literacy tasks remain important, literacy skills have evolved to extend beyond traditional literacies to include digital literacies *and* transliteracies. Transliteracy, defined as the ability to read, write, and interact across a range of platforms, tools, and media, reflects the transformational nature of literacy (Vacca et al., 2018). This notion is important because the internet is "this generation's defining technology for literacy and learning within our global community" (Leu, Kinzer, Coiro, Castek, & Henry, 2013, p. 1158). In this article, we present parallels between traditional and online search tools which address the transliterate nature of the internet.

The internet, a global library system, has become the largest repository for locating information (Leu, Forzani, Timbrell, & Maykel, 2015). According to Pew Research Center data, 84% of U.S. adults use the internet (Perrin & Duggan, 2015). Engrained in society's norms, navigating the internet requires essential digital skills (Coiro, Knobel, Lankshear, & Leu, 2008; International Society for Technology in Education, 2012). As internet access has become more readily available to students, concepts of literacy have evolved, and to "become fully literate in today's world, students must become proficient in the literacies of the 21st century technologies" (International Reading Association, 2009, p. 1). These technologies require the ability to search and locate information on the internet, determine the credibility, and attend to distractions (Warlick, 2009). Many students lack knowledge about how search engines work and how information is organized on the internet thereby limiting effectiveness of online research (Coiro, 2005; Pilgrim et al., 2018). According to the Common Core State Standards (CCSS, 2010), students must use various text features to locate key facts or information in a text efficiently. The CCSS refer to traditional features

such as bold print, subheadings, glossaries, and indexes as well as online text features, such as electronic menus and icons. Many students do not understand how to use these internet features and need additional instruction in order to become proficient in these skills (Coiro, 2005; Pilgrim et al., 2018). In considering transliteracy and the need to address the application of new knowledge and skills associated with online searches, we present a parallel comparison to illustrate how online texts mimic their analog counterparts and highlight ways in which they differ. This parallel may help teachers and students better understand the complexity of online text features as they prepare young readers to navigate sources.

Book to Screen Connections

Many traditional concepts about paper-based text continue to apply in web-based formats. The concept of a letter, a word, or a sentence has not changed in online environments. In addition, features such as titles, headings, authors, and copyrights are easily transferable from paper to an online format; however, orientation and navigation of text differ in online environments where text offers dynamic features not possible in traditional print resources. Figure 1 presents a comparison of traditional print and online information systems.

From Library System to Internet

Library systems link individual libraries and offer access to published resources from multiple locations within the system. These traditional resources undergo review and editing processes, in which publishers seek and examine materials representing accurate content. Library systems assume a responsibility to maintain current collections for library patrons.

In contrast, the internet is a global system with the participatory culture of contributing authors who can easily publish online with no approval or editing process. While online texts may often lack edited, cohesive, or accurate information (Coiro, 2005), revisions to online resources can be made quickly, easily, and inexpensively (McLeod & Vasinda, 2008). In the same way students learn to locate information in library systems, they must also learn to locate information in an online environment. Understanding how this works in both systems supports a comprehensive understanding of a wider array of research tools and resources.

