ABSTRACT

Title of Document:	ADOLESCENTS' CONSTRUCTIVELY RESPONSIVE READING STRATEGY USE IN A CRITICAL INTERNET READING TASK
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The goal of this study was to examine types and patterns of reading strategies that proficient adolescent readers used while reading on the Internet. Informed by research related to reading comprehension, intertextuality, and new literacies, I drew upon the model of *Constructively Responsive Reading* that had evolved from print reading to Internet reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). The model offered an analytical tool to construct descriptions of the complexity of use of the four general types of strategies in Internet contexts: *Realizing and Constructing Potential Texts to Read, Identifying and Learning Text Content, Monitoring*, and *Evaluation*.

Seven highly proficient adolescent readers (Mean Age = 17.5) individually performed Internet reading, with a goal to create a critical question about their self-selected controversial topic across two 45-minute sessions: Open Website Searching and Focused Website Learning. I used multiple sources to triangulate complementary data to infer participants' Internet reading strategy use. Participants' think-aloud verbal reports were synchronized with their reader-computer interactions recorded in

the computer. These real-time strategy data were complemented by other contextual data (e.g., pre-/post-reading interviews, participant-generated critical questions). I integrated these data into Internet Reading Strategy Matrices of the individual participants, which were analyzed, both qualitatively and quantitatively. During the entire course of data analysis, I constantly referenced the model of Constructively Responsive Reading with the four strategy categories.

My data analyses afforded detailed descriptions of diverse constructively responsive reading strategies in Internet contexts and dynamic patterns of such reading strategy use. Grounded-analysis of data resulted in the identification of an array of reading strategies and many instances of strategy interplay among the four strategy categories. Chi-squared analysis of aggregated strategy data revealed the goal-directed nature of strategy use, as participants' use of these four types of strategies was associated with two different session tasks. Also, analysis of the processing chains visualizing the flow of strategy use indicated differences in the performances of Internet reading strategy use among the participants and their distinctive modes of Internet reading. Overall, my study supported the theoretical model of Constructively Responsive Reading, with empirical data that described diversity and patterns of constructively responsive reading strategies in Internet contexts. The complexity of Internet reading was discussed with regard to constructively responsive reading that coordinates different roles and functions of the four general types of strategies.

ADOLESCENTS' CONSTRUCTIVELY RESPONSIVE READING STRATEGY
USE IN A CRITICAL INTERNET READING TASK

By

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Chapter 1: Introduction

This study is about seven proficient high school readers' reading on the Internet, with a special focus on their reading strategy use to construct meaning from self-selected Internet texts. I begin this chapter by describing contextual factors that motivate the study. I then present goals and questions of my study, and briefly overview approaches to investigating research questions, with relevant research literatures as well as the theoretical model. I close this chapter with possible contributions and limitations of the study.

1.1. Motivation for the Study

This study was motivated by three contextual factors surrounding the problem of adolescent new literacy practices: the rapid growth of the Internet, its increased use by adolescent readers, and "thin" sampling of reading in assessment. These factors reflect a concern with dominant conceptualizations of reading and literacy within a print-based paradigm. Taking these factors into important considerations provides the rationale for my study, which acknowledges changing tasks and contexts of reading and new demands of reading.

The rapid emergence of the Internet as the communication tool

The Internet is central to understanding and describing literacy practices in the 21st century knowledge-based and information-oriented society (Leu, Kinzer, Coiro, & Cammack, 2004). Technologies afford digital media and channels of designing meaning to become increasingly easy, fast, and more diverse, which continually boosts a growth and expansion of Internet information space (Rainie, 2008). Internet

terms like blogs, wikis, podcasts, instant messaging, and social networking are no longer strange in our daily lives. Most informational sources, which have been conveyed only through traditional print media, are currently being disseminated via online newspapers, webzines, Internet portal sites, professional databases and repositories, wikis, blogs, and numerous public or commercial websites.

Statistics offers a glimpse of the extent to which the Internet plays a key role in communication and how extensively it is used at our home, school, and work. Daily Internet users are increasing as the number of households with broadband connections increases (U.S. Department of Commerce, 2004). Additionally, current job markets increasingly seek out employees with adequate skills and strategies to use Information Communication Technologies (ICTs, Leu, Kinzer, Coiro, & Cammack, 2004). In the fall of 2005, nearly 100% of United States' public schools had access to the Internet, compared with 35% in 1994, and 95 % of public school instructional rooms in 2005 had access to the Internet, compared with 3 % in 1994 (Wells & Lewis, 2006). The Internet is being used for different goals, including information gathering, social networking, small business functions, work, and research (Jones, 2009). The population of Internet users has been dramatically increased over the past decade. In 2010, over 1.9 billion people worldwide used the Internet, with over four times the growth since 2000 (Internet World Stats, 2010, June 30).

These new contexts of information communication create new social and cultural needs that demand of readers competences to construct meaning from vast amounts of digital information presented in different modes (New London Group, 1996). Skills and strategies to comprehend a single print text are insufficient alone to

explain these new demands of reading. Changing contexts of reading increasingly

require more sophisticated reading skills and strategies in dealing with multiple

numbers of digital information.

Increased use of the Internet as the central adolescent literacy medium

The Internet is a highly popular information media for adolescents. Today's

adolescents often are portrayed as "digital natives," the generation born into the

Internet age (Palfrey & Gasser, 2008), who form their identities as digitally literate

users through a variety of literacy activities. Digital natives are engaged in managing

and constructing knowledge through thinking, reading and writing, and

communicating online (Alvermann, 2001; Lankshear & Knobel, 2003). Reading and

learning for digital natives may be different than for those of print-oriented

generations as Palfrey and Gasser (2008) noted,

> For Digital Natives, "research" is more likely to mean a Google search than a
> trip to the library. They are more likely to check in with the Wikipedia
> community, or to turn to another online friend, than they are ask to a reference
> librarian for help. They rarely, if ever, buy the newspaper in hard copy;
> instead, they graze through copious amounts of news and other information
> online. (p. 239)

Seminal surveys conducted by the PEW Internet & American Life Project

detailed this portrayal of adolescents and the Internet in the center of their literacy

activities both inside and outside of schools. Lenhart, Madden, Macgill, and Smith

(2007) documented the importance of Internet communication in adolescents' social

lives. Among surveyed online teens, ages 12 to 17, over 69% reported that they

created and shared their artifacts, like stories and photos, through the Internet.

Slightly more than a quarter of the respondents reported that they combined

information found on the Internet and incorporated it into their own creations, such as

blog postings. These results indicate that adolescents are active readers in searching for, locating, analyzing, and evaluating diverse Internet texts. The results also imply that adolescents are applying what they learned from Internet texts in communicating their ideas, opinions, feelings, and stances toward certain issues with other online users.

Moreover, the Internet is an important learning resource for adolescents (Lenhart, Simon, & Graziano, 2001). In the survey study conducted by Lenhart, Simon, and Graziano (2001), the vast majority of adolescent respondents with Internet access reported that they were using the Internet as a primary resource for schoolwork. Seventy eight percent of these students responded that they believed the Internet was useful when they accomplished their school assignments and projects. More than a half of these students reported accessing and using websites that were set up specifically for their school activities.

Overall, these results reflect that for many adolescents the Internet is, to a large degree, replacing the library as the primary resource for doing research for academic projects. Using the Internet, adolescents gather information in order to identify problems, seek possible solutions, and complete the reading tasks given to them. When school asks adolescent students to conduct research more in diverse school subjects, these developing readers should be supported to learn related skills and strategies for their learning with digital informational texts (Carnegie Council on Advancing Adolescent Readers, 2010; Moore, Bean, & Rycik, 1999; National Council of Teachers of English, 2008; The Aspen Institute Communication and Society Program, 2010).

Impoverished assessment of literacy: "Thin" sampling of reading

Despite the changing contexts of reading and student reading activities, most standardized consequential tests underrepresent these new literacy activities (Leu, Ataya, & Coiro, 2002; O'Brien & Scharber, 2008). This "thin" conceptualization of the construct of reading only affords correspondingly "thin" assessment of reading, which cannot offer accurate accounts of student reading (Afflerbach, 2002; Davis, 1998).

From a validity perspective (Messick, 1989), the problem with this "thinness" of assessment is two fold, due to partial construct validity (i.e., construct underrepresentation) and unintended, adverse social consequences. First, current assessment of literacy serves only "partial" construct validity as it seldom reflects the construct of reading as situated in new literacy contexts. This assessment cannot capture the complexity of such reading. Many statewide reading tests fail to observe and interpret higher-order thinking, including interpreting, evaluating, and critiquing multiple digital texts, since these tests measure only basic reading skills with multiple-choice items to ask rote memorization, information retrieval, or comprehension of factual information from short written paragraphs (Afflerbach, 2004; National Academy of Education, 2009). Narrow conceptualizations of reading threaten the construct validity of assessment, which may be achieved otherwise in assessment honoring the complexity of skills and strategies required in new literacy activities.

A more implicit problem is that continued 'thin' sampling of new literacies in assessment may bring in unintended, adverse consequences to a society in which

students, teachers, administrators, parents as well as policymakers themselves work together. Using such "thin" assessments may communicate implicit values to these education stakes-holders that knowledge and proficiency required in new literacy contexts are not important to measure and therefore, unnecessary to teach and learn at schools. For example, the National Assessment of Educational Progress (NAEP) sets its primary goal as "to provide, in a timely manner, a fair and accurate measurement of student academic achievement" (National Assessment Governing Board, 2008, p. 2). However, as this assessment does not measure student knowledge and proficiency in new literacy contexts, its results may misrepresent "academic achievement" as only print-based literacies. This value judgment about particular forms of literacy represents missed opportunities for students to learn, signaling that such knowledge and proficiency do not count as an important academic competence in curriculum and instruction.

Current assessments are highly limited in assessing students' learning and providing pedagogical information necessary for their growth (Afflerbach, 2002). That is, assessing only a 'thin' aspect of students' literacy activities cannot provide rich descriptions of students' learning and abilities and insights for improving their literacy (Afflerbach, 2004; 2007; Johnston, 1984; 1989). Messick (1994) noted important questions that should be investigated to develop better assessments:

> A construct-centered approach would begin by asking what complex of knowledge, skills, or other attributes should be assessed, presumably because they are tied to explicit or implicit objectives of instruction or are otherwise valued by society. Next, what behaviors or performances should reveal those constructs, and what tasks or situations should elicit those behaviors? Thus, the nature of the construct guides the selection or construction of relevant tasks as well as the rational development of construct-based scoring criteria and rubrics. (p. 16)

It is important to note that, as a beginning step toward ameliorating current impoverished assessment practices, we need to accomplish a preliminary task of any assessment project, that is, to analyze what knowledge, strategies, and proficiencies are valued in a particular domain (Messick, 1994; Mislevy, Steinberg, & Almond, 2003; Pellegrino, Chudowsky, & Glaser, 2001). Rich, detailed accounts of the construct would allow assessments that accurately describe students' Internet reading from evidence. As students read on the Internet, assessment practices must honor the complexity of these literate actions. Such assessment provides both formative and summative information that informs classroom practices and communicates accountability (Afflerbach, 2007; Afflerbach & Cho, 2010; Atkin, Black, & Coffey, 2001; Black & Wiliam, 2006; Shepard, 2000). The prerequisite task, therefore, is building a theoretical understanding of diverse aspects of new literacy activities.

1.2. Goals of the Study

Internet reading presents both promises and challenges to adolescent readers. On the one hand, the Internet is architecture that provides "possibilities." Adolescent readers explore texts, construct meaning from Internet texts, and identify the self through reading on the Internet (Alverman, 2002; Coiro, Knobel, Lankshear, & Leu, 2008; Lankshear & Knobel, 2003). Adolescents construct meaning with the texts located from the Internet, and construct themselves as competent readers through new forms of reading (Chandler-Olcott & Mahar, 2003; Jacobs, 2006; Lewis & Fabos, 2005; Moje, Overby, Tysvaer, & Morris, 2008). The Internet is the primary resource for schoolwork and research for learning (Lenhart, Simon, & Graziano, 2001) and the

medium that affords dynamic interactions of ideas and perspectives with others (Lenhart, Madden, Macgill, & Smith, 2007). These possibilities offer student readers new opportunities to learn.

On the other hand, the Internet bears "uncertainties." It presents an ill-defined textual environment in which a variety of sources, characterized by different voices and authorities, are connected by hyperlinks (Spiro & Jehng, 1990). The texts that readers are seeking may or may not be accessed where the readers are, or texts await "realization" but may not be coherently selected in a hyperspace (Bolter, 1998, Charney, 1987). Eye-catching links and pages become "seductive details" (Garner, Brown, Sander, & Menke, 1992), which may mislead readers to unexpected disorientation (Salmeron, Cannas, Kintsh, & Fajardo, 2005). These uncertainties present reading challenges to adolescent readers (Billal, 2000, 2001, 2002; Coiro & Dobler, 2007; Kuiper, Volaman, & Terwel, 2005; Leu, Reinking, Carter, Castek, Coiro, Henry, et al., 2007).

Internet reading takes place in this promising but challenging space, and it calls for "active readers," able to identify, organize, interpret, and evaluate Internet texts with strategic and critical mindsets (Alvermann, 2001; Bruce, 2000; Kress, 2003; Landow, 1992; Leu, Kinzer, Coiro, & Cammack, 2004; New London Group, 1996). The phenomenon of reading varies considerably according to the ways in which readers approach the texts. Readers must draw upon critical-analytical strategies for accessing, selecting, and understanding multiple texts in this "new textual landscape" (Fox & Alexander, 2009; Goldman, 2003; O'Brien, Stewart, & Beach, 2009). A strategic reader might pose the self-question "What should I read?"

in the course of navigating the problem space, learning important ideas and concepts, and finding a resolution of conflicting perspectives. An orchestration of these acts of reading characterizes "active readers" who come to the Internet reading task with reflective, flexible, and critical mindsets.

While these constructive reading strategies are increasingly prominent in new literacy contexts, we lack a precise and detailed understanding of such strategy use (RAND Reading Study Group [RRSG], 2002). The lack of information results in underspecified models of Internet reading and strategy use. Theorizing about curriculum and instruction is made difficult, as the theoretical basis for such suggestions is at best tenuous (Alvermann, 2008). Moreover, the insufficient understanding of student reading hampers design of valid assessment from which what students know and can do are inferred and interpreted (Afflerbach, 2007; Messick, 1994; Mislevy, Steinberg, & Almond, 2003; Pellegrino, Chudowsky, & Glaser, 2001). Research examining these new literacy processes would be a foundation of effective curriculum, instruction, and assessment of reading that supports students to become more strategic and critical readers (Alvermann, 2001).

