Competent Adolescent Readers' Use of Internet Reading Strategies: A Think-Aloud Study

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The purpose of this study was to investigate the type, pattern, and complexity of Internet reading strategies used by seven accomplished high school readers. Individual participants performed an academic Internet reading task with the goal of developing critical questions about their chosen controversial topic. Strategies for Internet reading were analyzed from the perspective of constructively responsive reading, both qualitatively and quantitatively, using participant-generated verbal reports complemented by recordings of their computer screens. The data described the nature and sequence of reading strategies that participants used to construct meaning, and the interplay of those multiple strategies in Internet settings. The results demonstrated that the participants' Internet reading involved the iteration and modification of traditional print-based reading strategies (e.g., meaning-making, self-monitoring, information evaluation) and also the use of strategies characteristic of Internet settings (e.g., text location). Implications of the study's findings on Internet reading strategy use for theory and research are discussed.

To successfully participate in anInternet-based, information-rich society, students must become adept at choosing, evaluating, and learning from complex digital texts (Alexander & The Disciplined Reading and Learning Research Laboratory, 2012; Common Core State Standards Initiative, 2010; Goldman et al., 2010; Leu, Kinzer, Coiro, Castek, & Henry, 2013). Successful readers determine where to navigate and what to read, in what may be large, unknown information spaces on the Internet, and take active roles in constructing meanings from the texts they access. The present study focuses on such strategic acts of reading in Internet settings, and it analyzes readers' verbal reports together with their screen moves to examine a broad question: What types, patterns, and complexities of reading strategies are involved in the Internet reading of seven competent high school readers? This study aims to contribute to the foundational knowledge base informing the teaching and assessment of reading in the 21st-century literacy context (Bransford, Brown, & Cocking, 2000; Pellegrino, Chudowsky, & Glaser, 2001).

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DEFINING THE TERM "READING STRATEGIES"

Reading strategies in the broad sense are situated actions of human cognition oriented toward a particular goal for reading (Greeno, 1989; Pressley & Harris, 2006). Reading strategies are selected, organized, and applied according to how readers interact with materials and sources available in the task environment (Graesser, 2007; Trabasso & Magliano, 1996; van den Broek, Rapp, & Kendeou, 2005; van Dijk & Kintsch, 1983). Thus, strategic readers respond actively to text, keeping both initial and emerging goals and priorities in mind, and this responsivity determines their selection and coordination of reading strategies (Paris, Lipson, & Wixon, 1983). For example, a strategic reader uses knowledge and strategy pertaining to the structure and content of the text that she or he reads (Anderson & Pearson, 1984; Meyer, Brandt, & Bluth, 1980). Given more than one text to process, the reader attends to identifying relationships across the texts in addition to comprehending individual texts (Goldman, 1997; Hartman, 1995). When the particular texts to read are not predetermined, as in many Internet settings, the reader begins reading by exploring and choosing useful texts (Hofer, 2004; Rogers & Swan, 2004). The nature of texts and their availability shape readers' decisions about where to start reading and how to read texts.

The conception of reading strategies offered here does not entail only successful outcomes. That is, although reading success is the intention, not all strategies have positive consequences (Afflerbach, Pearson, & Paris, 2008). The reader may associate inappropriate prior knowledge with text content, misjudge the importance of text information, or struggle to fix processing difficulties. Nonetheless, these actions can be considered strategic, and even critical, when readers determine the paths to their reading goals by negotiating meanings between their own cognitive resources (e.g., knowledge about texts and the world), available materials (e.g., texts accessed and selected), and the situations in which their strategies work (e.g., task constraints and affordances). Therefore, strategic readers are effortful, and their engagement in strategy use may lead to successful reading (Alexander, Graham, & Harris, 1998; Guthrie, Wigfield, & You, 2012; van Dijk & Kintsch, 1983).

INTERNET READING STRATEGIES

Multiple strands of research inform our understanding of the cognitive strategies involved in Internet reading. Traditionally, reading research has focused for the most part on the comprehension of a single text (McNamara, 2007; Pressley & Afflerbach, 1995; van Dijk & Kintsch, 1983), and it suggests that the same or similar comprehension strategies, ranging from literal and inferential understanding to critical reasoning and to regulation of these complex processes, are involved to a considerable extent in the process of constructing meaning from web sources (Coiro, 2011; Duke, Schmar-Dobler, & Zhang, 2006; Fox & Alexander, 2009). In particular, Kintsch's (1988, 1998) theory of written discourse processing provides a powerful account of strategic reading. According to this theory, reading comprehension requires building a *textbase model*, which represents a propositional network directly derivable from the text at the microstructure level. This initial mental model is preliminary and not necessarily consistent and coherent, so that it must be elaborated at the macrostructure level through the integration of the reader's text knowledge

and world knowledge with the results of microprocessing cycles. Irrelevant and unwanted information then must be eliminated, and a *situation model*, a coherent mental representation of the text suitable to the reading goal, can be established. Applied in Internet settings, the concept of situation model helps outline the course of strategic action along which readers must proceed to build a precise and coherent understanding of an accessed webpage with a propositional network of information.

Effortful use of these constructive-integrative processes is a hallmark of strategic reading, as Pressley and Afflerbach (1995) described in their model of *constructively responsive reading*. Based on their review of 38 empirical studies that examined expert readers' verbal reports, Pressley and Afflerbach suggested that accomplished reading is marked by three classes of reading strategies as the reader attempts to build a coherent mental representation of a text. These include strategies for *identifying and learning text content* (e.g., making inferences about text-implicit information), *evaluating* (e.g., judging the relevance of text content in relation to the reading goal), and *monitoring* (e.g., detecting processing difficulties due to unfamiliar text structure). Although the majority of the reviewed studies used or assumed a reading task comprehending a single print text, the discussion of the three strategy types facilitates understanding of at least part of the strategies required for Internet reading (Coiro & Dobler, 2007). That is, once a webpage is accessed on the Internet, regardless of the page's form of representing information (e.g., written language or images) and structuring information (e.g., linear or nonlinear), the reader must learn important information from the page and judge its information value while noting problems of comprehension, just as a strategic reader does with a printed text.

It is noteworthy that current research on reading comprehension has expanded its focus from single texts (Kintsch, 1998; Pressley & Afflerbach, 1995) to include the investigation of learning from multiple sources (Goldman & Scardamalia, 2013). For example, Rouet and colleagues described the complexities of multiple text processing, revising Kintsch's theory of comprehension (Perfetti, Rouet, & Britt, 1999; Rouet, 2006; Rouet & Britt, 2011). According to Perfetti et al. (1999), the reading of multiple texts is directed toward building a *documents model*, which refers to a globally represented situation model of those texts. The documents model is not merely a total of understandings from individual sources read in isolation, but must be built on an *intertext model* that represents certain relationships between and across the texts. In this account, a text is more than a series of pieces of propositional information; it is construed as an entity that includes the author, genre, publishing type, intended audience, explicit and implicit purposes, and intentional and unintentional messages. Thus, constructing an intertext model demands that the reader be intellectually engaged in identifying who constructed (or reconstructed) the texts and when and where the texts were crafted and published (Leinhardt & Young, 1996; Rouet, Britt, Mason, & Perfetti, 1996; Wineburg, 1991); discerning inconsistency, irrelevance, or inaccuracy among the texts (Afflerbach, Cho, & Kim, in press; McCrudden, Magliano, & Schraw, 2010; Stadtler, Scharrer, Brummernhenrich, & Bromme, 2013); and determining the contributions of individual texts to an intertextual understanding (Goldman, Braasch, Wiley, Graesser, & Brodowinska, 2012; Hartman, 1995; Strømsø, Bråten, & Samuelstuen, 2003; Wiley et al., 2009).

In their recent MD-TRACE model (Multiple-Document Task-based Relevance Assessment and Content Extraction), Rouet and Britt (2011) foregrounded that readers' analysis of the task they wish to accomplish guides the subsequent processes involved in the integration of multiple texts. Strategic readers construct a *task model*, informed by their analysis of the task goal, criteria

for the achievement of the goal, and actions required to meet the goal and criteria (Britt & Rouet, 2012). The task model guides the readers' assessment of information relevance as they read multiple texts. For example, consider the task of creating critical questions about fast food after reading relevant texts on the Internet. The reader must determine the task demands by considering his or her knowledge of the topic (e.g., fast food), the available tools (e.g., the Internet), the desired products of the work (e.g., critical questions), the required actions (e.g., creating critical questions, reading on the Internet), and other task affordances (e.g., reading multiple sources) and challenges (e.g., reading in a complex hyperspace). The reader then identifies the criteria for a high-quality task product, speculating on what the critical questions should look like and how the questions can be constructed. The reader's clear awareness of the criteria can then lead to his or her planning of strategic actions for Internet reading (e.g., making connections between different web sources, discerning relevant materials, using the sources to enhance topic-related understanding) to help generate the critical questions about the topic.

Both the documents model and the MD-TRACE model, resulting from research on multiple text comprehension, inform understanding of the complex use of the reading strategies that are required to analyze, synthesize, and evaluate the sources readers encounter on the Internet. Internet hyperspace is fundamentally intertextual, and this (con)textual feature forces readers to build coherent understandings from untested web sources that may be irrelevant and/or inaccurate (Brem, Russell, & Weems, 2001; Kiili, Laurinen, & Marttunen, 2008; Wiley et al., 2009). The set of strategies needed to comprehend a single printed text is not sufficient for the successful construction of meaning in Internet settings. Strategic readers must be active in evaluating multiple web sources, building a cross-textual understanding of those sources in a coherent manner, and monitoring and controlling their intertextual processes based on a detailed analysis of the task goal and situation (Goldman, 2010; Lawless, Goldman, Gomez, Manning, & Braasch, 2012).

In a recent meta-analytic review, Afflerbach and Cho (2009) updated the original model of constructively responsive reading (Pressley & Afflerbach, 1995), incorporating what research has suggested about the complexity of multiple text processing and the notion of intertextuality into their account of strategic reading. Their review of the growing body of research on reading multiple texts for both print-based tasks (e.g., evaluating primary and secondary historical documents, learning from conflicting scientific articles) and Internet-based tasks (e.g., comprehending website contents, learning from hypertext and hypermedia) described an array of complex intertextual processes required for Internet reading. Afflerbach and Cho grouped these processes into the original three strategy types proposed by Pressley and Afflerbach, extending the spectrum of the strategies within each type. In the updated model, constructively responsive reading of multiple texts requires effortful readers to use strategies for *meaning-making* from multiple Internet sources, including but not limited to analyzing and synthesizing information and building meaningful linkages across the sources in their minds (i.e., Pressley and Afflerbach's *identifying and learning text content*). Such readers continuously use the second strategy type, *self-monitoring*, to detect and amend reading difficulties while learning from Internet sources and to keep track of reading progress toward the goal (i.e., Pressley and Afflerbach's *monitoring*). Strategic Internet readers also share characteristics of critical readers who are committed to *information evaluation*, which is the third strategy type when interrogating both internal and external features of Internet sources, such as validity and reliability of the content, author reputation, or source information (i.e., Pressley and Afflerbach's *evaluating*). These intertextual strategies comprise important aspects of strategic reading in Internet settings.