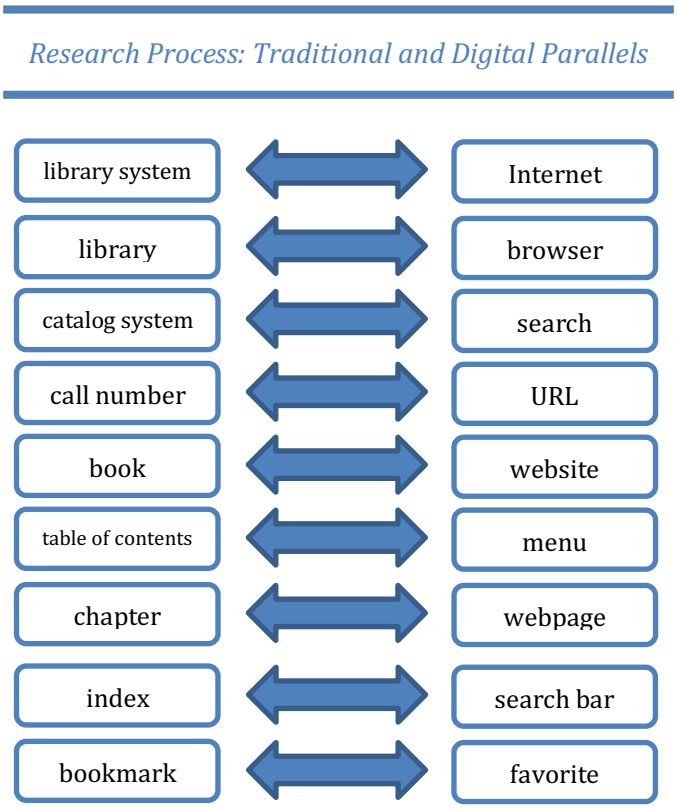

Figure 1. Research Process: Traditional and Online Parallels

From Public Library to Browser

Although most library patrons can search for their library system's resources from home, the local public library is an access point to the available resources found within its system. In the traditional sense, public libraries are "changing and dynamic places where librarians help people find the best source of information whether it's a book, a website, or database entry" (ALA, 2016, para. 1). Because public libraries are supported in whole or in part with public funds, they must abide by government regulations which require them to provide the following services: an organized collection of printed or other library materials, paid staff, an established schedule, and the facilities necessary to support the library collection (ALA, 2016). The public library building contains the finite analog resources curated at that campus as well as the resources they subscribe to electronically and through their system. Readers can access the library's catalog system that directs them to the desired resources.

Browsers parallel a library and serve a similar purpose for accessing internet resources. Browsers are software applications that interpret code (e.g. html, Java) to search for, retrieve, and navigate online resources. When browsers were first used, users had to type the desired search engine URL, such as google.com or yahoo.com, to access the search engine. With modern browsers, users can set a preferred search engine, which enables the passing of search terms or questions from the URL box to the search engine, removing a step from the former search process. Both the brick and mortar library and the browser tool contain the systems needed to search for and access resources. Because browsers are commercially, not publicly funded, regulations which apply to library services are not required of browsers.

From Catalog System to Search Engine

In 2015, those specially indexed cards many of us may remember in a library's card catalog stopped being manufactured as libraries had updated to digital catalog classification systems (Blakemore, 2015). Although the *card catalog* is not applicable to many students today, the card catalog has been considered "the first search engine" (Blakemore, 2017). Library patrons now use a digital catalog system to locate resources by entering an author, title, or subject to search within a particular section of a library, the full library, or the library system through a unique call number.

Such a search results in specific resources, availability status, and location.
Internet search engines like Google and Yahoo are software programs, which locate websites on the internet based on the search terms or question generated by the user typed into either the search bar or, more recently, directly into the address bar. Within the search engine, web-crawler background programs, also called spiders or bots, systematically and continually explore and examine internet data to match search terms with information. Once resources are found, their locations are returned and listed on the screen (Butterfield & Ngondi, 2016).

The affordances of a search engine versus a call number are incredible. Artificial intelligence (AI) led to the optimization of internet searches. To put it simply, it seems as if the computer can guess a search topic. As students begin typing a search, they can select from possible key words, which often eliminates the need for accurate spelling. For elementary classrooms, an awareness of search engines designed for children is important. Search engines like KidRex or GoogleKids enable safe searches in the classroom, providing security for student use.

From Call Number to Universal Record Locator (URL)

Once a resource is identified in a library catalog search, the call number reveals its physical location in the library. Call numbers serve as a numeric classification system and help patrons locate books among the library stacks (shelves). Books are organized by either the Library of Congress Classification (LCC) system (usually academic and higher education libraries) or by the Dewey Decimal Classification (DDC) system (public libraries and K-12 school libraries). For example, within the Dewey Decimal Classification, developed by Melvil Dewey near the end of the 19th century, the resources are initially organized into 10 broad categories represented by the first digit

of the call number. The categories are further divided into 10 more specific categories, represented by the second numeral, or hundreds division, and then 100 more subcategories within that specific division represented by a third digit, or the thousands division. To classify a book with a unique number, a decimal followed by the first letter of the author's last name and another set of digits gives it a precise number and location within the library (Figure 2). The system's design enables librarians to organize books on shelves in a meaningful way. For example, fairy tales, a type of traditional literature that teaches us about various cultures, are located in the nonfiction section of the library in the 300s. The system continues to be updated by the Online Computer Library Center (Online Computer Library Center, n.d.).