Many claims for new strategies for successful Internet reading exist (Leu, Coiro, Kinzer, & Cammack, 2004) but these are unexamined and often disconnect the knowledge of new and traditional forms of reading. A group of researchers studying on new literacies of online reading comprehension asserts that Internet reading requires five "new" strategies: identifying important questions, locating information, evaluating information, synthesizing information, and communicating information (Leu et al., 2007). Many aspects of these strategies, in terms of

psychological reality, are not much different from traditional print-based reading strategies. Print readers should pose specific goals and questions, identify and learn important information by analyzing and synthesizing text content, and evaluate information, within text, between two texts, and/or across multiple texts, as Internet readers should. To claim these strategies as "entirely new" acts of Internet reading (e.g., Leu, Zawilinski, Cas tek, Banerjee, Housand, Liu et al., 2008) must be based on a thorough appraisal of our knowledge of traditional, print-based reading strategies. Although their articulations and examinations of new reading strategies make important contributions to an understanding of new forms of reading, further theoretical and empirical examinations are needed to underpin these claims.

I situate this study at the nexus of new and traditional forms of reading, building upon our knowledge of both forms of reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). The purpose of this study is *to examine reading strategies that contribute to successful reading in Internet contexts*, and *to offer detailed accounts of the complexity of such reading strategy use*. In so doing, this study places a special focus on "types and patterns of strategic acts" that proficient adolescent readers perform in order to explore and identify useful texts, construct and deconstruct meaning from these texts, evaluate and critique the texts' values, and monitor and regulate the entire act of reading. This study will be a complementary research effort *to continue an ongoing investigation and explication of reading strategy that contributes to our evolving understanding of the construct of reading*.

1.3. Research Questions

This study is intended to explore the broad question: How do proficient high school students use reading strategies to construct meaning in Internet contexts? This overarching question is detailed into the following two research questions, regarding diversity of reading strategies and patterns of reading strategy use.

Research question 1. *What types of reading strategies do proficient high school readers use in order to construct meaning and develop critical questions within Internet contexts?* With a notable exception (Coiro & Dobler, 2007), scant research studies in the field of reading have been conducted to explore and describe a variety of reading strategies that skilled adolescent readers use on the Internet. Highly proficient readers come to the reading task with certain common tendencies, which operate on their learning from text and goal achievement (Pressley & Afflerbach, 1995). In my study, I observe skilled high school readers' strategy use in a critical Internet reading task, and analyze repertoires of constructive strategies and critical mindsets that these readers bring into the task. This question of diversity in strategies will guide research processes to construct detailed descriptions of different types of strategies for Internet reading.

Research question 2. *What insights about patterns of reading strategy use can be derived from proficient adolescent readers' Internet reading?* While many strategies for Internet reading have been reported and argued (Leu, Coiro, Kinzer, & Cammack, 2004), we lack finer-grained empirical research that examines complex, situated uses of reading strategies and how the strategy use contributes to successful Internet reading. Reading strategies are the goal-directed means to achieve the goal(s)

of reading, so the strategy use varies according to complex interactions taking place

between the reader and the text (or text environment) (Pressley & Afflerbach, 1995).

In this study, I analyze how readers deploy and regulate these goal-directed conscious

processes and how they actively respond to texts encountered in Internet contexts.

This question of patterns of strategy use will offer an opportunity to construct a vivid

description of strategy interplays and variation of strategy use.

1.4. Research Literatures Informing the Study

This study was broadly informed by multiple areas of research, which

contributed to an understanding of Internet reading and reading strategy use. These

include research literatures related to reading comprehension, intertextuality, and new

literacies. These fields of research were oriented from different epistemological and

methodological commitments, often conflicting with one another. However, they are

not mutually exclusive but instead have jointly contributed to our understanding of

student reading development. Coordinating these fields of research creates a

conceptual space to better understand constructive reading strategies in Internet

contexts (Figure 1).

Figure 1. A coordination of multiple areas of research in reading and literacy that inform the study

New literacies research describes:
• Information-seeking behaviors
• Online reading comprehension
• Multimodal text processing
• Critical stance toward media texts

New literacies
Intertextuality

Constructive strategy use in Internet contexts

Reading comprehension

Intertextuality research describes
• Multiple text comprehension
• Hypertext reading

Reading comprehension research describes:
• Inference generation
• Discourse comprehension
• Metacognitive control
• Prior knowledge use
• Text evaluation

What reading comprehension research describes

This study is primarily informed by the research related to reading comprehension strategies (Pressley & Afflerbach, 1995; McNamara, 2007; NICHD, 2000; van Dijk & Kintsch, 1993). Reading comprehension strategies are intentional activities toward constructing the meaning of text (Afflerbach, Pearson, & Paris, 2007). Accomplished reading is marked by readers' conscious activation and use of these strategies in response to texts (Pearson, 2009; Rosenblatt, 1994; RRSG, 2002). The utility and effectiveness of strategy use is central to describing and determining what good readers do and think when they comprehend meaning before, during, and after reading (Pressley & Afflerbach, 1995).

Multiple decades of reading comprehension research have investigated different aspects of how people read. Good readers activate prior knowledge and relate it with new information in the text (Afflerbach, 1990; Anderson & Pearson, 1984). Readers' knowledge of text content and structure, goals of reading, and task-related factors guides the process of reading. By integrating text content with these different sources of knowledge, strategic readers build a coherent mental representation of text (Kintsch, 1998a; van Dijk & Kintsch, 1983; van den Broek, Riden, & Husebye-Hartman, 1995). Good reading necessarily involves higher-order inferences to elaborate text information, grasp implicit ideas, and probe hidden meaning (Greasser & Kreuz, 1993; Greasser, Mill, & Zwaan, 1997).

Strategic readers monitor their reading processes, detect comprehension problems, and apply fix-up strategies (Baker & Brown, 1984; Garner, 1987). These readers make use of conditional knowledge, which assists in a series of decision-making of when and why a particular strategy should be used (Paris, Lipson, & Wixson, 1984). The conditional knowledge develops, built upon one's self-reflection of goals for reading. Readers adjust their attention and cognition, informed by a continual self-assessment of different aspects of reading. These readers determine when to give a quick read on a text or when to be more conscious about their reading processes (van den Broek, Rapp, & Kendeou, 2005).

What intertextuality research describes

A body of research on reading comprehension has expanded its area of investigation toward more complex situations of reading, comprehension of more than one single print text (Braten & Stromso, 2003; Goldman, 2003; Graesser,

Gernsbacher, & Goldman, 2003; Hartmann, 1995). The idea of intertextuality informs a conceptualization of reading strategy use in Internet contexts because the Internet is characterized as a complex hyperspace in which numerous texts are interconnected with one another by digital hyperlinks.

This characterization of the Internet as an intertextual environment entails two kinds of intertextuality (Bolter, 1997; Hartmann, 1992; Landow, 1992). Internet Hypertext presents explicit forms of intertextuality embedded in text(s) (i.e., digital hyperlinks on a screen). These hyperlinks by themselves do not mean anything to readers, however. These links become meaningful when readers locate and create certain relationships between different segments of text or different texts by selecting appropriate links, that is, cognitive construction of intertextuality in the mind. Internet readers should generate intertextual links across multiple texts in the mind, comparing, juxtaposing, and reconciling the texts. The entire process of intertextual reading is "an orchestrated effort to mobilize potential texts, which generate interconnections among many textual resources, resulting in a web of meaning." (Hartman, 1992, p. 298)

Intertextual reading strategies have been reported in a broader area of reading research. Highly strategic readers with multiple texts corroborate one text with another, reconcile different perspectives and arguments, and determine the status of texts they read (Wineburg, 1991a, 1991b, 1998; VanSledright, 2002). These readers build a meta-representation of multiple texts, not just by processing the contents of individual texts but also by locating interrelationships between and across the texts (Perfetti, Rouet, & Britt, 1999; Goldman, 2003). Readers are committed in the

evaluation of different aspects of texts and place different values and importance on each of the texts, based on an evolving understanding of multiple texts (Braten & Stromso, 2009; Rouet, Britt, Mason, & Perfetti, 1996).

In addition, intertextual reading strategies are largely iterative in hypertext and hypermedia reading contexts (Landow, 1992; van Oostendorp & de Mul, 1996). Hypertext readers navigate on an information space toward accessing relevant and useful links and texts (Lawless, Brown, Mills, & Mayall, 2003). They conduct a dual-task of managing information and constructing meaning at the metacognitive level (Yang, 1997). They select hyperlinks and access information sources in a coherent manner, imposing related prior knowledge and goal-relevance criteria (Salmeron, Cannas, Kintsch, & Fajardo, 2005; Salmeron & Garcia, 2011). These intertextual strategies help readers who are prone to "getting lost" in a hyperspace, and allow them to become active in more productive processing of texts.

What new literacies research describes

The new literacies perspective also informs an understanding of constructive reading strategies in Internet contexts. (Coiro, Knobel, Lankshear, & Leu, 2009). The term "new literacies" has different meaning to different people (Lanskshear & Knobel, 2003), and it is an evolving concept among societal, cultural, and technological changes (New London Group, 1996). From the new literacies perspective, the Internet presents new literacy contexts and new demands of reading. When Internet readers construct meaning from fluid, multiple texts, they must decide what to choose to read, what to read first and next, and how much further they should go into deep searching and learning (Luke, 2003; Zammitt, 2011). These new aspects

of reading give a glimpse of strategies that are increasingly prominent in Internet-based literacy contexts.

Strategies for Internet reading have been described in research studies from diverse areas. Internet reading demands sophisticated use of comprehension strategies, including overviewing the problem space, developing research questions, locating information to answer the questions, analyzing and synthesizing things learned from texts, and assessing the quality of information (Kuiper, Volman, & Terwel, 2005; Leu, Coiro, Kinzer, & Cammack, 2004). Many Internet texts embed pictures, graphics, video clips, as well as written texts, so readers should be prepared to use strategies to coherently understand meaning across multiple forms of information presentation (Kress, 2003). Since the Internet is getting more commercialized, readers should be critical in reading political and commercial intent hidden in the texts, in addition to processing text-explicit information (Bruce, 2000; Fabos, 2008; Luke & Freeboady, 1997).

The intersection of research on reading comprehension, intertextual reading, and new literacy activities allows the chance to integrate knowledge of both new and traditional forms of reading. It also offers a broader conceptualization of reading in Internet contexts, and a theoretical basis for the model for describing such reading strategy use.

1.5. Theoretical Model of Constructively Responsive Reading

Building upon the understanding of reading comprehension, intextuality, and new literacies, I draw on the model of *Constructively Responsive Reading* that was originally proposed in Pressley and Afflerbach (1995) and later extended in

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Afflerbach and Cho (2009). I use this model as a reference point to analyze and describe adolescents' constructive reading strategy use in Internet contexts. I made this decision through an observation that the model of Constructively Responsive Reading has evolved from print reading to Internet reading. The model was built upon comprehensive research syntheses, and it maintains the explanatory power in detailing complexity of reading strategy use in Internet contexts.

The original model of Constructively Responsive Reading

Pressley and Afflerbach (1995) conducted a comprehensive research synthesis of reading research for decades that examined expert readers' verbal reports. They found that these accomplished readers came to the task with some general tendencies:

> to overview the text as a way to begin understanding it and to plan reading of the text; to read from the front to the end of the text in general, but to veer off this course when comprehension requires processing of information found elsewhere in the text; to use strategies … in coming to terms with text, including predicting, visualizing, summarizing, rereading as needed, and so on; to monitor comprehension and other aspects of reading as part of the strategic planning process that continues throughout the reading; and to related the information in text to prior knowledge, permitting both formation of hypotheses about the text and evaluations of the text and the hypotheses. (p. 104)

Based on these observations, Pressley and Afflerbach (1995) concluded that accomplished reading is marked by the reader's conscious, intentional, and goal-directed "responses to text" in the course of "constructing meaning." These constructive responses determine both processes and products of reading.

Pressley and Afflerbach (1995) identified and grouped three general types of constructively responsive reading strategies: *Identifying and Learning Text Content*, *Monitoring*, and *Evaluation*. Strategies for Identifying and Learning Text Content are meaning-making processes, including paraphrasing, elaborating, literal/inferential

reasoning, and analysis and synthesis involved in the processing of text content. Monitoring strategies are metacognitive processes to detect comprehension problems and apply fix-it strategies based on the perception of the text, the context, and the self. Evaluation strategies are critical processes to judge both internal and external features of text, including validity of text content, credibility and trustworthiness of text information, and author reputation and source information.

Evolution of the model from print reading to Internet reading

The model of Constructively Responsive Reading was later updated by a continued effort that reflects changing tasks and contexts of reading (Afflerbach & Cho, 2009). The tasks used (or assumed) in the reviewed studies in Pressley and Afflerbach (1995) were limited to "reading with one single print text" while the model emerging from those studies offered a compendium of what could be learned from verbal protocol studies. Almost 15 years later, Afflerbach and Cho (2009) reviewed emerging research literatures that examined skills and strategies required in diverse tasks and contexts of reading: reading with a set of texts, different genres of texts, texts that mutually support or conflict each other, digital hypertexts and hypermedia, websites in an open-/close-ended setting, web-search engines and online databases, certain course-specific websites or learning systems, and so forth.

Afflerbach and Cho (2009) updated the original model of Constructively Responsive Reading, identifying an array of constructive strategies for "multiple text reading" and "Internet hypertext reading." Multiple text reading requires intertextual strategies, and may explain many aspects of Internet hypertext reading that is rife with reading multiple texts digitally connected through hyperlinks. For example,

Internet readers do not just build a mental model of individual texts. They also

construct cross-textual meaning by interconnecting one text with another to identify

shared, supportive, or often conflicting information (i.e., Identifying and Learning

Text Content). These readers conduct a continual monitoring of their intertextual

moves between and across Internet texts, making use of the results to constantly

update their evolving meaning (i.e., Monitoring). They value and critique texts and

determine which texts are more useful and how the texts can be used in a more

relevant way (i.e., Evaluation).

Internet hypertext reading, however, demands strategies for searching for,

locating, and selecting relevant and useful texts and links. Internet readers must take

an active role in self-questioning about where useful texts might be connected and

which links could lead to the texts. These acts of reading, when effectively

performed, afford the construction of unique and individualized reading paths to

potentially useful texts and goal achievement. Afflerbach and Cho (2009) labeled

these acts of reading *Realizing and Constructing Potential Texts to Read*, and

described it in the following manner:

> As readers begin reading hypertext environment, they must initiate a process
> that we characterize as realizing and constructing potential texts to read. By
> this, we mean that the rules of reading change: no longer is there one text, a
> given, for the reader. The reader must work to identify a series of links and
> texts that helps the reader move towards the particular goal attainment that is
> set prior to the commencement of reading. There is the potential for much
> uncertainty, given the ephemeral nature of reader choice, the degree of
> preciseness of search engines and strategies, and the universe of possible links
> to what may be related (or unrelated) texts. (p. 82)

Although written texts are a dominant information representation on the

Internet, Internet hypertext represents a fundamental change in the architecture of acts

of reading because the Internet connects numerous texts by hyperlinks and thus the reading of the web of texts is unbounded. The readers in the Internet hypertext reading must develop and construct their own reading pathways, by actively responding to "a series of unknowns related to possible links, possible texts, possible decisions and possible interactions." (Afflerbach & Cho, 2009; p. 81)

The updated model of Constructively Responsive Reading represents four general types of strategies and interactions among the strategies (Figure 2). It describes that accomplished Internet readers construct meaning by choosing, analyzing, and synthesizing across multiple texts, perspectives, and modes. The constructed meaning largely depends on the quality of texts that are located, selected, or often encountered. The evolving meaning contributes to a coherent construction of reading paths. Readers conduct a continual monitoring of both path construction and meaning construction, detecting and fixing the problems encountered in the entire course of Internet reading. They evaluate texts from a critical stance, judging relevance, trustworthiness, and usefulness of texts and links before and after accessing them. These four categories of strategies mutually enhance effectiveness of strategy use, and jointly contribute to Internet reading. If any of them is missing, successful Internet reading cannot be guaranteed.