Nonetheless, the above described strategy types—meaning-making, self-monitoring, and information evaluation—are for reading a predetermined and finite set of texts and are therefore insufficient to describe fully what strategic readers undertake in nonlinear, unbounded Internet text environments. It is important to note that Afflerbach and Cho (2009) suggested that Internet reading may demand a new group of strategies in addition to the three previously identified strategy types. Based on their review of research on the strategic processes involved in new forms of reading (e.g., open- and closed-ended hypertext reading, web-based reading tasks, information-seeking behaviors on the Internet), Afflerbach and Cho proposed a new type of reading strategies for *realizing and constructing potential texts to read.* This type refers to readers' "strategic approaches to reducing uncertainty, determining the most appropriate reading path, and managing a shifting problem space" in Internet reading (Afflerbach & Cho, 2010, p. 212), and highlights a contextual feature of Internet reading that may be novel compared with print-based reading. In Internet settings, the choice of text(s) is often undetermined at the onset of reading. Internet readers must commence their reading accordingly: exploring, finding, and selecting the Internet texts that can meet their goals and interests. To this end, strategic readers navigate useful sources along the reading paths they construct within the universe of possible texts and links (Bolter, 1998; Burbules & Callister, 1996; Landow, 1992). Internet reading becomes successful when readers negotiate a variety of digital sources effectively and make informed decisions about what to choose to read, how to sequence their choices, and when and where to read further and to access additional sources or not (Goldman et al., 2012).

Afflerbach and Cho's (2009) suggestion that readers require a new set of strategies for realizing and constructing potential texts addresses Internet reading's demand that readers actively engage in using strategies for *text location*. Although text location strategies may be required in print-based reading as well, such as selective reading of footnotes, information searches, or browsing among and choosing library books (Dreher & Brown, 1993; Guthrie & Mosenthal, 1987; Rouet, Vidal-Abarca, Erboul, & Millogo, 2001), these strategic moves are bound by a single text or finite set of texts. However, Internet reading with open-ended nonlinear hypertexts requires that readers use these strategic moves in determining what to choose, where to go, and how to get to the meaning while identifying and building cross-textual linkages in a virtually unbounded text environment (Britt & Aglinskas, 2002; Coiro & Dobler, 2007; Lawless, Schrader, & Mayall, 2007; Salmeron, Canas, Kintsch, & Fajardo, 2005; Salmeron & Garcia, 2011; Zammit, 2011). Therefore, relatively speaking, the fourth type of strategy (i.e., text location) in the updated model of constructively responsive reading may be used to a larger degree in Internet reading than in print-based reading, and thus this type of strategy must be considered in any characterization of strategic Internet reading.

Empirical research focusing specifically on constructively responsive strategies for Internet reading is rare. However, Goldman et al.'s (2012) think-aloud study is notable because it identified a variety of strategies that are integral to successful learning in an Internet setting. In this study, college-level readers learned about volcanic eruptions from seven preselected websites linked in a mock-up of a Google search results page. The descriptive analysis of the readers' think-aloud data resulted in a classification of four core strategic processes, which are similar to the strategy types that Afflerbach and Cho (2009) suggested in their updated model of constructively responsive reading for Internet hypertext reading. The results of Goldman et al.'s study demonstrate that reading web sources requires navigation (similar to text location on the Internet), intertext connections (similar to meaning-making from multiple Internet sources), monitoring (similar

to self-monitoring), and information/source evaluations (similar to information evaluation). In particular, their statistical analysis of the readers' strategic patterns and success with web-based learning indicated that accurate and thorough evaluation of web sources made a notable contribution to the learners' understanding of the topic. In this study, more successful learners often decided whether to continue reading or reject the accessed web sources based on decisions about the relevance and credibility of the information and its match to the task. Conversely, less successful learners left webpages after reading to the end of the page without strategic decision making about whether the information was relevant or useful to the task.

More recently, Anmarkrud, Bråten, and Strømsø's (2014) study is of importance because it used the typology of constructively responsive strategies (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995) to investigate readers' strategic processing of multiple digital sources. In this study, college students read six conflicting documents on the topic of cell phones and potential health risks, which they accessed through a controlled mock Google interface. The analysis of the readers' verbal reports documented many strategic actions and categorized them into the three strategy types for print-based reading—meaning-making, self-monitoring, and information evaluation—which jointly contributed to the readers' successful learning from multiple sources in the digital text environment. In this study, the more the participants engaged in cross-document linking processes and evaluations of source trustworthiness, the better they performed argumentative reasoning about scientific issues. However, Anmarkrud et al.'s study did not include strategies for text location—the newly added core strategy type for Internet reading in Afflerbach and Cho's updated model of constructively responsive reading—in their coding scheme. Therefore, while the study focused on the cognitive processes involved in the comprehension of multiple sources, it did not address how strategies for text location in conjunction with the strategies for meaning-making, self-monitoring, and information evaluation are used and function in the digital-text context.

While substantial progress has been made toward understanding the strategic processing of texts, both print and digital, it is clear that research is needed for describing the situated use of reading strategies in responding to more ecological Internet settings with both open and closed text environments. The recent studies by Anmarkrud et al. (2014) and Goldman et al. (2012) are foundational to understanding the complexities of Internet reading strategies. However, in these two studies, the readers' moves were constrained within researcher-developed "Google-like" systems. The systems were comprised of a limited number of sources and hyperlinks, and thus the design of the studies allowed observation of a limited set of strategic actions, which might have been much more dynamic and complex in an open-ended Internet space. Moreover, neither study was conceptualized within the Afflerbach and Cho (2009) framework.

THE PRESENT STUDY

This study extends prior research on the reading strategies framework of constructively responsive reading that has evolved from single-text reading to multiple-text reading and to Internet hypertext reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). The study used a critical questioning task, unlike simple information-location or questioning-answering tasks, to encourage readers' navigation of a problem space for a controversial topic and their use of sophisticated reading strategies within an ill-structured information space on the Internet (Spiro &

Jehng, 1990). Built on the previous research that has investigated reading processes within either open-ended or closed hypertext systems, this study situated the critical reading task within both more and less constrained Internet contexts in order to observe differences in how the four types of constructively responsive strategies were used in different Internet hypertext contexts (Snow, 2002). Hence, the study is able to describe the role that both relatively traditional print-based reading strategies (i.e., meaning-making, self-monitoring, and information evaluation) and new Internet-based reading strategies (i.e., text location) played in the participants' completion of a critical Internet reading task. Detailed descriptions of the strategy types and the patterns of strategy use that the readers engaged in during the Internet reading task will contribute to the discussion of new literacies (Leu et al., 2013).

The participants in this study were highly skilled high school readers who were continuing to grow in a developmental trajectory of reading competence. The life-span developmental perspective on reading (Alexander, 2003) suggests that these student readers were not yet expert readers—those possessing and using principled domain knowledge and skills. They can instead be better characterized as maturing "competent" readers: readers who meet higher expectations and are more likely to engage in deeper processing strategies than adolescent readers in general. The analysis of their strategic reading should inform our understanding of reading competence required in Internet contexts, adding to previous findings about both the strengths and weaknesses of adolescent readers within digital contexts (Brem et al., 2001; Coiro & Dobler, 2007; Guinee, Eagleton, & Hall, 2003; Hoffman, Wu, Krajcik, & Soloway, 2003; Kiili et al., 2008). The present study examined verbal reports from the seven competent high school readers to address two specific research questions: (a) What types of reading strategies are used in the Internet readings of seven competent adolescent readers with a goal of constructing critical questions about their chosen controversial topic? (b) How is the interplay and sequence of these reading strategies different in open-ended and closed-ended Internet settings? The updated model of constructively responsive reading with the four strategy types—text location, meaning-making, self-monitoring, and information evaluation (Afflerbach & Cho, 2009)—serves as the framework for exploring the complexities underlying the readers' use of reading strategies in Internet settings.

METHODS

Participants

This study used intensity sampling (Patton, 1990) to purposefully select a small number of accomplished adolescent readers who provide rich and in depth information of their Internet reading strategy use. In particular, because this study depends on a fine-grained analysis of the participants' verbally reported data, the adolescent readers who were selected to participate needed to have high levels of reading competence and verbal proficiency (Afflerbach, 2000). Competent adolescent readers may engage in versatile uses of reading strategies to process the sheer amount of Internet information (Coiro & Dobler, 2007; Leu et al., 2007), in contrast to their nonskilled peers, who lack the ability to use appropriate strategies and are often disoriented in a complex hypertext structure (Bilal, 2002; Fidel et al., 1999). Competent readers are more likely to engage in introspection about what is happening in their minds while they are reading (Pressley & Afflerbach, 1995). This characteristic was especially important for the challenging task in this

study, which was designed to evoke a wide range of sophisticated reading strategies. Moreover, competent readers with suitable verbal proficiency were necessary for this study because the think-aloud task imposed additional cognitive and social demands on the readers, who were asked to verbalize their thought processes in front of others (Smagorinsky, 1998).

Seven female participants, with an average age of 17.50, were selected out of 42 tenth- to twelfth-grade students enrolled in two Advanced Placement (AP) social studies classes at a public high school in a mid-Atlantic state. Multiple indicators supported the participant selection. In the state-administered standardized tests, the participants performed at the levels of either Distinguished or Above Mastery, which require higher level reading skills with both literary and informational texts in English and social studies. The participants had earned grade point averages higher than 4.0 for weighted credit for taking multiple honors and AP classes ($M = 4.15$, $SD = 0.19$), suggesting their reading competence and engagement across content areas. Four of the seven participants had earned high scores in the SAT critical reading ($M = 590$ out of 800, $SD = 11.54$), indicating their college-level reading skills in general. According to the participants' responses to the researcher-developed questionnaire, all participants perceived themselves as competent readers and spent, on average, about six out-of-school hours per week reading print and digital texts for school projects and informal learning. The participants performed at the satisfactory level in a 10-minute preresearch web-based inquiry task about fast food, which required identification of a reliable topic-relevant website within the time limit while verbalizing their thinking processes; their performance indicated, in part, their Internet reading competency and verbal proficiency. It is noteworthy that six out of the seven selected participants had a shared experience of learning inquiry skills from a semester-long multidisciplinary course designed by a group of content area teachers at their school. The course was designed to promote students' use of diverse media sources to research environmental and societal issues.