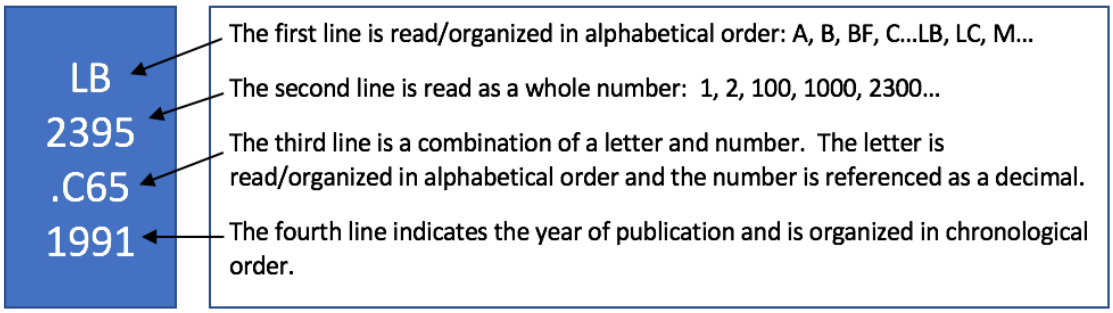

Figure 2. Reading Call Numbers. This figure explains how to read card catalogue call numbers. Adapted from the Boston Public Library's Reading Call Numbers (http://www.bpl.org/general/callnumbers.htm).

Similarly, a URL serves as a meaningful and readable address representing a numerical code, or Internet Protocol (IP) address for the location of resources on the internet. An adequate search will result in a list of websites, documents, images, or videos with a unique Uniform Resource Locator (URL), much like the call number on a library book. Students can search for topics using a search engine, such as Google, and limit the search to file type, such as images and videos (Figure 3). Internet searches provide immediate availability to online sources.

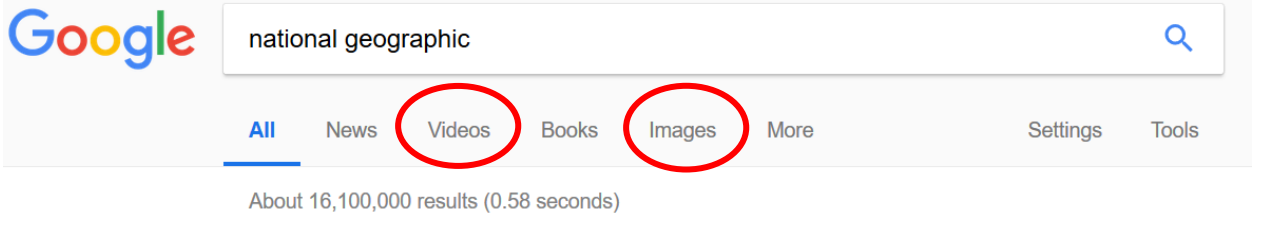

Figure 3. Search by File Type

The components of the URL or web address reveal the location of the content. For example, the URL https://kids.nationalgeographic.com/games, is interpreted in the format of protocol://domain/other_information. The URL begins with the hypertext transfer protocol (https)

indicating the site is secure. Next, the domain (IP address) includes the hostname indicating Kids National Geographic owns the site. The last part of the domain, called the top-level domain or extension, identifies the source of the content such as commercial, government, or educational (Table 1). The final section of the URL includes other information (this example indicates games), thus completing the unique web address for the resource (November, 2008; November Learning, 2018). Understanding the components of the URL provides context and can help readers determine reliability of the source.