Figure 2. The model of Constructively Responsive Reading in Internet contexts: Four
general types of strategies and dynamic interplay between the strategies
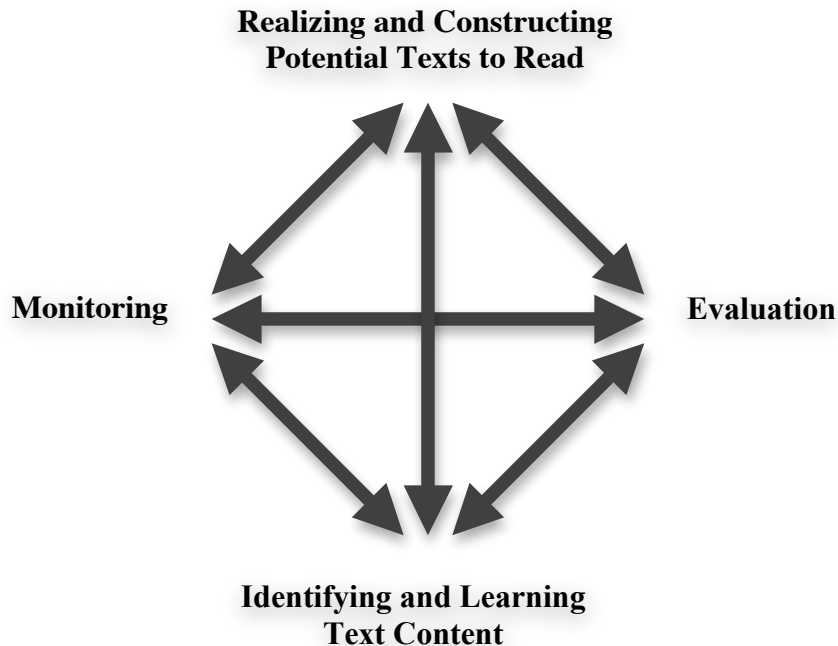
The model of Constructively Responsive Reading makes unique contributions
to our evolving understanding of reading. The model maintains its explanatory power
in describing constructive reading strategy use in Internet contexts, built upon an
effort to bridge the research literatures between new literacies and more traditional
literacies. The model is an outcome of our previous scholarships related to traditional,
print reading as a foundational knowledge base to better understand new literacy
processes and activities.

1.6. Verbal Reporting Methodology

Verbal reports are spoken records of what people do and think (Nisbett, 1977), which act as a window that gives researchers an access to the invisible psychological processes (Paris, Lipson, & Wixon, 1983). Verbal protocol analysis in reading is an examination of these verbal reports to infer the meaning of what readers do and think while engaged in reading tasks (Afflerbach & Johnston, 1984). I employ verbal reporting method and protocol analysis to observe complicated workings of the human mind involved in Internet reading, considering its benefits to the advancement of theory of reading.

Contributions of verbal reporting methodology to theoretical advancement in reading

Since verbal reports were valued as data that reflect subjects' mental processes (Ericsson & Simon, 1980; 1993), reading inquiry has conducted methodological experiments using verbal reports to investigate complex cognitive processes entailed in diverse tasks and contexts of reading (Afflerbach, 2000; Afflerbach & Johnston, 1984). Research examining verbal reports (especially for expert readers) has made important contributions to our understanding of reading, providing rich descriptions of complexity of reading, reading strategy, and reading competence (Pressley and Afflerbach, 1995).

Theories of reading, especially for more traditional print forms of reading, have been informed by verbal protocol studies. Verbal reports of highly accomplished readers describe the ways in which these readers identify and learn important text content, evaluate different aspects of text and reading, and regulate thinking processes (Pressley & Afflerbach, 1995). Verbal reports afford observations and accounts of

dynamic processes entailed by the readers learning from multiple texts related to the same topic (Wolfe & Goldman, 2005); engaging in building meaningful linkages between and across the texts (Hartmann, 1995); and performing domain-based reasoning about texts' credibility, authority, and trustworthiness by considering the context in which the texts were created and appeared (Wineburg, 1998).

Verbal reporting methodology is well suited to the study of relatively newer literacies (Afflerbach & Cho, 2009). Recent research has analyzed subjects' verbal reports to describe strategic acts of reading in new literacy tasks, including comprehending informational sources on the Internet (Coiro & Dobler, 2007; Leu et al., 2008), managing information and solving disorientation problems in a hyperspace (Yang, 2003), self-regulated learning in hypermedia contexts (Azevedo, Guthrie, & Seibert, 2004), and critical selection of links and sources on the Web (Killi, Laurinen, & Marttunen, 2008). As such, verbal reports are the source of considerable data that describes constructive reading strategy use in both traditional reader-text interactions and more recently investigates acts of literacy.

Triangulation of verbal reports with relevant theories and complementary data

Verbal protocol analysis demands considerable inferences from a researcher describing complex processes of reading. Although people may be able to report quite accurately about their cognitive processes (Nisbett, 1977), the language that they use to verbalize their own thoughts would vary considerably (Pressley & Afflerbach, 1995). Also, making inferences of mental processes from verbal reports becomes a more daunting work as the tasks and contexts of reading get more diverse and

complex. Thus, any methodology to use verbal reports should be designed to minimize the inference gap between verbal reports and underlying processes.

I particularly consider two important tactics to enhance a researcher's inference from verbal reports: theoretical task analysis and data triangulation. Theoretical task analysis is a necessary work to build the tight linkages between theory of reading and verbal reporting data. It helps a researcher anticipate what readers do and think in a particular reading task, based on theoretical understanding (Magliano & Graesser, 1991). In the task analysis, a researcher use and examine the most current knowledge about reading and the effect of related situational factors on reading, including reader ability and affect, text environment, and task demands and procedures. Thus, task analysis allows an opportunity to modify or amend current understandings of reading, and it also scaffolds new understandings of reading being examined based on the existing knowledge base (Afflerbach & Cho, 2009).

In this study, I conduct a comprehensive examination of currently available theories of reading, in both traditional and new literacy contexts. Based on this review, I use the theoretical model of Constructively Responsive Reading, which provides an analytical tool to understand participants' reading strategy use in Internet contexts. The review of relevant research and theory informs my understanding of constructively responsive reading strategy use in Internet contexts, and it also offers an important opportunity to predict what participants do and think in the Internet reading task and how to better infer their strategic and critical acts of Internet reading form their think-aloud verbal reports.

In addition to the rigorous theoretical task analysis, another way of making better inferences about reading processes is triangulating verbal reports with other complementary data (Magliano & Graesser, 1991; Afflerbach, 2000; Veenman, Van Hout-Wolters, & Afflerbach, 2006). Data triangulation can be planned in various ways, but the general principle is to design a system of complementary methods tied together that provide information that might be missing from think-aloud verbal reports. Complementary data may give more information on reading processes that are not verbalized, support verbalized reports by demonstrating whether the strategies were actually used, or dispute verbal reports by instantiating contradictory evidence. In each of the cases, a researcher's inference-making process becomes more valid and reliable with complementary data sources, and it allows more accurate descriptions of reading.

In this study, I triangulate participants' think-aloud verbal reports with screen recordings and other contextual data (e.g., pre-/post-reading interviews). Verbal reports can provide the data that represent what and why strategies are planned, which are complemented by screen-recordings, as reading digital texts on a screen requires additional behaviors (e.g., scroll bar use, mouse use, keyboard use). Recording these screen moves can offer the data that visualize dynamic interactions between the reader and the computer (Leander, 2008; Leu et al., 2007). Once the screen recordings are synchronized with concurrent verbal reporting data, they inform the reader's strategic moves, including what websites are accessed, what part of the sites are being read, what is being read first and next, what links are selected and accessed, what search terms the reader generated and applied, and so on. Thus, verbal reports

synchronized with screen recordings gives an opportunity to observe a series of quick cycles of moment-to-moment processes involved in Internet contexts, and to examine (in)consistency of verbal reports with screen behaviors.

When this strategy data is complemented by interview data, inferences on strategy use become more situated (Afflerbach, 2000). Reading strategies are goal-directed processes and influenced by the reader's initial and evolving understanding of what he or she read. Thus, it is necessary to hypothesize and interpret possible impacts of goals, knowledge, and beliefs that the reader brings into reading and the meaning constructed during the course of reading on the constructive strategy use. Interview data give information on these reader characteristics and contextual information of reading that affect patterns of strategy use. Interviews conducted before reading can give information on participants' prior knowledge, goal setting, topic interest, and plan for searching and reading. Interview conducted after reading also can inform what the reader understood and learned throughout the reading, what challenges were experienced in the course of reading, and how the goals of reading may be modified and maintained.

Taken together, theoretical task analysis and complementary data sources must be used to develop detailed accounts of constructive strategy use. Each of the data can provide consistent evidence from which strategy use is inferred in a mutually supportive way. Or particular data can produce conflicting information that serves to disconfirm a hypothesis of strategic processing to observe. Building the tight linkage between theory, verbal reports, and other methods serves for finding valid or

alternative explanations of reading, and it fosters a researcher's confidence in inferring and interpreting complexity of reading strategy use.

1.7. Contributions to the Field

Connection of new and traditional forms of reading

This study suggests the "continuity" of our accumulated knowledge of reading. The nature of Internet reading strategies cannot be fully explained only from a partial understanding of either traditional, print-based reading or new forms of Internet-based reading. A premise of this study is that Internet reading demands noble strategies but it also shares large numbers of similar strategies with traditional, print forms of reading. This study instantiates an ongoing examination of reading strategies, which contributes to our evolving understanding of reading, paralleled by changing tasks and contexts of reading. This balanced approach honors mutual relationships between both forms of reading, and it offers an opportunity to build fuller descriptions of Internet reading.

Explication of the theoretical model of reading

Our conceptualization of constructive reading strategies is always subject to modification and revision, evolving as our understanding of cognition, literacies, and the contexts in which they operate contribute new information. This study builds and uses the model of Constructively Responsive Reading, a research-informed theoretical framework that has evolved from print reading to Internet reading. In doing so, I intend to gather empirical evidence to be used in updating the model and enhancing its explanatory power in illuminating complexity of reading strategy use in Internet contexts. Results may contribute to constructing to the design of future

research examining the construct of reading in new literacy contexts, suggesting a compendium of reading strategies.

Exploration of triangulated verbal protocol analysis

Appropriate methodologies can provide data that contribute to paradigm revision and change, and this change can inform the future use of appropriate methodologies. I consider the reciprocity of the paradigm-methodology dynamic in this study, taking multi-method approaches for better inferences on invisible mindful processes. In this study, think-aloud verbal reports provide the information on "what" and "how", that is, what strategies were conscious in one's mind, why the strategies are considered, and how they are planned and performed. These verbal reports are complemented by screen-recordings, which may provide the information on "when" and "where." Screen-recordings are able to make visible when they select links, where readers are reading, where they go to find texts, and how they navigate on the Internet. Additionally, interview data would provide what plans and goals readers have, what experiences and challenges they are encountered, what they learned from Internet reading. Exploration in the way of establishing clear linkages between theory, verbal reports, and other measures may inform research methodologies in an inquiry of reading and mind.

Possible implications for the pedagogy of reading

The refined understanding of basic psychological processes and the contexts in which constructively responsive reading strategies operate should have positive implications for how we conceptualize and foster students' reading development. Informed pedagogy of reading begins with research efforts to build an accurate

understanding of what knowledge, skills and strategies, and dispositions are important and how they work together toward successful reading. Detailed description of Internet reading strategies is necessary for developing effective curriculum and instruction. School curriculum and instruction should be based on robust theoretical understanding of how adolescents read in new literacy environments. Without understanding of "new" strategies for Internet reading, instruction related to these new demands of reading may not be effective. Results from this study can draw attention to the need for inclusion of Internet reading strategies as considerations in curriculum and instruction practices.

1.8. Limitations of the Study

Sources of model building

The limited sources used in the building of the model of Constructively Responsive Reading must be considered in interpreting and evaluating processes and products of my study. The original model proposed by Pressley and Afflerbach (1995) was built upon the integrative inferences about reading strategies from highly accomplished readers' think-aloud verbal protocols reported in the reviewed studies. Also, the model updated by Afflerbach and Cho (2009) gained extensive benefits of verbal reporting methodologies because many of the reviewed studies had analyzed subjects' verbal reports as the major data, while the model also used a great deal of findings from a variety of research using different methods and data sources to infer psychological processes involved in reading in Internet hypertext contexts. This means that the model of Constructively Responsive Reading used thoroughly the outcomes of the empirical studies that employed verbal reporting methodologies, and

thus that the model may not embrace all possible benefits from other methodological approaches and the tasks used in the non-verbal protocol studies of reading. While my study partially relieves this concern by a comprehensive review of both theoretical and empirical works across multiple relevant areas of research to develop detailed accounts of the model, much should be examined and added to refine (confirm or disconfirm) the model to be more comprehensive in explaining the construct of reading in diverse tasks and contexts.

Degree of model saturation

Another concern with the model of Constructively Responsive Reading is that the compendium of constructive reading processes accounted by the model will not exhibit all possible strategic acts of reading entailed in diverse tasks and contexts (e.g., domain-specific reading skills and strategies). The model is used in this study, with an assumption that it has been built upon comprehensive syntheses of currently available research. Although the model of Constructively Responsive Reading explains four general types of strategies elicited in a variety of different tasks and contexts of reading examined in the previous studies, however, there is much possibility that novel tasks require novel strategies that cannot be explained by the extant model. I consider the model of Constructively Responsive Reading to be a maturing theoretical framework with considerable work to be done. The model is developing and may be further refined or revised with instances of novel strategies that cannot be subsumed in the four general strategy categories. In effect, my study is an example of research efforts to enhance the degree of saturation of the model of Constructively Responsive Reading, by adding detailed information to the model.