Internet Reading Task

A critical questioning task was designed to encourage the use of diverse knowledge sources and evaluative mindsets about numerous texts in Internet environments (Ikuenobe, 2003). Prior to the task, the researcher met with the participants individually and informed them of the task goals and procedures with the following written description:

> Your assignment is to create a critical question that guides classroom discussion about a particular topic, using the Internet. To this end, you will select one topic, navigate the Internet to find different web sources deemed useful, learn from multiple sources carefully, and create a critical question based on your Internet reading.

The participants were then introduced to the critical questioning task in a 15-minute activity using fast food examples. The participants were taught to compare the researcher-developed critical and superficial questions and discuss what would make a question more critical (e.g., explicitly claimed debating points, supporting details and evidence, potential impacts on problem solving). They also were given guidance about the writing of rationale statements, using examples, to support their ability to generate critical questions. The participants then selected one of a dozen contemporary, controversial topics (e.g., alternative energy, eco-friendly industry, the death

penalty, obesity and public health) for their own Internet research. The intention of the pretraining and topic choice was to help participants connect the current research task with their knowledge and interests (Brown, Collins, & Duguid, 1989), use critical strategies to read about an ill-defined topic (Fabos, 2008), and invest cognitive effort in the reading task (Guthrie & Wigfield, 2000).

Once the topic was selected, the individual participants read on the Internet in two 45-minute sessions. The participants performed Open Website Searching (Session I) first to identify three websites they deemed useful to learning about their chosen topic. They were allowed to use any search engines and visit any websites in an open-ended reading setting, except for sites prohibited by the school Internet policy (e.g., Facebook). The participants then performed Focused Website Learning (Session II) to study the topic within their chosen sites. They were unconstrained in moving to any spaces within those sites by using any available links, menus, or built-in search tools, but they were not allowed to access large-scale search engines (e.g., Google) or other complementary sites (e.g., Wikipedia) besides their original selections. This two-phase Internet reading task was designed to observe any differences in the pattern of readers' strategy use between open-ended and closed-ended text environments. Upon completion of the task, each participant constructed a critical question and provided a rationale for the question.

Data Sources

The primary data were the participants' concurrent verbal reports recorded in the computer, from which inferences were made about what and how strategies were planned, used, and assessed during reading. Possible concerns about verbal reporting and tactics to address the concerns were considered in the implementation (Afflerbach, 2000). Prior to the Internet reading task, the researcher modeled verbal reporting for the participants, using a website about fast food. The participants were told to verbalize freely at any point while reading on the Internet and were encouraged to think out loud whenever they clicked on hyperlinks, pressed navigation buttons, typed in search terms, managed scroll bars, or read particular information. This pretraining was intended to accustom the participants to think-aloud procedures and thus to reduce the burden of verbal reporting that the task imposed on the readers, while encouraging them to make verbal utterances as frequently as possible during the task. Although it should be noted that the modeling and prompts might have influenced what the participants reported, such instruction is commonly used in think-aloud studies of text processing because it is important to introduce and clarify the task for participants (Afflerbach, 2000).

During the Internet reading sessions, generic prompts were additionally given (e.g., Can you tell me what you are thinking now?) when the participants were silent for more than three seconds or when further information was needed to understand navigational behaviors that were not accompanied by verbal reports. The purpose of the prompts was to gather sufficient information on the reasons for the participants' reader–computer interactive behaviors for the researcher to make inferences about their underlying cognitive processes, but not to encourage use of any particular strategy types or initiate conversations about their acts that would potentially affect their reading processes. In the traditional approach to verbal reporting, spontaneous prompting is not recommended because it may force readers to provide self-explanations apart from their short-term memory (Ericsson & Simon, 1980, 1998). However, in this study, the prompts were indeed beneficial in interpreting the participants' verbal reports because the study sought to analyze these

readers' sophisticated reasoning processes, which, to some degree, involved their self-reflection on what they remembered about their mental processes (Afflerbach, 2000; Chi, 1997; Smagorinsky, 1998). The additional prompts were particularly useful to collect verbal reports about the myriad navigational behaviors that the readers used within the Internet hypertext context.

Synchronized with their verbal reports, the participants' computer screen moves during reading were also recorded in the computer using the screen-capture software *Camtasia.* Screen-recordings yielded information on how actively (or passively) the participants were engaged in their Internet text environments (Leander, 2009; Leu et al., 2007). These video data of the reader–computer interactions were planned to complement the verbal reports because the data indicated what search terms were applied and modified, what links were examined and selected, what web sources were accessed and read in what order, what part of texts were focused on first and next, and so forth. Thus, screen recordings afforded observations of how the participants' verbalized strategies were associated with their navigational behaviors. To aid collection of enriched data, the participants were instructed to move a mouse pointer along segments of the accessed webpage to indicate what information they were reading, attending to, focusing on, and verbalizing about.

Additional information about the participants' Internet reading performance was gathered to enhance the study's interpretation of their reading strategy use. First, topic-related prior knowledge self-reports were collected. The participants typed in as much as they could of what they knew about their chosen topic in a one-page Word document, and the reports were saved in the computer. Second, a series of pre- and postreading interviews were conducted, in which the researcher asked the participants questions about their goal setting, topic interests, plans for reading, and experiences with the current Internet reading task. Third, the participant-selected websites were saved in the computer, and the sites' characteristics were analyzed to assess whether the participants selected relevant and useful sources from the Internet (especially for Session I: Open Website Searching). Finally, the participant-generated critical questions with their written justifications for the questions were collected. The questions were used to understand the participants' engagement in the process of constructing meaning during the critical Internet reading task (including Session II: Focused Website Learning).

Data Analysis

Prior to the main analysis of the strategy data, a preliminary step to gain a first glimpse of the participants' task performance was to interpret the contextual data. The participants' prior knowledge reports were analyzed, and the contents were categorized and coded into ideas (or concepts) as units of analysis (Patton, 1990). Although the number of idea units varied among these seven participants ($M = 10.43$, $SD = 3.78$), each participant's report included conflicting arguments, major issues, and relevant examples concerning their chosen topic. The participants' prior knowledge was then compared with the critical questions they generated upon completion of the task. The contents of each participant's written critical question and justification statement were segmented and coded into idea units, built on the coding categories identified in the analysis of the prior knowledge reports. The analysis showed that the participants' critical questions and justifications for the questions included a number of ideas that were not identified in their prior knowledge reports ($M = 6.29$, $SD = 3.45$) as well as the ideas that were already reported prior

to the task ($M = 3.57$, $SD = 1.90$). Although the analysis was limited by the challenges in tracking changes accurately in the participants' knowledge before, during, and after their reading, its result indicated that, overall, the participants were engaged in constructing critical questions by incorporating what they had gained from Internet reading with their own prior knowledge. In addition, their selection of websites (a total of 21 sites) demonstrated what each participant deemed useful as sources. The majority were official sites of government and nongovernment organizations (13 sites), news media (three sites), and universities (two sites), and the participants tended to judge these sites (e.g., .gov, .org, or .edu) as more reliable sources than commercial sites.

The data with regards to the task performance are summarized in Table 1, which shows individual participants' prior knowledge, the goals they set prior to the task, the websites they selected in the end of their open website searching (Session I), and the critical questions they typed up after their focused website learning (Session II). Taken together, the analysis of the data sets suggested that, overall, the participants managed their Internet reading toward selecting and learning with useful web sources and constructing critical questions related to their chosen topic.

Informed by both the original and the updated framework of constructively responsive reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995), the analysis of the participants' verbal reports in conjunction with their screen moves adopted a quantitative-based qualitative approach in which the qualitative data were examined and coded to see the underlying patterns of the data and develop supportive descriptions of the patterns (Chi, 1997). The recorded verbal reports and screen moves were first transcribed with the following transcription conventions: navigational behaviors are enclosed in parentheses, texts read aloud are enclosed by single quotation marks, typed-in language is surrounded by double quotation marks, and any word and image hyperlinks are underlined while verbal reports are unmarked. The decision was made to include the entire corpus of transcribed protocols in the data analysis because the focus of the study, with its small number of participants, was on the construction of enriched descriptions of the ways in which a variety of different Internet reading strategies are used.

The transcribed protocols were analyzed using grounded theory analysis techniques (Corbin & Strauss, 2008) for open coding to identify an array of strategic actions and then axial coding to group those actions into the four core strategy types for constructively responsive reading. Each session's transcript (two sessions each for seven participants, for a total of 14 transcripts) was time stamped and then further segmented into cells of strategic actions. These cells divide the series of moment-by-moment strategic actions into the smallest possible units, based on the corresponding transcribed verbal protocols and reader–computer interactive behaviors, which served as the units of analysis. The individual cells were labeled and coded by comparison with over 400 strategic actions for single text reading identified by Pressley and Afflerbach (1995) and nearly 80 strategic actions for reading multiple texts and Internet hypertext identified by Afflerbach and Cho (2009).

For example, the transcripts were first segmented into the units of identifiable strategic action (i.e., the cells of strategic action in this study) inferred from the verbal utterances with navigational behaviors (e.g., I'm going to use just alternative energy broadly, instead of this question [deletes the previous term "why is renewable energy important?;" types "alternative energy" into the Google search box]). The identification of the cells corresponds to the coarse grain size of the segments that Chi (1997) suggested for coding verbal protocols, which captures the meaning of the strategic action situated within the larger processing chains. Next, a particular strategy name was assigned to best describe the strategic action in each cell (e.g., modifying search

TABLE 1
Complementary Information on Participants' Internet Reading Performance

Pseudonym	Goal Setting	Idea Units of Prior Knowledge	Main Topics of Selected Websites	Written Critical Questions
Andy	Explore directions for critical questioning about the *death penalty*	Controversial subject One's own morals Right to punish someone Determined in a court of law Methods of execution Not practiced in some states Practice is questioned Pros and cons to it	Pros and cons of the death penalty (.org) Methods of execution (.org) Death penalty information (.org)	If it could be proven that the death penalty was more expensive than life in prison, would the Judicial System of America still continue to practice it? If the deterrence in crime proves to be unaffected by the death penalty, will states still continue to practice it?
Cindy	Explore importance of *alternative energy* and related policies	AP Environmental Science Types of alternative energy Becoming popular Mountaintop Removal-MTR Destructive to the Earth Releasing harmful chemicals Regulating coal companies Reducing coal use Lobby against the MTR Sustainable Using solar panels at home	Mountain-top-removal coal mining (.org) Sustainable energy (.org) Energy products (.com)	Why is it important to invest in alternative energy for future generations? What are the economical, environmental, and social impacts of alternative energy in the United States?
Hannah	Learn about legal issues (court cases) and moral issues related to *physician-assisted suicide*	Medical expert assists Terminal disease Patient's will Painless death Controversies Doctor's right Doctor pledge Court cases Ethical and moral	Euthanasia terms (.com) Public health in Oregon (.gov) Euthanasia research (.edu)	Is it ethically right for a physician to perform assisted suicide? What could happen to the doctor if it is illegal and the doctor performs it? How do family members feel about assisted suicide?
Katie	Learn about new laws and regulations related to *obesity*	U.S. the most obese country Fast food Convenience Lack of exercise Lack of consciousness How to prevent	Obesity (.gov) Obesity and overweight (.gov) Obesity regulation (.gov)	How could parents take action into their own hands to encourage a healthier lifestyle for the children at a younger age? How can parents and children make a difference in their community environments to help encourage healthier living across the United States?