Table 1

Top-Level Domain Codes and Initial Meanings

Top-Level Domain Code	Initial Source of Content
.com	Commercial or Business
.edu	Education, usually higher education
.gov	Government
.net	Networking Services (such as email / phone)
.org	Non-profit organizations

In recent years, this sourcing reference has lost some of its original intent. Of the top-level domains listed, only .edu and .gov, consistently retain these distinctions. Other top-level domains use two letter codes to identify the country of origin. Because Google has become synonymous with internet searching, students may not know the terms search engine or URL (Coiro, 2005). Thus, students may need explicit instruction to understand terms and processes for internet searches, just as they did for the Dewey Decimal Classification system.

From Book to Website

Structurally, a book is a collection of pages bound together around a story, topic, or theme in a linear sequential pattern, which students read left to right, top to bottom (Clay, 2002, 2005, 2016; Warlick, 2009). Previewing printed text includes scanning for chapter titles, headings, diagrams, and boldface words (Coiro, 2005). Even when printed text includes pictures and captions and readers might customize the order with which they attend to text features, the flow of the print is linear and sequential, moving from one page to the next. Readers turn physical pages expecting the next page to continue the story or information from the previous page.

In the digital format, a website typically presents a homepage, usually the domain of the URL, to organize content but also contains multiple layers of webpages. Rather than reading pages consecutively, the navigation from webpage to webpage is quite different, requiring clicking a mouse or tapping a touchscreen. The organization of a website could include multiple layers of webpages. Webpages can replace or extend the current URL or open in a new tab. The URL in Figure 4 shows the reader's navigation from "/explore/" to "/badges/." Readers can backtrack in the URL to identify the homepage or the original website (kids.nationalgeographic.com), which is often the server of the content.

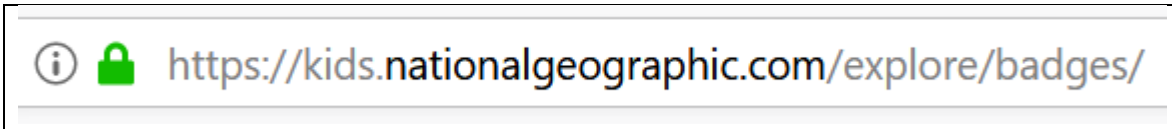

Figure 4. Understanding the URL

Learning to read the URL can help readers navigate the internet. Some links or icons may open a pop-up window, thus complicating the URL navigation. Reading websites in a nonlinear fashion is often more efficient when pursuing specific content. Students may have a difficult time understanding the navigation, may get lost in the pages, or may accidentally visit a different website. Learning to navigate the features is complex and the process is constantly changing as new technology evolves.

From Table of Contents to Menu

In printed text, the table of contents, found at the beginning of the printed publication, helps readers find chapters or sections according to page numbers. This list is also a visual representation of the author's organization of major content. Readers get a sense of what to expect as they scan the table of contents, and in expository text, can customize their reading to go directly to specific sections needed to answer specific questions.

Where is the table of contents on a website? Web designers have different techniques for making the content organization on a website clear, often organized with clickable tabs, drop-down, or pop-up menus (Figure 5). Whereas the table of contents offers a consistent format for resource navigation, the varied design of websites results in features which may be overlooked. As students gain experience exploring internet features, navigation can become somewhat intuitive; however, direct instruction can help developing readers and researchers become more purposeful and successful in locating the information they want or need.