Skill-and-strategy differentiation in verbal protocol analysis

The nature of verbal reports as spoken records of cognitive processes, including both skills and strategies, should be considered in an appraisal of my study. Reading skills are habitual processes, whereas reading strategies are more consciously enacted processes. The acts of reading combine both reading skills and strategies, which are evoked and regulated according to readers' goal setting, available cognitive resources, and diverse situational factors (e.g., text difficulty, task demands). It is not possible yet to differentiate what are verbal reports of skills and what are those of strategies. Thus, while verbal reporting methodology is used in this study to observe mental processes involved in Internet reading, the observed processes may be either skills or strategies. Nevertheless, I use the term "strategies" throughout the study, rather than the combined term "skills and strategies", because I value the pedagogical value implied in the term strategies. Strategies are skills under control, which become skills through repeated practices, experiences, and instruction. Thus, reading skills reported by highly proficient readers should be transformed and reinterpreted into reading strategies, as pedagogical content of what we must teach for developing readers in classrooms.

Generalizability of the study results

The generalizability of my study is limited because in the study I examine only one student-by-task-by-occasion. Although the model of Constructively Responsive Reading describes four types of generic reading strategies required in Internet contexts, findings from the study may not be generalizable across different types of texts, tasks, and purposes involved in different Internet reading contexts.

Strategies to be interpreted in this study will not be exhaustive, and thus the study

cannot explain all possible and needed strategies in Internet reading. The model

cannot be saturated only with limited instances of Internet reading strategies from a

limited number of participants and types of task. Reading strategy use may be

different when Internet readers may use Internet search engines merely to locate

simple factual information, use online dictionaries just to know the definitions of

words, or navigate websites for pleasure. Applying the model with different readers,

texts, and tasks relationships will be an intriguing future research focus.

Chapter 2: Literature Review

This chapter is intended to construct a theoretical base for the study, presenting results from a review of relevant research literature. The four parts of literature review constitutes the chapter:

- Conceptualizing "reading" and "reading strategy"

- Describing constructive reading strategies in print-based contexts

- Describing constructive reading strategies in internet-based contexts

- Introducing the model of Constructively Responsive Reading in Internet contexts, with a synthesis of previous studies on adolescents' Internet reading processes

I begin the chapter by defining "reading" and "reading strategy." I conceptualize reading as situated literacy practice, and reading strategy as situated activity to achieve the goal(s) of reading. Next, I revisit what research says about traditional, print reading. I offer theoretical accounts of constructive strategies for print reading, reviewing theories of prior knowledge use, discourse comprehension, inference making, metacognition, source evaluation, critical stance, and multiple text reading. Building upon the theoretical understanding of print reading strategies, I then present theoretical accounts of constructive strategies additionally required in Internet reading. I synthesize a current body of research emanating from diverse areas of research, including hypertext theories, multimodality, information and library science, and critical literacy.

Finally, I introduce and explain a comprehensive model of reading, Constructively Responsive Reading, which reflects the knowledge of both new and traditional forms of reading grounded in research reviewed above (Pressley & Afflerbach, 1995; Afflerbach & Cho, 2009). Employing this model, I review previous research studies that examined adolescent readers' strategy use in Internet contexts.

2.1. Theoretical Constructs

2.1.1. Reading as Situated Literacy Practice

Understanding the construct of reading is an arduous task because of its complexities. More than a century ago Edmund Burke Huey depicted reading as "the most intricate workings of the human mind" and "the most remarkable specific performance that civilization has learned in all its history" (Huey, 1908, p. 6). Later, Thorndike characterized the reading of a complex paragraph as "the elaborate and selective procedure" that involves mindful processes to "select, repress, soften, emphasize, correlate and organize, all under the influence of the right mental set or purpose or demand" (Thorndike, 1917, p. 329).

Twenty years later, Rosenblatt (1938) described the complexity of reading as transactional processes between the reader and the text:

> The special meaning, and more particularly, the submerged associations that these words and images have for the individual reader will largely determine what the work communicates to him. The reader brings to the work personality traits, memories of past events, present needs and preoccupations, a particular mood of the moment, and a particular physical condition. These and many other elements in a never-to-be-duplicated combination determine his response to the peculiar contribution of the text. (p. 30)

While these earlier descriptions of reading come from different orientations,

they represent that reading is characterized by its complexity and dynamism and to formulate a definition of reading is equally complex and challenging.

Throughout history, reading inquiry has examined the complexity of reading. Since reading became recognized a field of inquiry, different conceptions of reading has reflected different theoretical emphases and pedagogical implications. While particular perspectives often are privileged or sanctioned by different groups of people, currently competing conceptualizations acknowledge diverse aspects of reading.

"Constructivist" perspectives views reading as constructing meaning, and the meaning is constructed through a transaction between the reader and the text within the particular context (Pearson, 2009; Rosenblatt, 1978). Readers actively respond to the text in order to construct meaning, brining in their knowledge, experiences, beliefs, motivations, and stances to the task (Alexander & Jetton, 2000; Anderson & Pearson, 1984; Baker & Brown, 1984; van Dijk & Kintsch, 1983). The recent synthesis of reading comprehension research defines the term 'reading comprehension' as the process of meaning construction in the following manner:

> We define reading comprehension as the process of simultaneously extracting and constructing meaning through interaction and involvement with written language. We use the words *extracting* and *constructing* to emphasize both the importance and the insufficiency of the text as a determinant of reading comprehension. (RRSG, 2002, p. 11)

In this account, meaning does not originate solely from either of the reader or the text. It is constructed through interactive "activities" between the reader and the text in the particular socio-cultural context. Readers actively use their prior knowledge to comprehend information in text (Anderson & Pearson, 1984). They

make inferences to put segments together into a coherent whole and interpret what the text means to the readers themselves (van Dijk & Kintsch, 1983). They conduct a continual monitoring of their own reading processes and apply fix-up strategies when comprehension problems are detected (Baker & Brown, 1984).

Successful meaning construction requires readers' conscious, intentional processes directed toward constructing meaning. These processes vary according to readers' standards to determine whether meaning is being coherently built (van den Broek, Rapp, & Kendeou, 2005). Stances towards reading guide these goal-directed processes (Rosenblatt, 1978), and engagement is a driving force to enact such conscious processes (Alexander & Jetton, 2000; Guthrie & Wigfield, 2000). Epistemic beliefs of text, knowledge, authority, and reading shape what they can do in interrogating texts (Luke, 1995; Wineburg, 1991a, 1991b).

More recently, situative perspectives on cognition and learning inform a conceptualization of reading (Brown, Collins, & Duguid, 1989; Greeno, Collins, & Resnick, 1996; Lave & Wenger, 1991). Any human activities are situated within a particular context. People keep interact with resources and information available in the context, to achieve certain goals of their behaviors. As such, reading is embedded and embodied within the context in which it takes place (Barton & Hamilton, 2000; Gee, 2001). Readers get more conscious about what they can (or can't) do, experiencing and reflecting on what the context affords and constrains.

This situated nature of reading is an important consideration in conceptualizing reading. The 2009 NAEP reading framework conceives of the

situativity of reading in defining the construct of reading (NAGB, 2008). It

conceptualizes reading as an active and complex process that involves:

- understanding written text;
- developing and interpreting meaning;
- and using meaning as appropriate to type of text, purpose and situation (p. 2)

This definition describes three aspects of reading. It is noteworthy that the

third aspect "using meaning" is newly considered as an important aspect of reading

while the first two aspects are similar to "extracting and constructing meaning"

(RRSG, 2002). The notion of using meaning is further illustrated in this document as

following:

> Readers draw on the ideas and information they have acquired from text to meet a particular purpose or situational need. The "use" of text may be as straightforward as knowing the time when a train will leave a particular station or may involve more complex behaviors such as analyzing how an author developed a character's motivation or evaluating the quality of evidence presented in an argument. (NAGB, 2008, p. 3)

Using meaning is required in readers' self-questioning of what to do with the

text in a certain context. Readers use the meaning they constructed from text to

conduct critical interpretation of text content and author intention in relation to the

context in which the text appears (Luke, 1995). Readers with historical documents

perform domain learning and reasoning (VanSledright & Kelly, 1998; Wineburg,

1991a, 1991b; Wolfe & Goldman, 2005), using the evolving meaning across the texts.

Also, use of meaning is involved in making meaningful connections of what readers

learned from texts to content area learning (Shanahan & Shanahan, 2008). Overall,

readers use the evolving and constructed meaning from text in a particular task

setting, asking what this situation demands, what ideas better fit into it, and how

applicable meaning could be constructed.

Recent international assessments also consider the situated nature of reading: Programme for International Student Assessment (PISA) 2009 Framework (Organisation for Economic Co-operation and Development [OECD], 2009); 2011 Progress in International Reading Literacy Study (PIRLS) Framework (International Association for the Evaluation of Educational Achievement [IEA], 2009). For example, the PISA 2009 framework defines that "reading literacy is understanding, using, and reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society." (OECD, 2009, p. 23) This framework places a special emphasis on reading skills and strategies for "finding, selecting, interpreting and evaluating information from the full range of texts associated with situations that reach beyond the classroom." (p. 21) It assumes that meaning construction is most often a midpoint in the act of reading, where the meaning construction is followed by the use of the meaning that is constructed from a variety of print and digital texts.

The acknowledgement of the situated nature of reading signify the important realization that people read to use and act with the meaning they construct through the reading of the wide range of texts in different situations. Human cognition works as situated within a particular context, and the context shapes the nature of how cognition works (Barsalou, 1999; Brown, Collins, & Duguid, 1989; Greeno & the Middle School Mathematics Through Applications Project Group, 1998; Huchins, 1995; Lave & Wenger, 1991). Processes and products of reading vary according to how consciously readers perceive, imagine, plan, and create the use of their reading;

how they actively interact with their texts and contexts given, self-identified, or encountered.

2.1.2. Reading Strategy as Situated Activity to Achieve the Goal

As reading is re-conceptualized as situated practice, reading strategy can also be reconsidered. Reading strategy is the means to achieve one's goal(s) for reading, and the use of strategies is situated in the context in which the reader interacts with text environment (Afflerbach, Pearson, & Paris, 2008; Alexander, Graham, & Harris, 1998; Paris, Lipson, & Wixon, 1983; Pressley, 1995; van Dijk & Kintsch, 1983).

Reading strategy used to be labeled as the term that only represent "algorithmic" information processing perspectives (Pressley & Harris, 2006). While strategy is a cognitive construct, an understanding of this construct needs a further consideration of its flexible and situated use. In other words, to better understand how reading strategies work, we need to consider what knowledge and stance the reader brings in reading, how the reader plan and design their reading, and how the reader respond to their reading situations and textual environments. This flexibility and situativity should count as an important aspect of an actual strategy use when we conceptualize strategic reading.

Reading strategy use

As the end of a particular activity cannot be achieved without a proper means, the goal(s) for reading can never be achieved without an effective reading strategy use. Reading strategies are intentionally used when the reader intends to achieve goals. Strategic reading is "the situated act of human cognition" so the utility of strategy use is never fully evaluated only with a certain pre-established rubric, but

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rather it is interpreted based in the reading situation in which strategies are used. Van

Dijk and Kintsch (1983) noted on the situated nature of text processing strategies as

following:

> Strategic processes contrast with algorithmic, rule-governed processes. An example of the latter is a generative grammar, which produces a structural description of a sentence by syntactic parsing rules. This process may be complex, long, and tedious, but it guarantees success as long as the rules are correct and are applied correctly. In a strategic process, there is no such guaranteed success and no unique representation of the text. The strategies applied are like effective working hypotheses about the correct structure and meaning of a text fragment, and these may be disconfirmed by further processing. (van Dijk & Kintsch, 1983, p. 11)

Strategies are flexible acts depending on how readers recognize and respond

to the reading situation. Strategies themselves do not directly offer readers an exact

road map leading into text understanding. Text content may be processed in a several

possible orders with several possible sets of strategies. Readers adjust these strategy

operations, perceiving the reading situation and seeking the best means to solve the

problems that the situation present. The use of strategies largely depends on what

knowledge, abilities, standards, and stances that readers bring into their reading and

in what ways the readers spontaneously reflect on and make use of these resources to

respond to text environment (Afflerbach, Pearson, & Paris, 2008; Alexander,

Graham, & Harris, 1998).

Although readers' intention is for success, not all strategies are advantageous

and bring positive consequences. Afflerbach, Pearson, & Paris (2008) described,

> It is important to note that reading strategies, like reading skills, are not always successful, and a definition of reading strategies does not entail only positive and useful actions. A young reader may choose an inappropriate goal, such as reading fast to finish before peers rather than reading carefully to understand the text. Some strategies are simply incorrect ideas about reading, such as guessing a word based on its initial letter. The actions are indeed

strategic; they connect specific means to specific goals but they are inappropriate and ineffective for reading. Having good intentions and trying to be strategic are good starting points but neither alone ensures that readers will decode and understand text successfully. It is the appropriateness of the goal, the means, and the path to connect them that must be negotiated in every situation in order to be strategic and successful. (Afflerbach, Pearson, & Paris, 2008, p. 368)

Readers with clear goal awareness may apply, combine, and reconcile a variety of possibilities of their strategic acts. Strategic reading is the process of "negotiation" between readers' own available strategies and the situation in which the strategies may be used. These negotiating processes entail mindful processes to seek and implement the best combination of strategies for achieving the goal situated in particular social, cultural, and communicative contexts (van Dijk & Kintsch, 1983).

Strategic readers control their reading processes and deploy an optimal coordination of different strategies (Afflerbach, Pearson, & Paris, 2008; Alexander, Graham, & Harris, 1998; Pressley & Afflerbach, 1995; van Dijk & Kintsch, 1983). Strategic readers may adjust their reading speeds and allot attention and focus for selective reading, responding to the text, task, and context (van den Broek, Rapp, & Kendeou, 2005). For example, conscious readers may keep reading an easy text (or part of the text) automatically, that is, "skilled" reading at least at this moment. This automatic processing rarely requires intentional, deliberate, effortful, and conscious attentions and procedures from readers. Yet, once certain difficulties or needs are perceived, readers may read the text with more self-controlled management of both physical and intellectual resources. They may respond to the challenging text by using an array of intentional, conscious strategies to learn the text content, monitor

their reading processes, and evaluate different aspects of text processing (Pressley & Afflerbach, 1995).

Reading strategy development and related factors

A successful development of reading strategies plays a pivotal role in the successful development of reading competence. Alexander, Graham, and Harris (1998) noted,

> … strategies are mandatory (essential) for academic development. That is to say, no one can reach competence or proficiency in history, reading, writing, or any other academic domain without the attainments of procedures for acquiring, organizing, or transforming information, or regulating one's performance. (Alexander, Graham, & Harris, 1998, p. 132)

A growth of reading competence takes place on a developmental trajectory of knowledge, strategy, and motivation (Alexander, 2005). Children, in an early developmental stage, initially have little knowledge about reading (e.g., what is reading like, what are texts like, how people read). Knowledge is fragmented and unprincipled, and their strategy for text processing is shallow. As they move toward reading competence, however, they become more knowledgeable about reading and keep trying to use their knowledge and strategies under deliberate control. While experiencing both success and failure in reading, over time, children become to use strategies more efficiently and sophisticatedly by using their updated knowledge about reading.