Madison	Learn about pros and cons of lowering the *drinking* age and determine which side is more legitimate	Drinking age 21 in U.S. Low as 18 in the past Arguments for 18 Arguments for 21 Military service age Brain development Consequences of alcohol use Alcohol-related deaths and injuries	Debate on the drinking age (.com) Drinking age (.com) Lowering the drinking age (.org)	What effect would lowering the drinking age by the method of education and licensing have on current underage drinkers? How would this new law, were it passed, be enforced, and would it be effectively enforced? Would a lower drinking age cause a change in the psychological and social behavior of teenagers and would they be safer drinking in a more responsible and controlled setting?
Rachel	Find a way to help other countries improve their agricultural practices to create *eco-friendly industries*	Agriculture Not sustainable Not economically efficient Local farms/economies Big businesses Pesticides Unnatural products Bad for the planet and people Monoculture farms currently Not a full healthy variety Ways to avoid this problem Sustainable methods More efficient eventually Bigger picture of energy Energy efficient cycle Chemical runoff	Sustainable agriculture (.gov) Movie on sustainable farming (.com) Agricultural experiment (.edu)	What is the most sustainable and environmentally friendly method of feeding our country? Does American agro business cause dependency of other countries on the United States? What are some ways to ensure agricultural independence of all people?
Sam	Know about economic issues with *alternative energy*	Vital part of our future Eco-friendly world Electricity cheaper Windmill power Large sources of power in southwest Researching alternative energy Maintenance cost of windmills Advanced technology AP environmental science Solar panels Greenhouse in the school Internship related to greenhouse Costs of alternative energy No legislation	Solar products (.org) Wind power generation (.org) Environment (.com)	How is the economy right now affecting the sales of alternative energy resources? What kind of legislation can they make to change that? How can this negatively affect people? How can it positively affect people? What do you think is the most effective form of alternative energy? How can you produce an alternative energy plan where you live?

terms to explore information sources that are not identified in the previous search). This labeled strategic action was then coded as one of the four core strategy types (e.g., Text Location [TL]). Finally, the encoded cell was grouped into an emerging category that subsumed similar kinds of actions (e.g., accessing and managing information spaces on the Internet) that worked toward the corresponding core strategy type. The identified individual cells of strategic action often entailed multiple verbal utterances with a series of sequential reader–computer interactions. In most cases, the utterances and behaviors in a cell converged into one independently identifiable strategic action, and a corresponding single code was assigned to the cell. Sometimes, a cell was dual-coded if two strategic actions underlying the utterances and behaviors were intertwined in the cell. Table 2 shows an example of a series of identified cells that are labeled, categorized, and coded in the four-strategy scheme of constructively responsive reading.

While the procedures are described sequentially here, it is worth noting that the entire course of verbal protocol analysis required recursive cycles of protocol segmentation, cell identification, strategy labeling, and strategy coding and categorization. The analysis also involved forward-and-backward comparison processes between the protocol data and the framework of constructively responsive reading as the reference point. Consequently, the qualitative analysis resulted in 14 sets of coded protocols (two Internet reading sessions by seven participants), and it yielded a total of 1,784 encoded strategic actions. The coded protocols were used in two ways. First, the counted strategic actions (i.e., observations) were submitted to a chi-square test to detect any associations between the two Internet reading sessions (Open Website Searching and Focused Website Learning) and four strategy types (text location, meaning-making, self-monitoring, and information evaluation) as the two variables. Instead of the Pearson chi-square statistic, the Rao-Scott chi-square statistic was obtained for a cluster sampling design (Rao & Scott, 1981), because the participants (i.e., clusters) were independent of one another, and the observations were correlated within each cluster. Second, the results of the qualitative analysis using the coded protocols were summarized in both tabular and graphic forms. The labels and categories were used to create a comprehensive catalog of the strategies identified in the current examination. The catalog describes the unique features of each type of constructively responsive strategy for Internet reading. Also, the cells, transferred into spreadsheets, were color-coded to make it possible to visualize the processing chains within each session by each participant. This graphical representation illustrates the sequential patterns for the four strategy types used by the individual participants, complementing the results from the statistical analysis to build a picture of the overall pattern shared by the participants.

The researcher and a colleague with expertise in reading comprehension research and verbal reporting methodology collaborated in the processes of coding the data and checking intercoder reliability (Afflerbach, 2000). Prior to the reliability check, the coders discussed various factors and issues related to verbal reporting and protocol analysis specific to the present study (e.g., task demands and procedures, affordances and constraints of the task, transcription, data segmentation, coding). Suggestions drawn from a series of discussions were incorporated into the coding scheme (Table 3), which guided follow-up actions, such as reviewing the data segmentation, identifying and coding the cells, and comparing them to the reference framework of constructively responsive reading.

The coders practiced together on a small subset of the transcribed protocols (one participant's first session protocols). The percentage of agreement obtained in this training was approximately 75%, so the coders talked through disagreements about coding until they felt comfortable in

TABLE 2
A Snapshot of Encoded Protocols of Verbal Reports and Screen Moves, With Examples of Labeling
and Coding of Cells of Strategic Action

Elapsed Time	Cell of Strategic Action: Verbal Protocols and Computer Screen Behaviors	Labeling and Coding of Strategic Action
24:13	Um those things and … this is kind of … this site gives you things like a brief overview (points on the title of the table "In a Nutshell") and they give you the background of the death penalty … which is good!	Conducting anticipatory evaluation of the webpage's usefulness according to the criteria for relevance (i.e., a current focus is to gather background information) and organization (i.e., content overview)—*Information Evaluation* (IE)
24:28	(Scrolls down; stops at the subheading "Overview/Background;" the pointer moves on the written text with the subheading "Yes") right now I'm reading about the costs because thinking about making a question out of the cost um I'm just really reading more opinions	Paying more attention to the information related to tentative, refined focus—*Meaning-Making* (MM)
25:25	(The pointer moves on the written text with the subheading "Yes") … I'm just gonna jot a few things down … I'm gonna take that um questioning things and saying them out loud at the same time while searching and reading … I can easily forget them	Note-taking to remember important information—*Self-Monitoring* (SM)
26:11	So I'm going to write down … (takes a note, "Is the death penalty cost really more expensive that life in prison?") … I said … is the death penalty cost really more expensive than life in prison? … let me see (takes a note, "Does the death penalty act as a more effective deterrence to crime than life in prison?") … and I just wrote down … does the death penalty act as more effective deterrence to crime than life in prison?	Developing a question and elaborating it by writing down—*Meaning-Making* (MM)
27:53	(Scrolls down) I'm just reading um … (scrolls down) … it's [the death penalty is] such a broad subject!	Perceiving the knowledge demands related to the topic and problem space—*Self-Monitoring* (SM)
28:22	(Clicks the backward button; [Google page with the term "Pros and cons of the death penalty"]) okay now I'm going to type in forms of death penalty! (deletes "Pros and cons of the death penalty;" types "Forms of death penalty" into the search box; [Google page with term "Forms of death penalty"]) just to investigate it more really (moves the pointer to ENTRY: The Death Penalty; clicks on ENTRY: Methods of Execution) uh! methods of execution let's see	Changing search terms to gather information that is needed to investigate topic further—*Text Location* (TL)

TABLE 3
The Coding Scheme Emerging From the Course of Data Analysis Guided by the Framework of
Constructively Responsive Reading

Strategy Type (Code)	Description and Example	Determination
Text Location (TL)	Strategic actions to search for, access, and select various web sources and links. The actions are directed toward the goal for reading to explore, identify, and locate goal-relevant and useful texts in multiple information spaces on the Internet.	To code a strategy into TL requires certain types of interactive screen actions (e.g., clicking and typing) and strategic moves (e.g., going back to a previous page, going forward to next page, moving to another page, clicking links or taps, moving to a different part of text by clicking a link, closing or bookmarking a page, retrieving a result page).
Meaning-Making (MM)	Strategic actions to construct the meaning from different types of information sources. Examples include, but not limited to, prior knowledge use, paraphrasing, tackling word meanings, making inferences, interpretation, analysis and synthesis, use of text structure or website structure, identifying main ideas, comparing and contrasting different information, questioning, and so on.	To code a strategy into MM does not necessarily involve explicitly generated screen behaviors but requires significant involvement of text content and information, reader knowledge and understanding, or both in verbal protocols.
Self-Monitoring (SM)	Self-initiated perception and awareness of different aspects of reading, including text characteristics, task-related factors, goals for reading, reading situations, and the readers themselves. Strategic actions include planning information searches, monitoring and regulating thinking processes, detecting reading problems, and applying fix-up processes that are entailed in the entire act of reading.	To code a strategy SM does not necessarily require interactive screen actions but verbal protocols must reflect a level of readers' self-assessment.
Information Evaluation (IE)	Strategic actions that readers use in valuing, appraising, critiquing, assessing any semiotic entities on the Internet. These include various forms of information (e.g., written texts, pictures and graphics, audio and video clips, websites), hyperlinks (e.g., search entries, menus, buttons, image links, headings and subheadings, text-embedded word links, linked references), and tools (e.g., general Internet search engines, modified search engines, built-in site search tools).	To code a strategy IE requires any sort of evaluative judgment in verbal protocols but does not necessarily require interactive screen actions.

coding strategy data in the same way. Disagreements between the coders were mostly about which code(s) should be assigned to a particular cell, but questions about whether the segmented cells themselves were appropriately identified also provoked disagreements. To resolve these disagreements, the coders collaborated in reviewing the data transcripts and revisited the data

segmentation processes to best identify cells of strategic action. This process involved combining two cells into one cell or separating one cell into two or more cells, based on the inferred underlying strategic behaviors of the cell(s) using the constructed coding scheme. One result of this recursive process was to enhance the coders' sensitivity to the data. The coders repeated this process for four sets of protocols from two participants until they reached 100% agreement. For the final reliability check, the coders chose two session protocols from a participant and independently coded them. The coded protocols were compared and obtained 98% agreement between the coders.