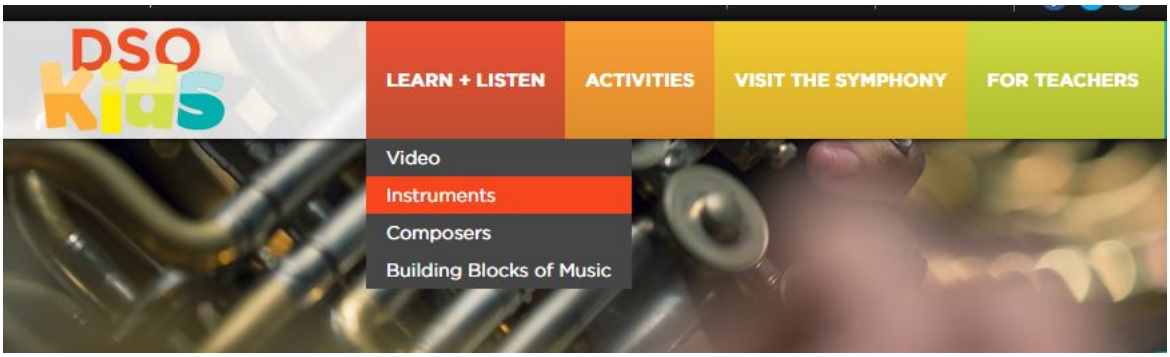

Figure 5. Dropdown menu

From Chapter to Webpage

As previously stated, in the Western world the directionality of text is top-down, left-to-right starting at the beginning and progressing to the end. When a reader gets to the bottom of a printed page and the sentence has not signaled its end through terminal punctuation, the experienced reader understands that the sentence will be continued at the top of the next page. Early readers have to be taught this navigation just as they are taught the return sweep of a sentence that continues from one line to the next (Clay, 2016). In reference to an online reading environment, Warlick (2009) calls this across and down movement "two-dimensional reading" (p. 22). Directionality of text and punctuation are the same for book chapters and webpages.

The webpage is paralleled to the chapter with multiple pages. However, the webpage is more like a chapter than a single paper page, as it is not limited in terms of space and dimension. In other words, the reader may need to scroll to reach the end of the text. The layout of a webpage is often more similar to a newspaper with separate headings, advertisements, and images. As readers proceed to locate specific content, they encounter multiple webpages within the website. One advantage to this hypertext environment is that readers can search for desired content quickly and can readily access multiple related sources. Nevertheless, readers can become distracted as hyperlinked resources may have different or contradictory aims. By clicking on a hyperlink or an advertisement, the reader can inadvertently open another website, which is similar to accessing a new book. A reader who is unaware of the navigation process may not realize which page is currently open.

From Index to Search Bar

In addition to searching for information in the table of contents, most printed expository texts utilize an index which allows readers to find references to specific content throughout the book. The index of the printed text is found at the end of the book, alphabetically arranged by terms limited and predetermined by the author. Next to each term is a page number, or range of page numbers, where the reader can go back into the pages of the text and find that specific information.

Readers who are knowledgeable of a text's full resources know how to use the index to search for and locate needed information, which is a more expedient search strategy than scanning a text for references to the wanted information.

The search bar on a website is somewhat comparable to the index. It is usually located on the homepage of the website with a magnifying glass icon to represent the word "Search" (Figure 6). While the search bar has the basic functions of a search engine, it is limited to the website. The technology expands the number of search words far beyond the predetermined list in a printed index.

Figure 6. Website Search Bar

From Paper Bookmark to Digital Favorite/Bookmark

Readers use physical bookmarks to mark their place in a book so they can easily return to that place later. Readers also use bookmarks to flag important sections or information they want to revisit. Readers place tabs, paper, clips, or commercial bookmarks between pages to save designated sections.

In the online environment, readers have different bookmarking options. Readers can copy and save a URL for future use or for sharing with others. Bookmarking information provides a way for students to revisit websites without conducting a full search. Bookmarking in the web environment utilizes Web 2.0 to provide an interactive platform. Social bookmarking tools like Diigo provide many options for students, including a place to store located information, ways to take and organize notes about websites, and ways to share digital folders and post notes during online collaboration. Web browsers also have platforms for digitally recording internet locations.

Bookmarking or starring favorites is a quick way to save information for future use. While back-arrowing may lead a reader to webpages recently visited, experienced internet users may also review the *search history*. While these processes can become somewhat instinctual for experienced internet users, direct instruction will facilitate website navigation for all readers.