Reading strategy also co-develops with motivation for reading (Alexander, Graham, & Harris, 1998). Strategies are "willful acts" so motivation is a driving force that encourage the reader to conduct a trial and error of strategy use in reading. Motivational development may be hindered when strategies are not developed

adequately and appropriately because inefficient strategy use and repeated failures

mitigate the reader's self-efficacy and self-concept. That is, the lack of motivation

impedes an active strategy use, which yield missed opportunities for a developing

reader to apply, test, and update their strategic reading abilities.

This reciprocity between strategy, knowledge, and motivation turns out a sort

of Matthew effects in reading (Stanovich, 1986). That is, strategic readers get more

opportunities to develop strategy and knowledge, which allow increased motivation

that contributes to reading competence development, while non-strategic readers keep

un-/de-motivated due to repeated missed opportunities and reading failures. Without

an appropriate level of strategy development matching the levels of knowledge and

motivation development, reading competence cannot be achieved successfully.

Therefore, strategy plays both "essential" and "facilitative" roles in the development

of reading competence (Alexander, Graham, & Harris, 1998).

Pedagogical value of understanding reading strategy

When the concept of strategy is compared with the concept of skill, it is more

evident why strategies should be taught and assessed (Afflerbach, Pearson, & Paris,

2008). Strategies and skills are related concepts but they are differentiated, based on

whether they are automatic or operate under deliberate controls. Skills are relatively

more automatic processes so use of reading skills seems smooth and fast. In contrast,

strategies are relatively more conscious processes so use of strategies seems to need

more attention and control. The more successful readers become in using particular

reading strategies, the less they may become aware of using the strategies. However,

this paradox should not underestimate the importance of reading strategies to

successful reading and the challenges that a lack of strategies may present to developing readers (Afflerbach, Pearson, & Paris, 2008).

The fact that strategies and skills have developmental relationships informs what and how to teach in order to support student readers to achieve reading competence (Afflerbach, Pearson, & Paris, 2008). Developing readers learn and practice strategies until the strategies use become fluent, that is, skilled. As strategies can become skills by learning, practicing, using, and self-reflection, developing readers can become increasingly competent readers. In this light, while skills imply a level of mastery, strategies indicate what student readers can do now and need further to accomplish reading competence.

An automatic and fluent use of reading skills can be understood as a central attribute of proficient readers. So the skills can be conceptualized as the outcome or goal of reading education. Yet skills are acquired from practices of conscious and effortful use of reading strategies, which may be guided by teachers and then finally implemented by students themselves (Dole, Duffy, Roehler, & Pearson, 1991; Garner, 1987; Pearson & Gallagher, 1983). Strategies reflect readers' conscious actions of reading that inform what students can do now and what they need to learn more. Strategies are central to a successful reading and they provide information valuable to helping students become more successful readers. Strategies are pedagogical targets to teach and learn.

Noting the fact that reading skills and strategies are necessarily combined in reading, I use the term "strategies" throughout the study for the pedagogical value implied in the term. Strategies are skills "under control" (Afflerbach, Pearson, &

Paris, 2007), which develop into habitual processes (i.e., skills) through repeated practices, experiences, and instruction. Thus, reading skills reported by highly proficient readers should be transformed and reinterpreted into reading strategies, as pedagogical content of what we must teach for developing readers in classrooms.

2.2. Constructive Reading Strategy Use in Print Contexts

Reading strategies are central to understanding how people read text. This section describes different aspects of reading strategies examined in multiple areas of reading research. These descriptions will provide a theoretical ground for understanding print-based reading strategies as a prerequisite step toward anticipating Internet reading strategies.

2.2.1. Implications from Research on Reading Skills

While research on reading skills did not use the term strategies explicitly, notable works among them—Clymer (1968) and Davis (1944) reviewed in Pearson and Hamm (2004)—inform a description of print reading strategies. Davis (1944) identified nine basic reading skills, conducting a survey of previous research literature. These skills include using word knowledge; selecting meanings of words and phrases in context; following text organization; selecting main thoughts; responding to text-based questions; responding to text-based questions with paraphrase; inference-making about text content; using literary devices; and inference-making about the author. These skills range from retrieving word meaning through understanding explicit and implicit text information, making use of text structure and literary devices, and examining author intention.

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Clymer (1968) offered similar accounts of reading skills, suggesting four crucial skills that should be valued as the outcomes of reading instruction. These skills include decoding; grasping the author argument; testing and recombining the author's message with the reader's background understanding; and applying ideas and values to decisions and actions and extending the author's ideas to new settings. It is noteworthy that third and fourth sets of skills require higher-order thinking currently conceptualized in the reading research literature (Afflerbach, Cho, & Kim, 2011). These skills are used when readers delve into author intention and motive, and also used when readers connect text content with similar problem settings.

While a line of research on reading skills of the past is informative to understanding the psychological nature of reading abilities, it has limitations in describing the nature of active, complex, and intentional readers' acts of reading. An underlying assumption of the research on skills (Clymer, 1968; Davis, 1944) is that reading is merely a set of compartmentalized skills and that a skill use is stable and fixed. It viewed that a sum of skills equates with the phenomenon of reading, and thus learning is accumulated acquisition of each set of skills to help students become skilled readers. The research under-represents roles of other crucial factors that affects reading, such as reader, text, and context.

The research also assumed that reading (comprehension) is captured only through the stimulus situation in which readers answer the questions accompanying by the given passage (Davis, 1944). In effect, this line of research was confounded with test movements in the early 20th century because it was a prerequisite of understanding reading to dissemble complex mental processes into a set of discrete

skills (Pearson & Hamm, 2004). It assumed that skills are completely manageable and trainable with workbooks dealing only with a limited set of skills. Thus, this simple view of reading processes suggested that proficient reading is achieved when students are trained with curricular materials or tests that convey and measure a list of fixed, stable, and limited skills.

2.2.2. Discourse Comprehension

The emergence of cognitive science was a turning point at which reading strategies become recognized a central construct to understanding reading. Researchers interested in propositional text processing described reading strategies as more active, complex, and intentional processes (Kintsch, 1988, 1998; Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983). Reading is not just to construct meaning from words and sentences, but also to build a coherent representation of the whole text.

Van Dijk and Kintsch (1983) described different layers of strategies executed and controlled, taking an example of reading a *Newsweek* article on political events. Readers start reading with a general goal of information acquisition about political events: To communicating with others, to learning more, to develop personal interest, or to make a political decision. Prior to getting into the processing of text content, readers look at the headline and predict what text content might be, judge whether the text to be useful to achieve the reading goal. They then decide whether to keep reading or not. Up to this point, readers use general reading strategies to set up reading goals, activate prior knowledge, and anticipate text content.

During the reading of the *Newsweek* article, readers analyze and interpret text information by parsing and combining propositional relationships among text

information. Readers recognize and interpret meanings of words, sentences, and paragraphs and relate different ideas to one another. They attempt to derive a topic, theme, gist, or macro-proposition for the text as a whole, keeping their goal in mind. Over the course of reading, readers use a number of strategies to combine text information with a variety of knowledge related to both micro- and macro-structure of the text, general political affairs and specific political events described in the text, and genres and publications types. Readers integrate these knowledge sources with text content and construct a coherent mental representation.

This example foregrounds the roles of "propositional understanding" and "knowledge use" in building a mental representation of text. First, a propositional network must be constructed, edited, and then integrated (Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983). The Construction-Integration (CI) model suggests that reading comprehension consists of two steps of extracting and constructing meaning. The reader builds a "text-base model" that represents text content (Construction processes) and then refines the text-base model with their knowledge and transforms it into a "situation model" that represents the reader's understanding of a gist of text (Integration processes).

The text-base is a linguistic level of understanding to represent both the local and global text structure. At the level of microstructure, readers recognize words, parse and relate propositions, and elaborate and infer meaning between the propositional elements, by using general knowledge about the word, syntax, and the world. At the macrostructure level, readers then assign connections of all pairs of propositions, make interrelationships among the information resulting from a series of

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micro-processing strategies, and construct a global representation of text meaning.

Yet these "construction" processes are insufficient alone to guarantee text understanding because the network of propositions constructed may be incoherent or inconsistent. Propositional processing has been performed but it happened without a consideration of the reader' goal and awareness of contexts. Building a situation model is, thus, crucial to understanding text meaning because it is the process to eliminate unwanted information, select relevant information from the text-base representation, and integrate selected information into a coherent representation.

Second, readers' knowledge—diverse types of knowledge, in relation to text structures, genres, topics, and reading goals—plays a crucial role in these construction-integration processes (Kintsch, 1988, 1998). Information for a specific strategy use comes from many sources, such as textual cues, contextual information, and prior knowledge. Among those different strategies there are hierarchical relations. Strategies operate on an understanding of written text as a whole set of different levels of propositions. However, these processes involved in text comprehension are under a control of schema, that is, a theoretical structure of the reader's knowledge and goal. The overarching communicative goal and activated prior knowledge about language, text genre, and the world to a largest degree influence the use of text processing strategies. Thus, strategies for understanding text content (i.e., text-base model) and grasping a gist understanding (i.e., situation model) may vary according to what and how knowledge and goal the reader brings into reading.

2.2.3. Prior Knowledge Use

A considerable amount of knowledge must be activated and used for a

successful reading. The schema-theoretic view of reading suggests that to perform a strategic reading means the constructive process to relate the reader's prior knowledge with information in the text (Anderson & Pearson, 1984; Pearson, 2009). Anderson and Pearson (1984) illustrated these processes in the following manner:

> Whether we are aware of it or not, it is this interaction of new information with old knowledge that we mean when we use the term comprehension. To say that one has comprehended a text is to say that she has found a mental "home" for the information in the text, or else that she has modified an existing mental home in order to accommodate that new information. (Anderson & Pearson, 1984, p. 255)

A schema is an already-structured knowledge in mind. This abstract structure contains the ideas about particular content that are interrelated to one another within a network. In this network, a related corpus of knowledge is conjoined together in a meaningful way. Once a text-related schema is activated, it acts as a "semantic dragnet" (Anderson & Pearson, 1984) that helps the reader captures and understands schema-related text content.

Sometimes, a schema plays a role of semantic filler that complements the lack of explicit linkages between segments of text information. Thus, a mismatch between schema and text content may cause comprehension problems. At this point, the reader feel difficulty making sense of text content and would try to find alternative solutions (e.g., looking for an alternative schema or external sources that contain needed information that can eventually take the role of schema). Throughout these processes, the schema itself is reorganized and modified with the newly integrated information. Meaning is constructed where the reader's knowledge and text information are integrated, that is, when the schema is updated.

Schema theory explains two important aspects of reading strategy use:

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inference-making and attention adjustment. First, schema helps the reader infer text content with limited information (Anderson & Pearson, 1984). To comprehend the text, readers select a text-related schema among many in their mind. They seek out a pertinent slot within the schema matched with particular text content. When readers feel the lack of knowledge or insufficient schema information, they routinely assign a default value of the schema—a general assumption or common knowledge of particular text information, usually shared with the reader and the author—and draw a conclusion based upon the default schema use.

These inference-making is a central part of the process of connecting a schema to text information. Accomplished readers routinely and spontaneously integrate text ideas with their prior knowledge. By doing so, they draw inferences to guess what the text says about beyond the explicit information in the text. This inferential reasoning is different from less strategic readers' behaviors. Non-strategic readers often fail to use their knowledge to make inferences on what the text means. They reluctantly weave the information given in a text into a coherent overall representation, and seldom infer unstated or implied meaning by relating all the pieces of information.

Another implication is that a schema contributes to the reader's ongoing adjustment of attention (Anderson & Pearson, 1984). An effective use of schema allows the reader to distinguish important information from trivia. To understand text is the process of conducting a continual update of the reader's schema that represents text meaning. Before reading, strategic readers overview text content and decide which parts to process by applying their text-related schema. During reading, the

schema is being assimilated with already-processed text information, and this modification helps readers judge the importance of upcoming text elements. Strategic readers devote extra attention to the elements that surpass a criterion of importance, or less attention to the elements that are judged as trivia or unimportant.

This selective attention has an impact on final outcomes of comprehension (such as remembering). For accomplished readers, a prior knowledge use happens mostly in an automatic way. However, with a challenging text causing a larger meaning gap between text content and schema, readers should use their prior knowledge in a very conscious way. In other words, they should look for alternative knowledge sources if their prior knowledge deems insufficient. A prior knowledge use is central to a success in understanding text content. Appropriate use of prior knowledge is a key trait of strategic readers ably controlling their reading processes.

2.2.4. Inference Generation

Both theories of text-based and schema-driven comprehension suggest that inferences are important reading strategies to allow an integration of one's knowledge and text content. Graesser & Kreuz (1993) defined "knowledge-based inferences" in the following manner:

> Knowledge-based inferences are produced during text comprehension when world knowledge structures are activated, and the content of these structures is incorporated into the constructed meaning of the text…. Knowledge-based inferences are inherited (i.e., activated and copied) from these world knowledge structures during the process of comprehending the explicit text and constructing a "situation model" associated with the text. (pp. 146-147)

Inferences necessarily involve, while the degree of involvement may vary, dynamic interactions among text, knowledge, and goals (Graesser & Bower, 1990;

Graesser & Kreuz, 1993). Inferences are generated for various questions that readers pose to enhance text understanding. These questions are to predict (What does the title mean? Why does the author put this title?), to clarify and elaborate (Why did this event occur?), to process at the local level (How does this information relate to what I've read above?), or to understand global meaning (What is the main point, moral, or massage?). Even though some inferences are generated quickly and automatically (especially for local inferences), inference-making processes in general are regarded as conscious processes (Graesser & Kreuz, 1993).

Inferential reasoning accounts for an important aspect of reading strategies. Reading is not just to understand the information explicitly presented in the text. Readers must understand the written text by guessing the implicit meaning beyond the explicit text information by integrating prior knowledge and text content. Inferences are required because the text constructed with linear written language is naturally not a perfect device to contain and convey all the author intends. Inferences are needed because the author often presents ideas and thoughts in an implicit way, in order to provoke readers' curiosity, attention, and tension. Inferences are also requested because the author's perspectives, intentions, and purposes are hidden beneath the surface of written text. Thus, without properly generated inferences, readers would experience difficulty fully grasping the meaning of what a challenging text implies and what the author really wants to say through the text.

Different types of inferences were reported in reading inquiry, such as causal, thematic, temporal, lexical, or anaphoric (Graesser & Kreuz, 1993). All of these inferences are "real-time" processes that occur during reading. Yet, as noted in

Graesser & Kreuz (1993), inferences are generated also "after" reading. These inferences can be a critical help for readers to further interrogate the text read and their understanding of the text, built upon the meaning that has been constructed "during" the reading.