RESULTS

Types of Internet Reading Strategies

Regarding the first research question, the qualitative analysis of the participants' verbal reports and screen moves indicates the diversity of reading strategies used in Internet reading. The identified strategies were grouped into the four types of constructively responsive strategies: text location, meaning-making, self-monitoring, and information evaluation. Table 4 presents the multiple categories of strategic actions that were identified in the data and displays them under the four core strategy types. The participants employed the multiple versions of strategies that operated in similar ways to conduct the strategic action of the corresponding category and core strategy type, which are also described in Table 4. The following subsections offer descriptions of the roles each strategy type, with its multiple versions of strategic actions, played in Internet reading, with representative excerpts selected from the seven participants' protocols.

Text Location.   The data demonstrate that text location entails strategies for: (a) exploring goal-relevant information spaces and (b) navigating toward useful texts through hyperlink selections. These strategies are critical when readers construct their own text environment while deciding on a series of possible texts, links, and decisions. The most notable finding is that Internet reading starts with the exploration and management of a goal-relevant information space. This information space is initially unknown to readers, but the strategic readers in this study anticipated and sought to determine this space as they located relevant texts. Their initial focus was on identifying potentially helpful links, rather than directly retrieving a particular webpage. Primary and complementary search engines were frequently used, and search terms were generated and modified to gather relevant and useful information. The participants used different ways of changing search terms, according to their topic knowledge and emerging information needs: Search terms reflected publishing types (e.g., blogs, websites, news articles, research reports), information types and qualities (e.g., factual, scientific, credible), or particular authorships (e.g., government, interest group, just "people"), as well as the topic being examined.

For example, when Katie shifted her reading focus from gathering general information on obesity to studying obesity-related policies and regulations, this changing focus was mirrored in her subsequent search term use. The following excerpt comes from Katie's first session and presents an encoded cell of strategic action in which her verbal report is displayed along with her

TABLE 4
An Overview of Reading Strategies Identified From Seven Participants' Internet Reading

Strategy Type	Category Identified	Versions of Reading Strategy
Text location	Exploring and managing goal-relevant information spaces	Access a goal-relevant information space by generating key words to type into the search engine in the beginning stage of reading.
		Manage the range of possible information by modifying search terms to better clarify suitability of links and potential reading paths.
		Access goal-relevant websites to gain an overview and to learn possible target information, activating prior knowledge.
		Access complementary sources (e.g., *Wikipedia, twitter*) to get background information or to survey references. Explore website content with a built-in search function on a promising website.
	Navigating toward useful texts through link selections	Scrutinize website entries conjoined in the Internet search-results page.
		Test relevant menus within a website and sequence the order of reading.
		Examine hyperlinks that may lead to useful information outside of the site's boundaries (e.g., citations, references).
		Reserve a website as a potential source for the current information search and later stage of reading, or reject it.
Meaning-making	Making sense of hyperlinks	Survey and scan a list of website entries retrieved by a web-search engine or a group of hyperlinks listed on a webpage, prior to determining whether to use those entries and hyperlinks.
		Relate meanings constructed from the reading of multiple hyperlinks and connect the meanings to the evolving focus of reading.
	Comprehending webpage content	Survey the content of a webpage to make sense of its relevance and usefulness (both the design and content features).
		Generate an initial hypothesis about what the text is about (informed by the overview), which can be refined or disconfirmed in the subsequent reading.
		Identify and reserve important information that contributes to understanding.
		Generate inferences about missing information and plausibility and appropriateness of text content.
		Analyze and synthesize different parts of a webpage (e.g., inconsistency, claim-evidence relationships, continuous/non-continuous texts).
		Interpret text content by using prior knowledge and evolving meanings (e.g., connotations, commercial intents, hidden assumptions).
	Building linkages across texts	Relate information from more than one text to develop understanding in an ongoing way (e.g., categorization, thematic patterns, alternative explanations).
		Use the meaning constructed in the course of navigating and reading multiple texts to build an integrative mental model (e.g., forming, developing, modifying, and confirming critical questions).

TABLE 4
An Overview of Reading Strategies Identified From Seven Participants' Internet Reading (Continued)

Strategy Type	Category Identified	Versions of Reading Strategy
Self-monitoring	Managing the determination of reading paths	Determine that Internet hypertext reading needs attention while locating relevant information, and sequence the reading order.
		Manage the processes of information searching and determination of reading order (and the resultant path construction).
		Detect processing problems while exploring relevant information and identifying the sources of the problems (e.g., retrospective reasoning).
	Regulating the construction of meaning	Plan and adjust cognitive efforts in reading by balancing short-term and long-term foci of reading.
		Monitor the stimulation of cognitive processing and active processes to accommodate characteristics of text.
		Shift the focus of reading and allocate reading attention along with evolving understanding, information needs, and priorities.
		Note the need for controlling reading processes according to task-related factors (e.g., task demands, time constraint, information overload).
	Perceiving the self	Perceive strengths and weaknesses in one's own cognitive capacity (e.g., information-seeking skills, topic-related knowledge).
		Perceive one's affective responses to the links and texts.
		Perceive one's epistemological stance toward knowledge and truth.
		Perceive potential influences of one's own perspectives on reading.
Information evaluation	Examining the usefulness of hyperlinks	Anticipate an overall "goodness-of-fit" of a series of hyperlinks in relation to initial and evolving goals for reading or planned or identified solution paths to achieve the goals.
		Examine the usefulness of hyperlinks by using different knowledge sources (e.g., prior knowledge, author information, source information).
	Judging the information value of webpages	Judge the relevance, importance, and validity of webpage content by bringing analytical mindsets to reading.
		Judge the credibility, reliability, and trustworthiness of webpage content from a critical stance.
	Assessing the quality of websites	Assess the usefulness of Internet search engines, open sources, or portal sites as the means to locate, access, and overview targeted information.
		Examine the extent to which the website content relates to targeted information, contributes to the evolving questions, and helps complete the task.
		Assess the credibility, reliability, and trustworthiness of website (e.g., author reputation, source reliability, sponsorship, up-to-datedness, publishing types).
		Determine potential uses of the website in completing the task (e.g., testing available hyperlinks and references that may lead to goal-relevant information).
		Assess the comprehensibility of website (e.g., structures, layouts, languages).

computer screen moves, which are described in the parentheses (e.g., Clicks on the <u>hyperlink</u>). Italics have been added throughout the examples to emphasize points of particular interest.

> Katie: (Moves a mouse pointer onto the link Obesity (Weight Loss)-Complete medical information on this all) "obesity weight loss" okay *I think the next thing I'm going to research* will probably be (Scrolls up to the search box) . . . *something about what the government may be doing* . . . so I'm gonna type that into the search bar government um maybe regulations on obesity in America (*Erases "obesity" and types "government regulations on obesity in America" into the search box*) . . . kind of specific . . . *probably gonna bring up a lot of information but we'll see (Clicks the search button).*

Katie determined that many of the website entries on this search results page were linked to general information about obesity or originated from commercial sites. She perceived an emerging need for information from websites that she believed to be more legitimate and authoritative; she felt that these would provide the opportunity to learn about public actions related to the problem of obesity. Katie generated a search term by reflecting on the evolving focus of her reading in order to access more specific information.

The exploration of goal-relevant information space is coupled with hyperlink selection that involves a cyclical process of accessing, examining, and deciding upon Internet links on the path to locating useful texts. The process of making inferences about potential texts connected through the entries demands an increased focus from readers on the reading goal, information needs, and evolving understanding through an initial information search. Strategic link selections contribute to the optimized selection of useful texts, as illustrated in the next excerpt, which shows a series of Rachel's sequential verbal reports and navigation behaviors.

> Rachel: I wonder if I can search like imports and exports of goods (*Types "Exports of agricultural products" into the built-in search engine; Clicks the search button*) I'm searching exports of agriculture products on the USDA [United States Department of Agriculture] website because if it has anything about the United States' exports to other countries . . . I can then put that in my explaining why I'm asking this question.

> Rachel: (Moves a mouse pointer onto the Table of Contents) okay . . . *not specific laws . . . specific countries . . . I'm gonna go to page six (Clicks on the link Page 6).*

> Rachel: (Page 6 retrieved) so I'm gonna go to (Scrolls down slowly; Points at the link Attached Reports; Points at the link International Resources; Scrolls up to the top of the page) . . . this website "foreign agricultural service" *(Clicks on the link Foreign Agricultural Service) because it might show me . . . might give me information about how much . . . exporting the United States does.*

On a federal research institution library site, Rachel located new information that served her evolving reading focus—economic aspects of agriculture and other countries' food independence. This reading focus fueled her strategic moves to identify potential texts through multiple link selections. Rachel navigated through different pages to survey a number of hyperlinks connected to reference websites and finally determined one link that she deemed most relevant to her reading focus. This choice entailed that Rachel had standards for coherence among selected links, and it required her to make educated guesses in order to decide to reject or accept the links at hand.

As shown in the above examples, Internet reading requires readers to ask themselves what links can be useful and how those links can be accessed to identify useful texts. It calls for the action of anticipating the goodness-of-fit of the information space, in which many links and texts must be examined, with readers' specific and evolving goals. Strategies for identifying and selecting potentially useful texts become essential for determining the order of reading (e.g., which should I read first?) and developing multiple paths to useful information in a flexible way (e.g., where should I go?). These strategies are driven by the readers' immediate (more automatic) or attentive (more effortful) responses to the diverse links and texts with which the Internet presents them.

Meaning-Making.   The data document copious strategies for determining important information and learning from across multiple links and texts. Three meaning-making strategies regularly occur in Internet reading: (a) making sense of hyperlinks, (b) comprehending webpage content, and (c) building linkages across multiple texts. In particular, Internet reading is marked by an effort to integrate information segments into a metarepresentation of meaning. The participants in this study engaged in building meanings across multiple web sources, and this process helped them identify supportive or conflicting ideas and perspectives among the texts.

For example, in reading about alternative energy, Cindy identified a topical "pattern" from across the texts she had accessed, noticing the important information that repeatedly appeared in different places—about clean energy, jobs, and saving the planet. The identification of these cross-textual themes helped her critical questioning, as described in the following excerpt.