Hyperlinks: Where the Analogy Ends

One of the distinguishing features of online text is the hyperlink and the hypertext connectivity of internet-based resources. Hyperlinks are a connection between online text documents (Butterfield & Ngondi, 2016) that create a hypertext, multidimensional reading environment. In online texts,

hyperlinks are words, phrases, or images, typically indicated by underlining or change of color, which lead readers to a new page, document, or other multimedia element. Warlick (2009) describes this action as three-dimensional reading because the across and down process extends to supporting and related documents. "By clicking through words, phrases, and images, we are able to dig deeper into the information, moving deeper into greater understanding, or into greater distraction" (p. 22). Readers may enter online texts at many points and in any order through decisions to access or ignore hyperlinks.

Why the Connection Matters

The amount and type of information available when searching the internet is often a safety concern for educators. Yet, our global, digital world requires students to be efficient consumers of information, and knowledge of the internet is a necessary skill. According to Leu, et al. (2013), "not a single state in the United States measures students' abilities to critically evaluate information that is found online to determine its reliability" (p. 225). In an online environment, evaluating and critiquing information is paramount. For each parallel comparison, teachers must consider the skills required for participation in a global society. Table 2 presents an overview of the parallel and addresses the application of new knowledge and skills required for online searches. In order to understand instructional applications, one must understand the new challenge and/or affordance that accompanies an internet search.

Our parallel comparison amplifies the understanding that literacy is more than a single set of cognitive skills and that reading in online environments includes understanding the way hypermedia texts interact. Just as Marie Clay (2000) deeply and explicitly examined concepts about analog print to support emerging and novice readers, our goal is to clarify the skills for searching the digital text through the use of this analogy. In regard to traditional text, Clay reminds us that, "Teachers must teach so that all children become knowledgeable about these essential concepts so they open doors to literacy" (pp. 24-25). The essential concepts of online text have additional layers of complexity. The traditional "rules of the road" (Clay, 2000, p. 24) have shifted to rules of the information superhighway. We hope this analogy supports classroom teachers' metacognition about online text and that this knowledge supports readers by using familiar concepts to build a foundation for the skills required to be *transliterate.*

Table 2. *Making Connections: Application of New Knowledge and Skills*

Traditional Search Tool	Online Search Tool	New Challenge and/or Affordance of the Internet Tool	Application of New Knowledge and Skills
Library System	Internet	Information on the internet is not vetted for accuracy	Students need knowledge about how information is published on the internet. They need practice evaluating online materials for credibility.
Library	Browser	Accessibility and vulnerability	Students need basic knowledge of what a browser is and that an online search provides unlimited content. Students need to practice evaluative skills in order to recognize ads and inappropriate content.
Catalog System	Search Engine	Knowledge of key words	Students need knowledge about key word selection and the use of Boolean terms to narrow and broaden searches. Students need to practice searching the internet in authentic ways.
Call Number	URL	Web address knowledge	Students need knowledge about how web addresses, or URLs, function in order to investigate author information and credibility.
Book	Website	Text features	Students need knowledge about online text features that include web navigation (forward/backward links), scrolling, multimedia information, and hyperlinks.
Table of Contents	Menu	Online navigation skills	Students need knowledge about how a website menu differs from a table of contents. While menus are intuitive by nature, students need explicit instruction on how to use the menu buttons, drag down boxes, icons, and other features specific to online searches.
Chapter	Web Page	Organization of multi-layered content	Students need knowledge about the abstract nature of the internet. Unlike paper-based sources, websites are not two-dimensional. When searching online, readers must navigate a hypermedia, three-dimensional reading experience in which they can click on images and words that take them to additional hyperlinked pages of texts.
Index	Search Bar	Online navigation and search skills	Students need knowledge about how to find information on a website. Students need to understand that the goal of a website's search bar is to help locate information *within* the website, not the entire internet. This knowledge enables students to quickly search a site to locate specific information.
Bookmark	Favorite	Research tool	Students need knowledge about how to locate, store, and retrieve internet sources. Just as students created lists and notecards of books to use in research, students need explicit instruction related to online tools for saving referenced sites and resources.