While these types of after-reading inferences have not been under consideration of research on inferences (Graesser & Kreuz, 1993), it is noteworthy that people often reread the text or look back on their reading after reading the text from the front to back. These readers may develop the meaning that might have been missed, ignored, or not-yet fully interrogated. These *post hoc* inferences would be related to readers' self-reflection on what they have learned from text, what they have constructed from reading, and what they have done for meaning construction.

2.2.5. Metacognition

That reading requires strategy use under deliberate control calls another questions of what makes readers control these conscious (or automatic) processes. What function of human mind allows a judgment of the efficiency of a particular strategy use? What guides readers' decision-making to seek out alternative strategies? Strategic reading is a self-controlled act. It requires readers' self-reflection on their own reading processes. Metacognition is an important characteristic of strategic readers who are able to independently control, assess, and amend their own reading processes (Baker & Brown, 1984, Garner, 1987, Paris, Lipson, & Wixon, 1983).

Flavell (1976), a developmental psychologist, coined the term "metacognition" as knowing of knowing. He conceptualized that metacognition functions as both knowledge of one's own thinking processes and orchestration of those processes.

Knowledge or awareness of the task and the self allows executive control of behaviors in accomplishing the task, which helps one's decision-making and deliberate actions. These metacognitive "experiences" eventually help ones know better about their acts involved in certain task settings.

Metacognition is central to a success in reading as a series of problem-solving processes (Olshavsky, 1976-1977). Reading becomes an easier and more joyful event when readers can minimize cognitive demands to cope with comprehension impairments that may be used otherwise for more productive construction of meaning. Comprehension monitoring is an example of metacognitive strategies. It allows readers detect and solve comprehension problems at any point of troubled situations in the course of reading. These self-controlled actions are core strategic behaviors, which is a clear distinction between experts and novices or between strategic and non-strategic readers.

Baker and Brown (1984) delineated reading-related metacognition into "metacognitive knowledge" and "metacognitive control." Metacognitive knowledge refers to knowing of ones' mental resources, the availability of the resources in the reading situation, the compatibility between themselves as readers and the reading situation. Metacognitive control refers to regulation of ones' own reading processes, that is, the self-regulatory mechanism used by active readers who aim to solve comprehension problems in an ongoing manner. These self-regulatory strategies include planning reading, monitoring the process of reading, testing the strategy efficiency, seeking for alternative strategies, and evaluating aspects of reading. It is

noteworthy that metacognitive knowledge supports metacognitive control, and the control affords an update of metacognitive knowledge.

Jacobs and Paris (1987) further described metacognition in a different way. They defined metacognition as a joint functioning of self-appraisal and self-management. The first component "self-appraisal" requires different types of knowledge as declarative, procedural, and conditional. Declarative knowledge refers to a propositional knowledge about task structure, task goals, and one's abilities (knowing of "what"). It relates to knowing of what goals are pursued, what is known about text, and what can be done for text comprehension. Procedural knowledge refers to a strategic knowledge of the execution of various problem-solving actions (knowing of "how"). It is about knowing of how to connect prior knowledge with text, how to skim, summarize, or derive a theme, and thus how to use their own knowledge and strategies. These two types of knowledge provide important information for readers who should use their knowledge and strategies.

Yet both declarative and procedural knowledge are insufficient alone to ensure readers' strategic reading. These types of knowledge address readers' own intellectual resources and ways of using them, but are silent about the "situations" in which readers wish to use particular controlled actions. Successful reading requires readers' self-assessment of whether they are actually being aware of situational factors of reading. Thus, another type of knowledge is required, that is, "conditional knowledge." (Paris, Lipson, & Wixon, 1983) This knowledge is about knowing of "when and why" to apply various strategic actions. It provides readers with the rationale for use of particular strategies.

The second component is "self-management." This is similar to Baker and Brown's (1984) metacognitive control, an executive function of thinking processes. Self-management subsumes planning, monitoring, and regulation of actions. Planning is for a selective and coordinated use of strategies pertinent to a particular goal. Readers make a plan for reading by considering their reading goals, text characteristics, and task situations. Planning is important to an initial direction of strategic behaviors. Thus, the more sophisticated plan readers develop, the more efficient strategies they can use.

Initial plans often are modified or rejected, according to the results of readers' monitoring of their reading in unpredicted and thus challenging reading situations. Comprehension monitoring is central to self-management because it is an ongoing assessment of readers' acts of reading. Active readers keep in mind the fact that their plan for reading might not be perfect and could be failed, and thus conduct a continual monitoring and evaluation of their understanding. Comprehension monitoring informs readers of the progress of task performance (successes or failures, more or less demanding). It helps readers' allocation of cognition, attention, and focus, and eventually contributes to meaning construction.

In sum, reading-related metacognition can be defined as readers' being cognizant of their own reading processes situated in the reading context, and being able to regulate reading by orchestrating diverse strategies. Metacognitive knowledge acts as cognitive resources that help self-regulatory strategy use. Self-regulatory strategies enable readers to transform their metacognitive knowledge into a more refined knowledge. Metacognitive strategies in reading are higher-order thinking

processes executed in an ongoing way. Metacognitive strategies are for an ongoing construction of "meaning" and "the self." Readers who are able to perform this self-assessment are more likely to succeed in achieving their goals for reading.

2.2.6. Source Evaluation

Reading often demands both "reasoning with text" and "reasoning about text." (Rouet, Britt, Mason, & Perfetti, 1996). Reasoning with text means understanding meaning, both straightforward and hidden in text. This enhances "reasoning about text," that is, critical evaluation of different aspects of text, including credibility and trustworthiness. This "source evaluation" is a critical reading strategy important to successful reading of texts.

Research on domain-specific reading in history (Afflerbach & VanSledright, 2001; VanSldedright, 2002; VanSledright & Kelly, 1998; Wineburg, 1991a, 1991b, 1998) and science (Korpan, Bisanz, Bisanz, & Henderson, 1997; Norris, Philips, & Korpan, 2003) examined what strategies are requested for source evaluation. Wineburg (1991b) argued that historical reading requires a line of ample strategies to understand "subtexts," which is a hidden or latent meaning of text(s). Wineburg (1991b) described reading subtext in the following manner:

> In fact, many subtexts include elements that work at cross-purposes with authors' intentions, bringing to the surface convictions authors may have been unaware of or may have wished to conceal. These aspects fall into the second sphere, the text as a human artifact, which relates to how texts frame reality and disclose information about their authors' assumptions, world views, and beliefs. It is a reading that leaps from the words authors *use* to the types of people authors are, a reading that sees texts not as ways to describe the world but as ways to construct it. (p. 499)

In this description, problems in reading are not just with deciphering

propositional information and constructing main ideas. Problems are also related to delving into hidden assumptions, views, intentions, and purposes. These problems would be addressed and solved by questioning and evaluating subtexts.

Critical reading strategies involved in delving into subtexts is a central index to tell readers who can read like historians or not (VanSledright, 2002). Wineburg (1991a) juxtaposed novice and expert readers in history by observing how differently historians and high school students read multiple texts about a historical event. This study demonstrated that text evaluation relied on the reader's understanding of subtexts. For example, historians with a textbook passage assessed a hidden perspective on the historical event posited by the author, and determined it as an untrustworthy source. In contrast, high school students noted the same textbook passage as the most believable source because straightforward information was well organized and reported. These student readers used diverse reading strategies to process text content (e.g., factual information on the historical event stated in the text) and to identify main ideas but failed to delve into its subtext. As a consequence, the student readers were not successful in evaluation of texts central to historical reasoning.

This difference between expert and novices comes from different epistemic beliefs of history, texts, and historical reasoning. Students viewed texts as stable discourses and containers of factual information. History is understanding factual information about historical events, and thus historical reasoning is the process of gathering information and understanding a straightforward message stated in text. In contrast, historians viewed texts as organic discourses and media of a latent meaning.

For these expert readers, historical reasoning is to infer subtexts.

To sum, historical reading processes informs a description of text evaluation strategies. Strategic readers deploy sophisticated strategies not just to build a text representation but also to construct a representation of its subtexts. The model of subtexts reflects an understanding of the author's views and purposes. This understanding of latent meaning requires higher-order reading strategies, such as sourcing (e.g., to interrogate when and where the texts were written by whom), corroboration (e.g., to compare and contrast, interrelate, or reconcile different claims, perspectives, evidence from different sources), and contextualization (e.g., to reconstruct a historical event in the text by imagining the temporal and spatial context in which the event occurred). These critical strategies contribute evaluation of texts in terms of how texts present valid arguments, what roles of one text play in reading other related texts, to what extent texts are believable and trustworthy.

2.2.7. Critical Stance

Text is social construction. A text represents certain perspectives, ideologies, and power relationships, surrounding the text, between the author and the reader. Conscious readers are not neglect to examine what values, perspectives, and ideologies the text is trying to say. Reading is not entirely an individual activity. It is a socially situated activity in which readers engage in critiquing the text and participating in the discourse (Gee, 2008).

Luke and Freebody's (1997) four-resources model of reading is useful to describe critical evaluation strategies. The model considers both what are necessary and what are requested further to build a sufficient understanding of text. It illustrates

four-tiered, interconnected abilities of reading: coding, semantic, pragmatic, and critical competences. Each of these competences imposes different role to the reader: code breaker, text participant, text user, and text analyst.

Critical reading, like any sort of reading, starts from a basic, essential of decoding and comprehending written texts. Reader as code breakers must first decode written texts (coding competence), using knowledge of language, including alphabet systems, phonics, and print concepts. Coding is important to critical reading because it allows an access to the meaning of written texts. Readers then take a role of text participants, who can think more about understanding (semantic competence). This competence is the very knowledge and ability to make meaning from written texts.

In addition, critical reading involves use of meaning. For this, readers as text users must be able to ask what to do with texts and how the texts can be used (pragmatic competence). This figures in diverse contexts of reading, such as examining loan contracts, analyzing the job descriptions to prepare application portfolios, critical questioning about textbook passages to participate in a classroom discussion. Also, readers as text analysts must look beneath the surface text information and delve into a hidden meaning (critical competence). Text analysts are sensitive to the nature of texts as "public artifacts available to critique, contestation and dispute" (Luke, 1995, p. 110) so that they can spontaneously analyze, interpret, evaluate, and critique the texts.

Critical readers conduct an ongoing inquiry of what texts are trying to do to them and whose interests are intervened in the texts. Texts construct and represent the world so critical readers should conduct educated guess hidden assumptions, intents,

perspectives, and arguments. Critical competence is broadly required in reading diverse texts in everyday contexts, including newspapers, magazine articles, commercial and political advertisements, and so on. These texts attempt to persuade something to us, intending to buy the authors' opinions, arguments, beliefs, and ideologies. Critical readers must be able to perform a careful "second guessing" of what and how texts means to themselves.

Reading with critical stance is required in understanding and evaluating texts. Reading is not a stable phenomenon but a malleable practice to question, value or critique what texts are intended to "say." Evaluative strategies and mindsets would contribute to a critical understanding of hidden perspectives, assumptions, beliefs, motives, and arguments that texts construct. Texts can be challenged and their authorities are determined by how readers interpret and value them.

2.2.8. Multiple Text Comprehension

While reading research of the past decades informs an understanding of reading a print text, a great deal of recent research examined reading in a more complex task that often demands of readers understanding more than one text (Hartman, 1995; Wolfe & Goldman, 2005; Stromso, Braten, & Samuelstuen, 2003; Afflerbach & VanSledright, 2001; VanSledright & Kelly, 1998; Rouet, Britt, Mason, & Perfetti, 1996; Rouet, Favart, Britt, & Perfetti, 1997; Wineburg, 1991b, 1998). This line of research suggests that building intertextual links is central to understanding multiple documents (Hartman, 1995). Meta-representation of multiple texts is constructed by a variety of "linking" strategies, including comparing, contrasting,

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relating, and differentiating information from different texts (Afflerbach & Cho, 2009).

The reading of multiple texts is the process of "deconstruction *and* reconstruction of links among textual resources" (Hartman, 1995, p. 556). Readers construct intertextual links in the mind, through dynamic moves between one text and another (Hartman, 1995; Wineburg, 1998). For example, in the beginning of reading with multiple texts, readers concentrate on the current (single) text. This initial understanding of a text is both referenced and revised as readers get to know better about subsequent texts. At this point, strategic readers would rearrange a focus of reading and allot increased attention to assembling the meaning constructed from different texts (Braten & Stromso, 2003). Readers draw a mental bird's eye view reflecting the global meaning structure across the texts as they proceed to the subsequent readings. When detecting a lack of prior knowledge or an insufficient understanding of previous (or current) texts, strategic readers reserve a judgment of the texts and try to solve the problem. They would move back and forth between texts, identify interrelationships of texts, and situate the problem in a broader, evolving meaning constructed by these intertextual moves (Wineburg, 1998).

In summary, strategic readers learn the content conveyed across different texts, relating the currently read text to previous texts, cross-referencing and extracting related information, assembling different ideas into globally coherent meaning, and continuously elaborating a cross-textual mental model—synthesis strategies are highly required in the construction of cross-textual meaning. Readers with multiple texts attend to simultaneous processes of constructing meaning within

and across texts, and this load creates further demand for the management of these processes through monitoring. The maturing global understanding of different texts plays a role of tentative knowledge structure, based on which readers monitor their own comprehension processes during the reading of subsequent texts. Finally, strategic readers are able to not only build an argument model of multiple sources and contents, but they also employ the model to evaluate the usefulness and trustworthiness of the individual documents.

2.3. Constructive Reading Strategy Use in Internet Contexts

Our understanding of reading and reading strategies must evolve along to changes in literacy environments. This section considers (con)textual characteristics of Internet reading and newly demanding strategies. Internet readers should actively respond to the text environment on the Internet situation in which they read large numbers of multiple texts that are linked in a complex hypertext structure. These multiple Internet texts are more likely multimodal texts in which more than one mode are coexisting. Internet readers should conduct information seeking, navigating in this huge network of information space. Informational sources on the Internet should be screened, examined, and evaluated by readers' critical standards. The focus of this section is to illustrate Internet readers' strategic acts to identify, address, and solve the problems that are increasingly prominent in Internet contexts.

2.3.1. Information Search

The tasks used (or assumed) in most research studies related to traditional print reading (or reading in traditional classroom settings within a print-based

paradigm) are the situations in which participants (or students) read one single text or a limited number of texts that are pre-selected and given by the researcher (or teachers). In contrast, in Internet reading contexts, multiple texts mean virtually an infinite number of digital information sources potentially to be accessed, selected, and read by Internet readers. While new and traditional forms of reading have many commonalities, the difference in the size and scope of text environment instantly or potentially available for readers between print reading and Internet reading makes both forms of reading somewhat or more considerably different.