> Cindy: (The pointer moves around the article "The Potential for Renewable Energy in Iowa") here they are talking again about generating high-paying jobs . . . clean . . . *so I'm seeing a pattern here on all these sites* (Points to the browser tabs opened) about clean energy . . . jobs . . . and saving the planet . . . *I'll definitely include those three points in my critical question.*

In another example, Andy incorporated what she had read about the costs of the death penalty in multiple Internet texts (e.g., research reports, articles, numerical information, charts, tables) into her critical questioning task:

> Andy: (The pointer moves along to the first paragraph under the subheading "Tennessee") *okay this is what my critical question is about* . . . *this report says* "A new report released by the Tennessee Comptroller of the Treasury recommended changes to the state's costly death penalty and called into question its effectiveness in preventing crime" . . . and *my critical question was* . . . if it could be proven that the death penalty was more expensive than life in prison then I asked would we continue to practice the death penalty because we feel that it is a good deterrence of crime . . . and *here Tennessee is questioning* whether or not the death penalty is really effective in preventing crime.

When reading a research report on the death penalty in Tennessee, Andy connected this new information to her previous reading, from which she had learned that other states' research studies have documented the low cost-effectiveness of the death penalty in comparison with life imprisonment. Andy then integrated this understanding into her evolving question (e.g., Can the rationale for the death penalty depend on the result of cost–benefit analysis?). This understanding, the result of intertextual reading on the Internet, helped the reader confidently

justify the significance of her critical question. This strategy is central to learning from multiple texts.

As the data from this study make evident, Internet reading requires readers to take responsibility for assembling and disassembling numerous links and texts through which meanings emerge. Dynamic moves between the current text and the previous text(s)—often through navigation behaviors (e.g., click backs)—contribute to the location and construction of meaningful linkages in the mind. Successful Internet reading is marked by these intertextual strategies, as readers build linkages from across the sources they locate in different places in the unknown information space.

Self-Monitoring.   The participants' verbal reports demonstrate that they conducted self-monitoring to assess, amend, and control their own reading processes: (a) managing the construction of meaning, (b) regulating the determination of reading paths, and (c) perceiving the self. These participants' self-monitoring behavior illustrates that successful Internet reading demands a reflective reader. Monitoring produces the information that readers use to decide on subsequent actions for exploring and managing a goal-relevant information space and navigating the information space to move toward useful texts. Continual monitoring keeps readers sensitive to unexpected disorientation problems and responsive to the changing situations of information navigation.

For example, after reading several links and texts related to the environmental problems caused by particular farming systems, Rachel noted that the information she had accessed was insufficient to develop a critical question related to sustainable farming systems, and therefore she decided to seek information about "solutions" to the problems:

> Rachel: *I think I'm veering in the wrong direction a little bit so I'm gonna search solutions instead of problems because I feel like problems are pretty obvious like environmental problems* ... people are talking about the new green movement and people know about it more ... so I'm gonna focus on the solutions as opposed to what's wrong with our current way of doing things.

While Rachel situated her action within the navigation task, the underlying mental function of the action was consistent with self-monitoring in the service of the reading goal. Rachel consciously reflected on the original focus of reading while she implemented her strategic actions. This self-reflection helped her determine if their information gathering was successful in moving them toward task completion. In this study, this strategy was used in many of the steps that the participants took—modification of search terms, selection of hyperlinks, browsing of site menus—and it helped them progress toward locating useful texts for their Internet reading task.

Self-monitoring, especially comprehension monitoring, also helps Internet readers regulate the construction of meaning from across links and texts. Once a comprehension problem was detected, the participants attempted to identify the source of the problem and apply strategies to address it. Further, these readers frequently checked on their current understanding and switched their reading focus if needed, as shown in the following excerpt.

> Cindy: (The pointer stays on the written text with the three subheadings "Economically," "Environmentally," and "Socially") *right now in my head I've already got a statement or a thesis in mind*

that's ... um ... to prove that alternative energy is important so ... *right now when I'm reading information I'm thinking what's gonna convince other people* that alternative energy is also important.

As Cindy read, she monitored her progress toward her goal. This monitoring of her current status—understanding that alternative energy is important—guided her to a subsequent information search: Why is alternative energy important? This metacognitive thinking contributed to Cindy's perception of when she had made progress in determining meaning while she maintained an expectation that gaps in her understanding would be filled as her reading proceeded.

As demonstrated in the above examples, self-monitoring assists Internet readers by directing their reading for both searching for information and learning from texts. Perceptions of disparity and inconsistency between the information sought and that at hand may motivate readers to conduct a complementary Internet search or take an alternative approach to exploring a goal-relevant information space and learning with useful texts. Self-monitoring strategies work under the reader's executive function that controls the complex processes entailed in both text location and meaning-making.

Information Evaluation.   The verbal protocol data demonstrate that the participants evaluated and critiqued different aspects of Internet information as they examined and learned from texts. They (a) examined the usefulness of hyperlinks, (b) judged the information value of web sources, and (c) assessed the quality of web sources. The evaluative action that most frequently featured in the participants' Internet reading was related to link examination prior to selecting and reading particular texts. The competent high school readers in this study evaluated the goodness-of-fit of multiple website entries or hyperlinks by characterizing common features among them in relation to their initial and evolving goals for reading. This action of link examination was a prerequisite for making an informed decision about link selection. It involved activation of prior knowledge and generation of forward inferences about the significance of the connected information. For example, Rachel, in the following excerpt, used anticipatory evaluation of the link "usda.gov" as a promising source by integrating link information and prior knowledge.

Rachel: (Scrolls down to the "References") references ... (Points at the link usda.gov) USDA ... *government website* ... *that would be reliable* because it's the United States Department of Agriculture ... that's a great place to look for ... I mean that just seems pretty concrete since *it seems very relevant because it's about agriculture and it might give an idea what we're doing with other countries.*

Sometimes, link examination emerges from a reader's willingness to be tentative. In the following excerpt, Madison, reading about legal drinking ages, noted multiple layers of information—a link within an article within a webpage within a website—and determined that only the article connected through the link would be useful to her, rather than the website as a whole.

Madison: Here's a CBS news source (*Points at the web address* of the entry The Debate On Lowering The Drinking Age-60 Minutes-CBS News) *that's probably pretty reliable* ... *but it just looks like an article* (*Points at the title* of the same entry) *on the big news channel website so it might not give*

me a whole lot of information like a website that was totally devoted to the drinking age issues ...
I would like to read the article to know about the debate on lowering drinking age but not the whole
thing on this site.

This anticipatory evaluation is very similar to a prediction strategy. With print texts, strategic
readers decide early in their reading, based on salient information (e.g., author, title, abstract, table
of contents), whether the text will contain important information and deserve to be processed
carefully, if at all. Link examination plays a predictive role in Internet reading. As readers seek
to find more useful texts, they anticipate how useful the information will be once the link is
selected. Goal relevance is a primary criterion to make an informed choice, along with the criteria
of significance, credibility, and reliability.

Evaluative strategies are also used in judging the value of a text, and involve both internal
and external features of the text, including argument validity, credibility and trustworthiness, and
overall usefulness. For example, Andy perceived the need to determine the credibility of both the
author and the content of a text in the following two think-aloud excerpts.

> Andy: (Pointer moves around the author information of the article "Death penalty and sentencing
> information") this article is by this person who is the death penalty resource director so we already
> know that it's going to be biased towards the death penalty.

> Andy: One thing *whenever statements are made like this* "states that have death penalty laws do not
> have lower crime rates or murder rates than states without such laws" ... *that makes me want to
> search the credibility of that statement.*

Andy was tentative about using the article she had accessed because, based on her inference
about the name of the institution the author is affiliated with, she believed that the article might
be biased toward a particular stance. Andy also noted that the text content would need to be
verified and supported by legitimate evidence. That is, such thinking revealed her critical strategy
and mindset. Andy was acutely aware that a person wrote the document, meaning the document
included that person's particular biases, motives, and background knowledge. Consequently, her
stance was that the document must be evaluated by determining meanings that were not stated
explicitly. Like the astute reader of traditional print, Andy's stance toward the Internet text was
as a critical reader examining potential bias and trustworthiness, not as a passive recipient of
information.

Evaluative strategies contribute to selection, determination, and critical appraisal of texts
and links from the Internet. Evaluative reading interacts with the other core strategies, such
as meaning-making, self-monitoring, and text location. Effective use of evaluative strategies is
based on understandings developed through the reading of texts and through reflection on evolving
meaning and focus and thus helps readers make informed decisions on the path to choosing and
using texts and the construction of meaning from the texts.

Summary.   Overall, the results of the qualitative data analysis demonstrate that Internet
reading involves multiple strategy types, which are novel to varying degrees, and goal-directed
interactions of the strategy types. Effectively locating text, a strategy that was intensively used in
the participants' Internet reading, contributed to the readers' ability to access relevant information

spaces and select hyperlinks in order to progress toward collecting a set of useful texts. However, this critical and unique aspect of Internet reading was clearly supported by the other strategy types: meaning-making, self-monitoring, and information evaluation. The following section provides an account of the patterns that reflect the interplay among multiple strategy types, using both statistical and descriptive analyses of the verbal protocol data.

Interplay and Sequence of Internet Reading Strategies

Concerning the second research question, the quantification of the descriptive data allowed the observation of strategic patterns that the participants engaged in during the critical Internet reading task. Overall, these patterns were shared among the participants in this study, but the participants also showed individually distinct patterns. This section provides the results from a quantitative analysis of the strategies used by the seven participants, as well as a visual analysis of the individual students' sequences of reading strategies.

Strategy–Session Association Shared Among the Participants.   Statistical analysis was performed to observe differences in the patterns of reading strategy use between the two Internet reading sessions. The Rao-Scott chi-square statistic was obtained by dividing the Pearson chi-squared statistic ($\chi^2 = 52.8639$) with the computed design correction estimate ($\lambda = 5.2825$), accounting for clustering effects. The result revealed a statistically significant association between strategy type (i.e., text location, meaning-making, self-monitoring, information evaluation) and Internet reading session (i.e., Open Website Searching, Focused Website Learning) when the analysis was performed with the coded strategic actions from the seven participants: χ^2_{RS} (3, $N = 1,784$) = 10.01, $p = .0185$ (<.05). That is, even when the variation among the individuals was considered, all of the participants in this study showed a similar pattern of adjusting their strategy use between the open-ended website searching context (Session I) and the closed context of learning with their chosen three websites (Session II). This result shows, in part, the situated use of reading strategies in response to the task environment. Further analysis of the standardized residuals showed the contributions of the four different strategy types in the two sessions. In Table 5, values greater than 2 and smaller than −2 for a given strategy category within each of the sessions indicate a major contribution to the statistically significant test result.