REFERENCES

American Library Association. (2016). Definition of a library: General definition. Retrieved from https://libguides.ala.org/library-definition.

Blakemore, E. (2015). The card catalog is officially dead: Long live the card catalog. Retrieved from https://www.smithsonianmag.com/smart-news/card-catalog-dead-180956823/.

Blakemore, E. (2017). The Librarian of Congress weighs in on why card catalogs matter. Retrieved from https://www.smithsonianmag.com/smart-news/card-catalog-dead-180956823/.

Buckler, C. (2009). What is a web browser? No one knows! Retrieved from https://www.sitepoint.com/what-is-a-web-browser/.

Butterfield, A. & Ngondi, G. (Eds.). (2016). *A dictionary of computer science* (7th ed.). Oxford, UK: Oxford University Press.

Clay, M. M. (2000). *Concepts About Print: What have children learned about printed language?* New Zealand: Heinemann.

Clay, M. (2002, 2005, 2016). *An observation survey of early literacy achievement.* Portsmouth, NH: Heinemann.

Coiro, J. (2005). Making sense of online text. *Educational Leadership, 63*(2), 30-35. Retrieved from http://www.ascd.org/publications/educational-leadership/oct05/vol63/num02/Making-Sense-of-Online-Text.aspx.

Coiro, J., Knobel, M., Lankshear, C., & Leu, D. J. (2008). *Handbook of research in new literacies*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Common Core State Standards Initiative. (2010). *Common core state standards for English/language arts and literacy in history/social studies, science, and technical subjects*. Retrieved from http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf.

International Reading Association. (2009). *New literacies and 21st century technologies: A position statement of the International Reading Association*. *http://www.reading.og/General/AboutIRA/PositionStatements/21stCenturyLiteracies.aspx*.

International Society for Technology in Education. (2012). *National education technology standards for students.* Retrieved from http://www.iste.org/standards/nets-for-students.

Jones-Kavalier, B. R. & Fannigan, S. I. (2008). Connecting the digital dots: Literacy of the 21st century. *Teacher Librarian, 35*(3), 13–16.

Kress, G. (2010). *Multimodality: A social semiotic approach to contemporary communication*. New York, NY: Routledge.

Kymes, A. (2005). Teaching online comprehension strategies using think-alouds. *Journal of Adolescent and Adult Literacy, 48*(6), 492-500.

Leu, D. J., Forzani, E., Timbrell, N., & Maykel, C. (2015). Seeing the forest, not the trees: Essential technologies for literacy in the primary grade and upper-elementary grade classroom. *The Reading Teacher, 69*(2), 139-145.

Leu, D. J., Kinzer, C. K., Coiro, J., Castek, J., & Henry, L. A. (2013). New literacies: A dual level theory of the changing nature of literacy. In D.E. Alvermann, N.J. Unrau, & R. Ruddell (Eds.), *Theoretical Models and Processes of Reading* (pp. 1150-1180). Newark, DE: International Reading Association.

Leu, D. J., Forzani, E., Burlingame, C., Kulikowich, J., Sedransk, N., Coiro, J., & Kennedy, C. (2013). The new literacies of online research and comprehension. In S.B. Nueman & L.B. Gambrell (Eds), *Quality Reading Instruction in the Age of Common Core Standards*. (pp. 219-236). Newark, DE: International Reading Association.

McLeod, J., & Vasinda, S. (2008). Critical literacy and web 2.0: Exercising and negotiating power. *Computers in the Schools: Interdisciplinary Journal of Practice, Theory, and Applied Research, 25*(3-4). Retrieved from https://www.tandfonline.com/doi/full/10.1080/07380560802394815?scroll=top&needAccess=true

Mills, K.A. (2016). *Literacy theories for the Digital Age: Social, critical, multimodal, spatial, material and sensory lenses*. Bristol: Multilingual Matters.

New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review, 66*(1), 60-92.

November, A. (2008). *Web literacy for educators*. CA: Sage Publications.