Readers with multiple texts, whatever they are print or digital, must compare and contrast each text; find out supportive or contradictory relationships among the texts; and evaluate different aspects of the texts using internal and external evaluation criteria. Yet it is impossible to access, read, and connect all of these texts in this unbounded text environment because Internet contexts present the universe of texts to readers. Internet readers must narrow down an open-wide information space into manageable chunks of information. Internet readers must ask what texts they shall read, how to identify those texts, and what kind of criteria to be employed in the process of accessing and locating relevant texts (Coiro & Dobler, 2007).

Internet contexts demand that readers conduct a strategic search for relevant and credible texts (Kuiper, Volman, & Terwel, 2005). Internet readers do not just read and focus on a single webpage, but they also imagine potentially useful texts and possible routes to the texts above and beyond the webpage. In this light, information-seeking behaviors of Internet readers reflect conscious processes to collect more relevant and useful texts to read further and more deeply. When readers are able to

make a collection of relevant texts through Internet searches can get more opportunities to enhance reading for understanding. When readers experience repeated difficulty finding relevant texts on the Internet, their cognitive efforts would not be utilized for more productive making meaning. Proficient information-seeking strategies are necessary for a successful reading on the Internet.

Suppose a strategic student reader using the Internet to complete schoolwork. She would start Internet search to access Google and apply search terms. The search would result in hundreds thousands or millions of website entries with their Uniform Resource Locators (URLs). She would scrutinize first three to five Google search entries, and anticipate where each of the links leads her. If she found an entry deemed useful, she may click on it. If not, she scrolled down the webpage slowly and examines a few entries more. After a few times of trial and error, she may think of more specific search, reflection on her goal, by modifying the search terms she used or generating more specific key words.

This reading, in the very beginning of Internet reading, demonstrates the student reader used several sophisticated strategies for information search. She generated and modified search terms based on her reflection on goal as well as on her search. She carefully examined minimal information emanating from Google search entries and determined the usefulness of the links before selecting. This quick cycle of sense making, evaluating, and monitoring guides her Information search processes.

Strategic readers explore and sample specific links to check on the suitability of information for helping achieve the goal of reading. Readers must infer or predict the utility of links in Internet text when confronted with more than one hypertext link,

and this is often done with relatively quick judgment using minimal information (Leu et al., 2007). Or, it may be an inference based on more detailed consideration of the information found by clicking through to preview particular web pages and websites.

Concurrently, strategies readers generate inferences about the relevance, or goodness of fit, of alternative links on the pages visited (Lawless, Brown, Mills, & Mayall, 2003). Strategic readers choose the reading order by accessing links based on criteria of coherence among links and apparent relevance of the website or webpage to the specific situational interests (Protopsalitis, 2008). As reading continues, readers conduct complementary searches with modified or revised keywords in order to better clarify suitability of links and potential reading path (Salmeron, Canas, Kintsch, & Fajardo, 2005).

Taken together, a number of strategies are important to successful Internet search. First, Internet readers should be proficient in generating and using search terms (Guinee, Eagleton, & Hall, 2003). These terms are not randomly generated and used, but rather these may come from readers' proper use of prior knowledge related to the topics, awareness of the goals for reading, and the knowledge of web search engines. When the term applied fails to produce hyperlinks to relevant websites, Internet readers need to generate alternative search terms. Sometimes, using a single key word is enough to list abundant entries of web sources, but often multiple discrete terms are needed for more focused search results.

Different search engines have different characteristics and focuses, so that Internet readers should be able to switch one to another. When the key word searches are not fully effective, Internet readers also conduct a complementary browsing using

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the categories that are pre-organized on the Web search engine. This Internet search strategy is somewhat similar to search the book for specific words, phrases, or information. However, there is also different characteristic because Internet reading almost of all begins with searching while searching is an optional act for print reading.

Second, Internet searching involves strategies for selecting information sources useful to achieving the goal for reading (Salmeron, Canas, Kintsch, & Fajardo, 2005). While non-strategic adolescent readers often highly reactive and their searching processes largely depend on what they saw on the screen (Fidel et al., 1999), strategic readers impose the criteria of relevance, usefulness, and importance in choosing possible sets of text to further read in an in-depth manner (Coiro & Dobler, 2007).

Prior to conduct focused reading of websites, Internet readers must overview resulting entries of websites and evaluate which is more relevant to them. This strategy is very similar to print reading strategies, such as conducting an overview of texts and deciding which parts will need readers' particular attention and focus. However, this hyperlink selection strategy is different than print reading strategy in that resulting websites and a body of texts can be determined by this strategy. This strategy, as it has been illustrated in strategies for reading hypertext, is for reducing the uncertainty that the Internet presents, narrowing down the scope of the texts to be processed and managed, and constructing a chunk of texts to be processed into a coherent meaning.

Third, in search of relevant texts and links, readers must maintain their awareness of reading goals while performing multi-layered inferences (Coiro & Dobler, 2007). They must predict the relevance of displayed hyperlinks in advance, often based on multi-layered information displays, determine the most appropriate next move and link, and infer the relevance of a link, sometimes with minimal information. In addition, they may need to preview a text offered in a link, while predicting how far it might take them towards (or from) the reading goal. This seems to be a unique strategy in comparison with print reading strategies. Internet environments present multiple layers of information sources that are connected with a strong or loose relationship, or arbitrary or unintended links. Multi-layered inferences are needed to discern related and unrelated or wanting and unwanting sources among these relationships.

2.3.2. Hypertext Processing

Multiple information sources on the Internet are connected by hyperlinks. Landow (1992) defined computer hypertext as "text composed of words (or images) linked electronically by multiple paths, chains, or trails in an open-ended, perpetually unfinished textuality described by the terms *link, node, network, web,* and *path*." (p. 3). Hypertext is a central characteristic of digital information network. Hypertext affords readers a variety of possibilities to larger numbers of texts that convey diverse topics, issues, ideas, arguments, and opinions through different modes of information representation.

On the Internet, numerous webpages contain texts, images, animations, video and audio clips, and so forth. These digital texts conjoined by hyperlinks constitute

the Internet as a huge intertextual information system. As Landow (1992) noted, hypertext is characterized by "a fundamentally intertextual system" and "has the capacity to emphasize intertextuality in a way that page-bound text in books cannot" (p. 10). None of the text in this hypertext structure surpasses others. There is no center or beginning and ending. This intertextual environment (or hypertextuality) calls for active readers able to make their own routes on which texts are constructed and deconstructed.

While sometimes hypertext refers to a sort of technologically related texts, the meaning of "hyper" is actually realized by the reader's choice of links and texts and depends on ways of reading hypertext (Dillon, 1996; McEneaney, 2000). Regarding the nature of hypertext reading, it seems not plausible to apply a dichotomy of "Internet reading as hypertext (or non-linear) reading" and "print reading as non-hypertext (or linear) reading." Indeed, neither all acts of reading on the Internet are hypertext reading, nor all types of reading with print texts happen in a linear fashion.

Internet reading could be driven by a non-linear fashion of reading. To read only a webpage without hyperlinks from the top to the bottom is not hypertext reading, even though it takes place on a screen. Or when readers ignore hyperlinks being present on a webpage and read through the beginning to the end without clicking them, it seems not to be hypertext reading even if the webpage in itself is hypertext. These ways of non-linear reading happened in a hyperspace are very much similar to the reading of print texts in which the reader follows the order of reading that the author determined without consciousness of possible divergent, idiosyncratic routes of reading.

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Print reading also could be hypertext reading, depending on the reader's determination of reading order. To search for and read information from a book often involves nonlinear reading behaviors. In this reading, the reader very often uses indexes and table of contents to locate target information. On a particular page, the reader may find a superscript on a certain word, sentence, and paragraph, and then look up footnotes at the bottom of page or endnote at the end of section. Or the reader, typically with newspaper, starts to read by skimming headlines, seeking a couple of interesting sections and articles, and then selectively read the articles. These reading processes are very much similar to those for locating and selecting links and texts in a hyperspace and determining the order of reading.

While the commonalities between print reading and hypertext reading, it is noteworthy that demands of hypertext reading are much higher in reading on the Internet than that with print texts. This is not just because Internet texts are mostly hypertexts. But it is also because conscious readers, being aware of the benefits of hypertext for their reading and learning, must simultaneously process both chunks of information and a series of links to construct their own text environment that potentially offers more opportunities to read and learn. The need for processing both information and links is a very distinctive feature of Internet hypertext reading, compared with reading print texts without explicit forms of hyperlinks. Hyperlinks are prepared for activation and await realization by readers' choices (Bolter, 1998). Hyperlinks afford readers' intentional moves to another segments within the text or to another texts in the network (Charney, 1987). Thus, hypertextuality of Internet

contexts yields a unique "situativity" of Internet reading, and it should be considered

in describing conscious processes entailed in Internet reading.

> Electronic texts that incorporate hyperlinks and hypermedia introduce some complications in defining comprehension because they require skills and abilities beyond those required for the comprehension of conventional, linear print. (RRSG, 2002, p. 14)

Suppose a search for Internet texts on the topic of obesity. Each of the

resulting entries that *Google* produced on obesity has more than one link. These links

leads readers to webpages in unidirectional or mutually referential ways. For

example, on a *Wikipedia* page almost every sentence has a link or two that are

connected to other parts of the webpage. Another website has several hyperlinks

allowing readers to dynamically move in and out of the website. This example evokes

questions. Are all these links are beneficial for learning about obesity? Should a

reader click on every single of hyperlinks whenever encountered? Or should the list

of links be skipped and read selectively? Once selecting a link and the source

connected through it, does hyperlink selection stop or need more decision-makings?

These questions are queried at every point of reading these hypertexts, and connote

different or new aspects of Internet reading in comparison with print reading.

Hypertext reading is marked by readers' construction of their own reading

path. Although there are variations in choosing the reading path in linear print reading

situations (e.g., scanning the table of contents and then reading the target page, going

back to a previous part of text to confirm one's understanding), the principle rule in

this print reading is to follow the path the author organized (e.g., following the order

of words, sentences, paragraphs, chapters). However, hypertextuality increases both

readers' responsibility and autonomy. Internet readers are allowed to select their own

individual reading paths by choosing hyperlinks, reflecting on their purposes, needs, and interests. Readers make decisions from a start through an ending point in the course of constructing their reading paths. They must pay attention to orienting themselves by making continual choices of where to go next. In this sense, hypertext calls for active readers who are able to efficiently and meaningfully form the reading path and eventually construct texts to read.

All the preexisting categories of strategies—meaning construction, monitoring, and evaluation—are necessarily required for a better construction of the reading path (Coiro & Dobler, 2007). Readers do not process entire texts that they encounter. Strategic readers overview and predict whether the texts are what they wanted to find. As Internet readers plan search tactics, generate and use search terms, visit search engines, and seek relevant sources, they often interact and learn with multiple sets of Internet texts. In this course, Internet readers must have continual evaluative mindsets during the text construction. Strategic readers evaluate sources and links, with limited information presented on hyperlink entries, front pages of websites, or through a few trials of link selections. These anticipatory evaluations help readers choose and access more relevant sources. These overall procedures of text construction provide readers with background information what they want to learn, which will eventually contribute to the meaning construction across the texts they constructed.

Finally, these processes to construct, learn from, and evaluate the texts are monitored under readers' metacognitive control. Strategic hypertext readers must monitor their navigational processes to avoid getting lost in a complex hyperspace.

Readers must determine if their original reading goals can be maintained or change as a result of navigating Internet environments and if incoming information can change the reading path and reading goals. When readers fail to monitor their reading acts to choose relevant Internet links, sites, and information in a strategic and coherent manner, the basic assumption of an available, relevant text is not guaranteed.

Inefficient monitoring may cause readers' disorientation in hyperspace (Yang, 1997), and repeated failures to monitor may result in the exhaustive but non-productive use of Internet navigation and hyperlinks (Fidel et al., 1999; Lazonder, Biemans, & Wopereis, 2000; Leu et al., 2008; Niederhauser, Reynolds, Salmen, & Skolmoski, 2000; Schacter, Chung, & Dorr, 1998). These processing impairments can result in ineffective text construction and comprehension.

2.3.3. Multimodal Text Comprehension

Information on the Internet is presented via multiple forms, and this situational characteristic creates possibilities and challenges at the same time. From a perspective of multimodal semiotics by Kress and Van Leeuwen (2001), modes are "semiotic resources which allow the simultaneous realization of discourses and types of (inter)action" (p. 21). Multimodality is the multiplicity of modes "as the use of several semiotic modes in the design of a semiotic product or event, together with the particular way in which these modes are combined" (p. 20). For example, when a teenager posts up a daily journal with written paragraphs and pictures on her blog, modes are writing and images and these make the posting as a multimodal text to present its meaning with combined modes. The teenager, a multimodal text writer, uses diverse edit functions, attaching image files, adding captions, and finally

coordinating written texts and visual images. Today's technologies for creating and using diverse forms of information presentation make the innovative progresses of this kind of multimodal Internet writing. It becomes easier and easier to apply the technologies to create multimodal texts, and thus multimodality is made easy, usual, and natural by these technologies (Kress, 2003).

Once we click the link to the website of the World Health Organization (WHO, http://www.who.int/topics/obesity/en/), one of the resulting entries from a *Google* search with the term "obesity," what is presented on the website is mostly written information. At a glance, this webpage appears to be unimodal and its major mode is writing. Written texts provide a brief explanation about obesity and its serious risks to people's health. Other textual information is used for subtitles and menus with hyperlinks that lead to another parts of the website. These links and menus imply that they contain information on diet, physical activity, obesity, statistics, WHO programs and activities, related topics, etc. There are only two thumbnail images of African kids in different places in this webpage. One of the two images is not activated, but the other has a hyperlink. The caption of the image link is "Malri's story: facing obesity." The caption implies that this image leads to a narrative of this African child. Overall, this webpage appears that a dominant mode is writing and images are supplementary, because most information is presented by written texts.

It is noteworthy that the images and captions compete for readers' attentions. Readers may not ignore what the images can say to them. However, in this webpage different modes (e.g., writing and images) are taking different roles. Readers may attend to the two images, after (or before) a quick skimming of the webpage. They

may questions: Why are they kids? Are they living in Africa or another country? Or are they in this country? Is this about these kids' stories and an example of obesity issues? When the image link is clicked, it leads to another webpage that presents 10 thumbnail images with written information on the-third-world peoples who suffer from different chronic diseases. One of them is Malri, a five-year-old obese child who is suffering from a number of chronic diseases due to his obesity problem. At this point, readers may feel that obesity is not just about America but also about the countries with poverty and our world. When the Malri's thumbnail is clicked, another window pops up. The new five image slides and accompanying written information are presented to depict Marli's diseases and pains, families and neighbors, and life conditions. When readers watch the slides telling Marli's story, they may sense that obesity is not just about fatty hamburgers and fries but rather about poverty, weak life conditions, or a lack of knowledge and supports.