TABLE 5
Cross Tabulation of Strategy Type and Internet Reading Session

Session	Text Location			Self-Monitoring			Information Evaluation			Meaning-Making			Total	
	f	*%*	*R*	*f*	*%*	*R*	*f*	*%*	*R*	*f*	*%*	*R*	*f*	*% d*
Open website searching	340	28.8	2.5	266	22.5	−0.1	236	20.0	1.3	338	28.7	−3.1	1,180	100
Focused website learning	108	17.9	−3.5	138	22.8	0.1	91	15.1	−1.9	267	44.2	4.3	604	100
Total	448	25.1		404	22.7		327	18.3		605	33.9		1,784	100

Several observations can be made based on this analysis. First, the participants adjusted their use of text location and meaning-making strategies based on the session tasks and text availability. A larger proportion of text location strategies (e.g., search term generation and modification, web-search engine use, and selection of website entries on a search results page in an open information space) were used in the first session than in the second session. The participants were attending to identifying three websites in an unbounded Internet text environment during the first session, whereas they were focusing on constructing meaning from their three chosen websites during the second session and therefore their strategies for text location were used mostly to select hyperlinks, menus, or reference links embedded in the websites as the limited text boundary. In contrast, meaning-making strategies were used relatively more in the second session because the participants were focusing on the contents of their chosen websites while reading details, selecting important information, and integrating identified sources to enhance their understanding of the topic, as compared to the first session in which the meaning-making strategies were often used for making sense of hyperlinks, skimming webpages, and identifying goal-relevant websites. This result indicates that the participants extensively used strategies to explore and select a limited number of useful websites in an open-ended information space but then switched their reading attention from locating suitable texts to learning from those texts.

In relation to managing the processes of text location and meaning-making, the consistent occurrence of self-monitoring across the sessions demonstrates the importance of executive function during the entire course of Internet reading. Participants continually monitored their own reading processes across the sessions (e.g., monitoring both the course of building reading paths and the course of constructing meanings from texts, based on their perceptions of and reflections on the task, the goal, and the self). Based on the results of this consciously performed monitoring, the readers selected and organized the strategies pertaining to the problems detected. This metacognitive function was essential to self-regulation of the reading processes involved in this dual task of Internet reading (i.e., exploring useful text sets and simultaneously understanding their contents), regardless of the tasks and text availability.

Although the standardized residuals did not indicate that information evaluation made a significant contribution to the chi-square test result, evaluative strategies were more common in the first session than in the second session. This difference between the sessions suggests that the task of locating and selecting useful websites demanded that the readers use anticipatory evaluation extensively prior to engaging in comprehending the content of a particular webpage or website (e.g., examining the usefulness of the website entries retrieved on a Google search-results page; scrutinizing a series of hyperlinks to gain an overview of website content and judge its usefulness). Participants used evaluative reading strategies as moment-by-moment processes when they judged the multiple hyperlinks and sources they encountered and when they made informed decisions of what to choose and what to read in the open-ended information space of the Internet.

The distribution of the four strategy types across the two sessions is noteworthy in that nearly 75% of the strategic actions used by the participants were iterations and modifications of print-based reading strategies (i.e., meaning-making, self-monitoring, and information evaluation), while approximately 25% of the reported actions were related to text location, a class of reading strategies that becomes prominent in Internet contexts. Moreover, the proportion of the reported strategies that are similar to those for print reading increased when the primary goal of the

reading was to comprehend and construct meaning from Internet texts, reaching 82.1% of all the strategic actions used in Focused Website Learning (Session II), while those print-based reading strategies accounted for 71.2% of the strategic actions performed in Open Website Searching (Session I). These findings suggest that Internet reading contexts require readers to pay increased attention to strategies to explore, identify, and select potentially useful texts, but not at the expense of meaning-making, monitoring, and evaluative actions that maintain continued importance in Internet reading.

Sequences for Strategic Actions Individualized by the Participants.   An analysis of processing chains—sequences of reading strategies situated in the time order of reading—showed some idiosyncrasies of reading strategy use among individual readers. Two distinctive patterns were observed. In Figure 1, the color-coded processing chains juxtapose notably different patterns of strategy interplay, by Rachel and Andy, in their first 20 minutes of reading for both Open Website Searching and Focused Website Learning.

While both Rachel and Andy used the strategies of self-monitoring and information evaluation consistently in both sessions, each of these two readers coordinated her strategies for text location and meaning-making with a different emphasis and focus. Rachel's open website searching was more directed toward text location than meaning-making. From the onset, she invested time and effort in locating and examining a variety of website entries across multiple search engine results pages. Rachel changed her search terms, retrieved website entries, accessed websites familiar to her, and browsed different places within the sites by clicking links and menus. She sporadically used meaning-making strategies, although most were link-reading strategies, in order to make decisions to select or reject the links she read. In contrast, Andy's open website searching was marked by the active use of meaning-making strategies. She examined the usefulness of the entries on a search engine results page, but once she determined that a website would be useful, she used productive meaning-making strategies on the site. The variety of meaning-making strategies she employed contributed to her success in gaining an overview of the websites she found, navigating the problem space, and engaging in comprehension of the content. Andy did not only skim each website's content but also attempted to figure out how meaningful the website was for her critical questioning task.

These readers continued to take their own pathways toward the task completion in the focused website learning. Rachel slightly increased her attention to meaning-making strategies in the second session; most of these strategies were still focused on making sense of links and menus or pieces of information scattered in the websites she used. Her reading was continuously driven by the use of text location strategies, which served her reading focus of finding information to support certain perspectives that she had brought to the reading task. She extensively browsed available menus on the sites and sampled several hyperlinks to see if they connected with useful information that she was seeking. In contrast, Andy persistently used meaning-making strategies while her text location strategy use was still selective. Andy focused on finding significant aspects of the issue of the death penalty (e.g., cost-efficiency and crime deterrence) that could inform her critical questioning, through reading several written paragraphs that represented multiple claims with supporting evidence. She invested her time and effort in learning from these texts and engaging in a deep thinking process with minimal but active use of necessary meaning-making strategies.
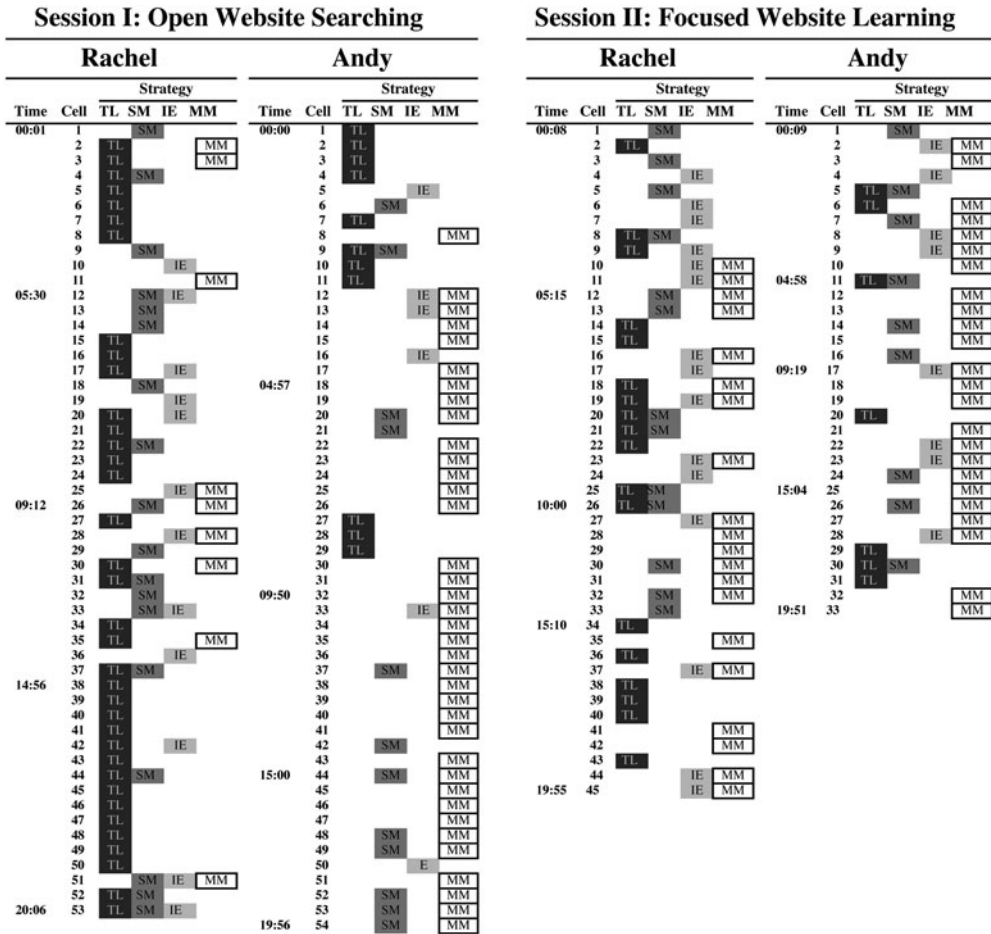
FIGURE 1 A visual representation of the processing chains created in Rachel's and Andy's 20-minute reading strategy use for open website searching and focused website learning. Twenty-minute timed course reading from the beginning of each session was divided into approximately 5-minute intervals. Magnitudes of all color-coded cells are identical to one another, so each cell represents one time of occurrence for the corresponding strategy but not the duration of each strategy. TL = text location. SM = self-monitoring. IE = information evaluation. MM = meaning-making.

Summary.   The data demonstrate that the participants were able to adjust their reading strategy use as they responded to their goals (e.g., finding useful web sources, learning from multiple sources), available text boundaries (e.g., more open-ended or constrained Internet setting), and changing situations of reading (e.g., emerging information need and priority). The situated nature of reading helps explain the distinctive patterns of Internet reading strategy use shown by the participants in this study. That is, the determination of which strategies to use in Internet reading is situated within a particular moment of reading in which complex interactions take place between the reader and the text environment. The participants identified and selected useful texts, as required by the Internet, while making progress toward their goals by comprehending the content

of the web sources. In the course of their reading, self-monitoring and information evaluation helped the readers coordinate the strategies they used to accomplish the dual task of information comprehension and information management.

GENERAL DISCUSSION

This section discusses the integral strategy types and the interplay of those strategies in Internet reading. The discussion links the findings of this study to the framework of constructively responsive reading and thus to the research literature. Primarily, the results demonstrate the centrality of text location strategies, which feature prominently in Internet reading. The participants in this study engaged in exploring, identifying, and selecting useful texts in an Internet setting, supporting the suggestion of the updated framework of constructively responsive reading that accomplished readers actively realize and construct potential texts in Internet settings (Afflerbach & Cho, 2009). Readers may go virtually anywhere on the Internet to seek the information they want, but this information accessibility requires that readers adjust the scope and amount of texts that they process through the examination of self-identified information spaces (Alexander, Kulikowich, & Jetton, 1994; Kuiper, Volman, & Terwel, 2005). Readers need to first scan the multiple links available to them and then make multilayered inferences about what links would lead to what sort of texts and whether the connected texts may be relevant and useful to their reading (Coiro & Dobler, 2007). Internet reading demands that readers make a series of moment-by-moment decisions about links and texts, as critical hypertext theorists have argued (Burbules & Callister, 1996; Charney, 1987; Landow, 1992). Active readers generate educated guesses, informed by prior knowledge and prior Internet experiences, to decide whether to reject or accept particular links and texts in a timely manner and thus opportunistically determine and sequence their reading.