November Learning. (2018). *How to read a web address.* Retrieved from https://novemberlearning.com/educational-resources-for-educators/information-literacy-resources/4-how-to-read-a-web-address/.

Online Computer Library Center. (n.d.). Organize your materials with the world's most widely used library classification system. Retrieved from https://www.oclc.org/en/dewey.html.

Perrin, A. & Duggan, M. (2015). Americans' internet access: 2000-2015. *Internet & Technology.* Retrieved from http://www.pewinternet.org/2015/06/26/americans-internet-access-2000-2015/.

Piaget, J., & Inhelder, B. (1972). *The psychology of the child* (2nd ed.). New York: Basic Books.

Pilgrim, J., & Bledsoe, C. (2015). The role of technology in the transformation of twenty-first century literacy skills. In M. Khosrow-Pour (Ed.), *Encyclopedia of Information Science and Technology* (3rd ed.) (pp. 4805-4813). New York: IGI Global.

Pilgrim, J., Vasinda, S., Bledsoe, C., & Martinez, E. (2018). Concepts of online text: Examining online literacy tasks of elementary students. *Reading Horizons: A Journal of Literacy and Language Arts, 57*(3), 68-82.

Vacca, J. L., Vacca, R.T., Gove, M.K., Burkey, L.C. Lenhart, L.A. & McKeon, C.A. (2018). *Reading and learning to read* (10th ed.). New York: Pearson.

Warlick, D. F. (2009). *Redefining literacy 2.0.* (2nd ed.). Columbus, OH: Linworth Books.

Authors

Christie Bledsoe, EdD, is an associate professor at the University of Mary Hardin-Baylor, where she teaches courses and supervises dissertation. Christie earned her bachelor's degree at Louisiana Tech University, her master's at the University of Texas at Arlington, and her doctorate in Educational Leadership at UMHB. Christie began her career teaching secondary math and science in the public school system and continues to share

her love or learning with college students. She believes that teaching and researching enhance one another and make a difference for learners. Her research interests include teacher preparation, math education, and technology. She is a past president of Texas Association of Teacher Educators and remain active today. Her email address is christie.bledson@umhb.edu.

Jodi Pilgrim, PhD, is a professor at the University of Marhy Hardin-Baylor in Belton, Texas. Jodi earned her bachelor's and master's degrees at Texas A&M University in College Station, Texas, and her doctorate in Reading Education from the University of North Texas. Jodi currently teaches literacy courses for undergraduate and graduate pre-service teachers. With over 20 years of experience in literacy education, Jodi's passion is ensuring struggling readers receive the instruction and motivation necessary for success in the classroom. Jodi is an active member of the International Literacy Association and the Texas Association of Literacy Educators. Jodi's teaching and research interests include new/digital literacies, Universal Design for Learning, teacher preparation, and technology integration. Her email address is jpilgrim@umhb.edu.

Sheri Vasinda, PhD, is an associate professor of literacy education at Oklahoma State University. She earned her master's and doctorate degrees at Texas A&M University-Commerce. With over 25 years of K12 experience, she now supports preservice and inservice teachers in developing deep understandings of literacy processes and practices. She is passionate about supporting readers and writers with varying abilities through purposeful pairings of new technology tools with strong traditional literacy strategies so that all students find success with traditional literacies discover their potentials through new literacies. She researches ways technology affords authentic self-assessment opportunities, the challenges and affordances of online reading, multiliteracies, and teacher education. Her email address is sheri.vasinda@okstate.edu.

Elda E. Martinez, PhD, serves the University of the Incarnate Word in San Antonio, Texas, as Director of Teacher Education and professor. Elda earned Bachelor of Arts and Master of Arts in Teaching degrees from Trinity University in San Antonio, Texas. She earned a Doctor of Education in Organizational Leadership from Teachers College, Columbia University in New York City. Prior to UIW, she completed ten years of teaching in the San Antonio Independent School District in both general and special education settings, supporting students from kindergarten through middle school. Elda's teaching and research are focused on issues related to teacher preparation, instructional approaches, special education, and teacher induction. Her email address is eemartin@uiwtx.edu.