In particular, the participants' verbal report data describe their establishment of reading paths during Internet reading, and this resonates with recent research that has examined readers' coherent hyperlink selection (Salmeron et al., 2005; Salmeron, Kintsch, & Canas, 2006). In print reading contexts, text generally presents a predictable order and structure of reading, and this constrains readers' dynamic moves back and forth between different parts of a text and their ability to go beyond the text in a convenient way. In contrast, Internet reading may be marked by readers moving more freely in an information space, juggling multiple texts and links, and building their own pathways (Goldman et al., 2012; Salmeron & Garcia, 2011). This process demands that readers make sophisticated judgments on the usefulness of links and texts before accessing them, and that readers are able to modify their original plans by responding to the accessed information space. It requires skillful improvisation by readers who may possess limited resources for understanding, both cognitive (e.g., lack of prior knowledge) and textual (e.g., insufficient amount of information gathered). These actions for building reading paths serve readers who control the universe of texts in the establishment of their own text environment.

Another major finding of this study is that effective text location requires equally effective strategy uses in making meaning, monitoring reading processes, and evaluating information qualities (Afflerbach & Cho, 2009, 2010). First of all, the participants' verbal report data demonstrate that the strategic actions for making sense of multiple links and texts and integrating diverse web information are central to reading for understanding in Internet settings. This is consistent with

previous studies on multiple text comprehension (Anmarkrud et al., 2014; Goldman et al., 2012; Perfetti et al., 1999). Internet reading demands assorted strategies to construct meaning from multiple webpages and websites, which, for the most part, are more similar to than different from those for reading print texts. Internet readers must select useful texts and construct meaningful relationships among these texts. While managing digital links displayed on a screen, readers build semantic cross-textual linkages in their minds, which tie multiple texts together in a relevant and coherent manner (McCrudden et al., 2010; Rouet & Britt, 2011). Linking strategies (e.g., comparing, contrasting, interrelating, corroborating) assist readers in locating intertextuality in their cognition (Hartman, 1995; Strømsø et al., 2003). They use these strategies to identify interconnections of information and to construct metarepresentations of the multiple texts that they explore, examine, or often encounter. When we seek to understand Internet reading processes, these strategic actions for making meaning from texts cannot be underestimated; as the results of this study indicate, intertextual meaning-making strategies are critical to successful reading on the Internet.

In addition, the data suggest that self-monitoring was habitual for the competent readers who performed the critical Internet reading task in this study, and this backs up findings from research on self-regulated learning in a web-based hypertext context (Azevedo, 2007; Rogers & Swan, 2004) and, more generally, expert readers' text processing (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). The participants in this study were metacognitively competent and effortful in detecting problems with searching and comprehension. Once the readers detected a reading problem, they increased their cognitive efforts to identify the sources of the difficulty, look up alternative strategies, and test and apply the strategies to amend their reading. They also intentionally increased attention to planning possible subsequent actions when they determined the need for a complementary information search or more in-depth examination of text content. Varying rates of reading and adjusted cognitive efforts are possible because strategic readers conduct a continual monitoring of their own reading and thinking processes (van den Broek et al., 2005; van Dijk & Kintsch, 1983), even though monitoring itself does not always lead to actual behaviors. In some sense, the fact that readers use strategies in a particular way at a particular moment means that they are able to reflect on both the original and emerging focus of their reading (Paris et al., 1983). Such readers are also sensitive to the text environments they construct and the meaning evolving in their minds. The results of this study support the claims of previous research that self-monitoring is central to flexibly regulating the transactional processes between the reader and the Internet text environment (Coiro & Dobler, 2007) and that it is an important executive function to help readers achieve their goals (Stadtler & Bromme, 2007).

As reported consistently by researchers investigating multiple text comprehension (Anmarkrud et al., 2014; Barzilai & Zohar, 2012; Goldman et al., 2012; Rouet & Britt, 2011; Rouet et al., 1996; Wiley et al., 2009; Wineburg, 1991), evaluative reading is crucial to reading success within complex intertextual spaces on the Internet. The readers in this study engaged in the examination of the characteristics of multiple hyperlinks in light of their credibility, relevance, and usefulness. Link evaluation takes place in a quick cycle of retrieving and accessing links, making meaning from the minimal information of links, and determining their usefulness (Brem et al., 2001; Coiro & Dobler, 2007; Leu et al., 2007). Based on the results of examining very limited information (e.g., link titles, a few lines of written texts, Uniform Resource Locators [URLs]), this study's participants judged whether a particular link would be good to use. Once a webpage was accessed,

the readers initially scanned the content of the text to see if it was relevant to and useful in their learning. They then looked up information about authorship and sponsorship through the webpage (and the website) to see who had created and offered it (Kiili et al., 2008; Tabatabai & Shore, 2005). In addition to using these surface markers as evidence, the competent readers in this study allotted increased attention to delving into internal features of texts (Goldman et al., 2012). These readers both evaluated and critiqued each of the websites they read (e.g., in terms of content validity, source credibility, commercial intents, author expertise and bias) and assigned a unique role to each of the sites for future reference and subsequent research. Evaluation of these different aspects of sources is central to the process of text analysis and informed decision making in new literacy contexts.

In relation to patterns of strategy use, this study's findings also suggest that the workings of multiple strategy types are intricate and situated within the task environments. The participants controlled and adjusted their strategies in response to the unconstrained open Internet setting or the closed Internet setting with a limited text boundary, as shown by the quantitative analysis that indicated an association between strategy use and Internet setting. The scope of text boundaries affords or limits the use of particular strategies, such as text location, and readers respond to the situations they encounter through the function of self-monitoring. In the unconstrained Internet search setting, the participants engaged in many strategic actions for exploring and selecting useful texts (e.g., search engine uses, search terms uses, hyperlink examinations and selections), while they increased their use of strategies for making sense of available texts within the constrained text environment. That is, the readers in this study created opportunities to develop their own unique text environments by narrowing down the open-ended space, but when their strategic moves were constrained in the text environment with a limited boundary—similar to a print-based context of reading with bounded texts—they focused on different strategies to locate information within that limited space. This result supports the notion of responsivity, which suggests that reading strategies are selected, organized, and performed in response to the nature of texts or text environments (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995).

While the competent readers in this study shared some general tendencies that they brought to the reading task, they also showed differences in their use of the four strategy types, as the analysis of processing chains revealed. Two distinctive sequential patterns are notable. One pattern describes readers who focus on the process of identifying and selecting texts—text location. These readers can gain opportunities to access diverse links and texts and to explore the problem space in multiple ways. However, a continued use of these strategies may be caused by ineffective information searches and repeated failures that hamper readers' engagement in the construction of meaning (Azevedo, Guthrie, & Seibert, 2004; Yang, 1997). Ill-constructed (or unconstructed) text environments are likely to create obstacles for readers wanting to learn from the texts. As this situation regenerates information needs, readers must return to searching in order to locate previously unsought information. Sophisticated readers need to consciously respond to the text environment they construct or encounter (Afflerbach & Cho, 2009) while avoiding the simply reactive behaviors without rigorous planning that many nonstrategic readers show (Fidel et al., 1999).

In contrast, the other pattern characterizes readers who engage in the intensive use of strategies for learning important ideas from web sources. Although their reading begins by gathering and

learning general information that can mitigate a lack of prior knowledge or help them gain an initial overview of the problem space, what follows are increased efforts to identify and learn important information in the accessed text(s). These readers analyze details and connect information segments by focusing on the ultimate goal of reading (critical questioning in this study). In this light, engagement in the use of meaning-making strategies is a characteristic of critical examiners in Internet reading. The critical reader uses surface markers to make an initial, quick judgment of certain links and texts, but then shifts reading attention to delve into the relevance of contents of texts, their validity, and the plausibility of the ideas and perspectives represented in the texts (Brem et al., 2001; Goldman et al., 2012; Kiili et al., 2008; Wiley et al., 2009).

Taken together, the results from this study demonstrate that Internet reading demands the situated use of the central strategies that are required in reading more traditional print texts (i.e., meaning-making, self-monitoring, information evaluation), and it also calls for readers to use newly important and demanding strategies to respond to unique features of Internet text environments (i.e., text location). There have been many claims made over the past decade that the Internet creates new challenges that dramatically change the landscape of the strategies that readers need to use to be effective and critical consumers of information (e.g., the new literacies of online reading comprehension proposed by Leu, Kinzer, Coiro, & Cammack, 2004). As discussed above, this study's results show that these challenges may be due to the additional demands of Internet reading, which requires novel strategies for identifying, accessing, and choosing texts that are potentially useful for achieving readers' goals. However, the results also suggest that Internet reading is challenging because it requires readers to have flexible mindsets in order to situate their strategies for reading printed texts within the unbounded and nonlinear intertextual space of the Internet. That said, the cognitive strategies required by Internet reading might not be entirely new psychological realities because both similarities and differences may exist between print reading strategies and Internet reading strategies, although the ways in which the strategic actions are modified within the new literacy environment might be new. Therefore, new challenges in Internet reading are associated with the fact that students need more complex strategic knowledge and critical mindsets to manage the course of their actions in a sophisticated manner as they attempt to negotiate numerous sources and construct intertextual meanings.

The present study contributes to describing the foundational cognitive processes in Internet reading. Nevertheless, the study is limited, primarily by its exclusive focus on strategic processing. This study provides a detailed description of the strategies used for Internet reading by individuals who have demonstrated success in reading print, but it tells little about what connects readers' use of multiple Internet reading strategies to the outcomes of their Internet reading; thus, what this study provides is only a partial account of successful reading on the Internet. Ideally, the participant-generated critical questions, as the outcomes of Internet reading, could have been analyzed and linked to their strategic patterns, using a detailed rubric including specific criteria (e.g., relevance, significance, rationality) and graded quality descriptions for each criterion. This limitation should be overcome in future research, because reading strategies are the means for achieving the particular goals of reading. Still needed are further investigations to demonstrate the association between readers' strategic processing and reading outcomes and to clarify the ways in which different types of constructively responsive strategies may contribute individually and jointly to successful construction of meaning in Internet settings.

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