This example raises several questions, both theoretical and empirical. What strategies are involved in Internet readers' processing of multimodal texts? What sorts of criteria are employed to understand these texts? How do readers use their actions as strategic viewers? How do Internet readers judge different roles of modes in their meaning construction? How do they construct a coherent meaning across the modes? There are needs for research on these aspects of new forms of reading. Noting the notable lack of research, theoretical works on multimodality provide some insights to help inferences on strategies for reading these disparate forms of information. Kress (2003), taking an example of reading a multimodal website, argues the importance of multimodal characteristics of Internet reading:

The significant point … is that 'reading' is now a distinctly different activity to what it was in the era of the traditional page. Reading is the imposing of the reader's order on this entity, an order which, while of course responding to what is here, derives from criteria of the reader's interest, disposition and desire. This is reading as ordering. Even when I have decided to enter via a category on the menu, it is my choice which category I choose to enter. (p. 138)

Kress (2003) provides a synopsis of strategic reading of the multimodal webpage: modal scanning, deciding dominant and non-dominant modes, reading the modes conjointly, and judging the roles of modes. For the WHO website example, readers access the website and overview it to explore what distinct modes are there. Readers determine that information is dominantly presented through writing, supplemented by images. Readers skim chucks of textual information, but also attend to the thumbnail images. They attempt to read and understand the meaning designed in written texts and images. Especially, readers try to figure out how these modes convey the meaning by clinking and reading the image and slides. Based on their reading goals to learn about the issue of obesity, readers make sense of the website and construct the coherent meaning that obesity is not just about United States' fast food problems, but more about serious public health issues that suffer many people living in weak life conditions worldwide. In this reading, readers impose critical standards for understanding the world through the Internet reading. The resulting meaning from this reading reinforces readers' critical understanding of the issues.

Reading multimodal texts requires general print reading strategies, such as readers' active strategy use to construct meaning and monitoring and evaluation of different aspects of understanding across multiple modes. However, reading multimodal texts requires additional aspects of meaning construction strategies

because multimodality is an issue very closely connected to a coherent understanding of meaning across video, images, graphics within the frame of webpage, as well as textual information. When multiple modes (e.g., writing, speech, music, or image and other 3D graphics) are co-presented in a text, they play different roles for meaning construction. These modes may reinforce one another with a same massage but in a different way. They may play complementary roles to support incompleteness of other modes. Or they are hierarchically ordered with different importance, such as the order of written text, images, and background music. The coherent, intertextual understanding of meaning using these structural relationships is central to the reading of multimodal texts. In other words, reading multimodal texts requires strategies for constructing meaning from across all the modes which co-present in a text—particularly, a synthesis of information across different modes into an organized, coherent whole.

2.3.4. Internet Source Evaluation

Strategies for evaluation in traditional reading typically include readers' evaluations of the style of the text or author. Vocabulary choices, rhetorical style, and the relationship between claims made in a text and evidence to support these claims may all be evaluated by readers. As well, strategic readers focus on the content of text. Evaluative strategies are used to render judgments about texts' currency, interestingness, accuracy, and trustworthiness. As important is the particular stance that a reader adopts towards text. Strategic readers bring evaluative mindsets to acts of reading, consistently questioning, verifying, and reflecting (Pressley & Afflerbach,

1995), in contrast to non-strategic readers who are uncritical of some (or all) of the above-mentioned aspects of text.

Evaluating texts in relation to their sources and the quality of their information is essential to Internet reading success (Bruce, 2000; Henry, 2005). The Internet is a rich resource for skilled readers who are able to analyze and evaluate materials. There is a vast array of information that may stimulate students' motivation and interests. However, Internet texts may present obstacles for non-strategic readers. For example, any person or group may author a text encountered on the Internet, but the authorship and sponsorship of the Internet text are unknown. Thus, there seems a direct connection to Internet reading and traditional reading of texts when the author, purpose and publisher (or producer) of the text are not known, or partially known.

The Internet, like any modern mass media such radio and television, becomes more commercialized and privatized, and this situation renames online users as "consumers." (Fabos, 2008) As with traditional reading, there might be not credible source information available or there might be camouflaged surface markers to deceive the readers. Non-strategic adolescent readers often fail to evaluate the quality of Internet texts. They only use available surface markers, but not examine the validity and reliability of the information that the texts contain (Brem, Russell, & Weems, 2001; Hoffman, Wu, Krajcik, & Soloway, 2003; Leu et al., 2007). Non-strategic readers may be mislead when they encounter biased opinions, inaccurate information, implausible websites, or seductive information because of the failures to reflect on goals and stances for reading (Damico & Baildon, 2007a; 2007b). Internet readers must have the strategies to help them evaluate information on the Web.

Internet readers must perform evaluation not only as they read, but also as they make decisions about selecting or ignoring particular texts (Rieh, 2002). Efficient readers do not try to click through every link and webpage yielded by a search: They must strategically evaluate possible links, paths, and information based on their prior knowledge and goal-awareness, as they construct texts to read. Readers with healthy skepticism of texts located in certain Internet environments will read with a consistent evaluative stance. After locating and comprehending texts, those Internet readers may then evaluate the texts for credibility, usefulness, or trustworthiness (Kiili, Laurinen, & Marttunen, 2008). These two phases of Internet reading in turn contribute to enhancing an effective search and to avoiding disorientation, and to constructing meaning. Strategic readers may employ evaluative reading strategies during the entire process of searching for, locating, and comprehending, imposing criteria for judging Internet information (Tabatabai & Shore, 2005).

In summary, evaluative strategies are central to the successful construction of both texts to read and meaning from the texts constructed. These strategies operate as readers begin a reading task, and they feature throughout as readers make evaluative decisions about trustworthiness, the relation of their knowledge to the text content, the author's ability and the suitability of information in a text for a given task. These strategies are consistent with both traditional and Internet reading. Internet reading may raise the bar for evaluative strategies: it can increase the frequency and severity of situations in which readers cannot ascertain specific sources of information, the author of a text, or the reliability of information found in text. This, of course, may

make reading more challenging. The sheer volume of possible reader-text interactions that is possible on the Internet suggests that evaluation strategies may be regularly taxed.

2.4. Theoretical Model of Constructively Responsive Reading on the Internet

2.4.1. Evolution of the Model from Print Reading to Internet Reading

The model to be used for describing dynamic and complex nature of reading strategy use in Internet contexts must honor the knowledge of each of the research areas reviewed in the previous sections. I draw on the model of Constructively Responsive Reading as a reference point to analyze constructive Internet reading strategy use because it has evolved from print reading through Internet reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). This model is built upon comprehensive reviews of a broad range of research studies across new and traditional forms of reading (Table 1), and thus it maintains an explanatory power of reading strategies required in changing literacy tasks and contexts.

Table 1. Profiles of the research studies reviewed in Pressley and Afflerbach (1995) and Afflerbach and Cho (2009)

Characteristics	Pressley and Afflerbach (1995)	Afflerbach and Cho (2009)
Number of studies	37 studies (single text reading); 1 studies (multiple text reading)	14 studies (multiple text reading); 32 studies (Internet/hypertext reading)
Nature of studies	Verbal protocol analysis	Triangulation of 2 or more data sources is much more common: Verbal protocol analysis, screen protocol, interview and observation, log files, survey and questionnaire
Outlets for work	Journal articles and book chapters in cognitive psychology, reading, writing, linguistics, poetics	Journal articles and book chapters in information and library science, educational technology, multimedia and hypermedia media, cognitive psychology, domain-specific learning, reading and literacy, and writing

The original model of Constructively Responsive Reading

Constructively Responsive Reading was originally proposed in Pressley and Afflerbach (1995), a comprehensive research synthesis on reading strategies. They valued contributions of verbal reports to examining and describing reading strategies, and analyzed the studies to offer detailed accounts of what and how accomplished readers do and think in the course of reading.

Accomplished reading entails diverse strategies playing different roles and making contributions. Accomplished readers who have a certain level of prior knowledge and interest set a goal situated in a context. They construct meaning by actively responding to the text read, performing goal-directed acts. Ways of

responding to the text, with different sequences and combinations of diverse

strategies, determine the processes and products of reading.

> This [accomplished] reader comes to the task with some general tendencies …
> The reader's constructive tendencies and responses to the text determine the
> type of meaning construction, and, ultimately, the meaning that is finally
> arrived at. (Pressley & Afflerbach, 1995, pp. 104-105)

Relating more than 300 strategies identified in their work, Pressley and

Afflerbach (1995) suggested three general categories of strategic activities:

Identifying and Learning Text Content, *Monitoring*, and *Evaluation.* A great deal of

activity is in the service of constructing meaning from text (Identifying and Learning

Text Content). While the majority of this activity occurs during reading, it is also

used before and after reading. The strategies for meaning construction contribute to

comprehension and learning, which are regulated by the reader's perception,

awareness, and control (Monitoring). This activity is allowed by a continual self-

reflection on one's own thinking processes. Monitoring affects both strategies to

understand text content and evaluative reading. Accomplished reading demands

ongoing affective and critical judgments of different aspects of the text (being) read

(Evaluation). The activity of evaluative reading affords challenging and critiquing a

text in terms of their validity, usefulness, trustworthiness, and credibility (For

theoretical accounts of these three types of strategies, see also sections of multiple

areas of research on print reading in 2.2.2. through 2.2.7)

The three types of activities are more evident in the verbal reports of readers –

with a level of prior knowledge, skills and strategies, motivation and interest, and

agency that drive their reading–in a challenging task situation. Challenging tasks ask

more conscious and active strategy use from readers. Further, readers' strategy use is

situated in the particular context. Thus, ways of selecting and using strategies are affected by the tasks and contexts of reading.

It is important to note that these three types of strategies do not work alone. The strategies are interwoven and often jointly work throughout the course of reading. Each group of strategies has different roles, which are interrelated in the dynamic interplay among meaning construction, monitoring, and evaluation. A "good" reading demands readers' opportunistic activation and use of multiple strategy interplays. These strategies for identifying and learning text content, monitoring, and evaluation are mutually supportive and have symbiotic relationships. Reading is achieved through mutual and recursive operations of the three general classes of strategies. If any group of strategies is missing, a successful reading cannot be guaranteed.

Although Pressley and Afflerbach's (1995) catalog of constructive reading strategies is informative to understanding the nature of reading, it is somewhat limited because the vast majority of the studies (31 out of 32 studies) designed the task of reading in which participating readers comprehend and learn with one single print text. Given that tasks of reading become more complex in new literacy contexts demanding understanding not just with single print texts but also with multiple digital texts, the model of Constructively Responsive Reading should be updated enough to describe reading situated in the changing contexts.

The extended model of Constructively Responsive Reading that describes Internet hypertext reading

Almost 15 years later, Afflerbach and Cho (2009) revisited the model of Constructively Responsive Reading, reflecting on the needs for both a thorough

appraisal of extant knowledge and building of new understandings:

> Investigations of constructively responsive reading strategies will be well-suited when they reference the existing and considerable catalog of reading strategies for guidance on strategy categorization while simultaneously focusing on the novel or hybrid strategies that new reading situation create. (p. 85)

Afflerbach and Cho (2009) collected a number of recent research studies that examined reading strategies in diverse tasks and contexts, and identified two emerging themes that were not explicitly accounted in the original model: multiple text reading and Internet hypertext reading. The strategies examined in this collection of studies were compared with those for single text reading identified in Pressley and Afflerbach (1995). This grounded analysis resulted in a preliminary description of constructive strategies for multiple text reading and Internet hypertext reading.

First, many intertextual reading strategies were found in this analysis (See also 2.2.8. Multiple Text Comprehension). These "linking strategies" make important contributions to constructing the meaning from multiple texts (Identifying and Learning Text Content), perception and regulation of the entire act of intertextual reading (Monitoring), and assessment of the quality of different texts (Evaluation). The description of intertextual reading strategies has two important benefits for understanding constructively responsive reading. These strategies inform the complex nature of reading with more than one single text, and contribute to an update of our understanding of reading in print contexts. Moreover, given the characteristics of Internet contexts as multi-textual environment, these intertextual strategies accounts for central aspects of the activities for constructing meaning, monitoring reading, and evaluating multiple texts on the Internet.

Although multiple text reading strategies explain many aspects of Internet reading, new aspects of Internet reading strategies can be described further by taking into account how Internet readers construct navigate Internet hypertext space and locate texts they finally will read and use. In their list of representative strategies for Internet reading, the additional category was labeled as *Realizing and Constructing Potential Texts to Read* (Afflerbach & Cho, 2009). Realizing and Constructing Potential Texts to Read is the activity to locate, identify, and select useful texts and links, and eventually to determine the order of reading and construct unique and individualized reading paths in Internet hypertext contexts.

Readers' strategies for realizing and constructing potential texts to read is necessary of Internet reading, compared with print reading. In print reading contexts, readers (e.g., students) learn with texts given or pre-selected by other authorities (e.g., teachers). Readers with a print text should follow the order of reading pre-determined by the author, which are sequentially displayed through words, sentences, paragraphs, sections, and chapters. Readers may move between multiple texts but the boundary of reading are not easily go further beyond limited number of texts. However, on the Internet, readers may choose texts they want and need, determine the order of reading across texts, and go further navigate on an open-ended information network through links. This activity necessary require readers' critical mindsets to manage "uncertainties" in the "unknown" space of information, and to construct the most appropriate paths to accessing potentially useful texts (For theoretical accounts of this activity, see the section '2.3. Constructive Reading Strategy Use in Internet Contexts').

Building the model of Constructively Responsive Reading in Internet contexts

The evolution of Constructive Responsive Reading from print reading to Internet reading acknowledges necessary reading strategies in Internet contexts and dynamic, recursive interplay among the strategies (Figure 3). The model of Constructively Responsive Reading in Internet contexts involves complex and conscious processes of reading, representing the strategic activities of Realizing and Constructing Potential Texts to Read, Identifying and Learning Text Content, Monitoring, and Evaluation. It also represents dynamic interplay between these four types of strategies.

Overall, strategic Internet readers construct meaning by choosing, analyzing, and synthesizing across multiple texts, perspectives, and modes. The quality of construction of meaning largely depends on the quality of texts that are identified and constructed, and the evolving meaning constructed is crucial to coherent hyperlink selections and the resulting text construction. Those readers consciously monitor their searching, navigation, and meaning construction processes, and solve the processing problems during the entire course of Internet reading. They strategically evaluate the relevance and usefulness of hyperlinks before selecting them, and critically assess the quality of the Internet texts' validity and credibility after reading them. All these strategies are interconnected to one another and jointly work together in the course of Internet reading. If any category is missing, a successful Internet reading cannot be guaranteed. Following are the sections of each of the four strategy categories, informed by the research that examined processes of reading and learning with Internet texts with a focus on adolescent readers.

Figure 3. Evolution of the model of Constructively Responsive Reading: From print reading to Internet reading

Realizing and Constructing
Potential Texts to Read

Monitoring

Evaluation

Identifying and Learning
Text Content

Strategy interplay in print reading contexts: Based on Pressley and Afflerbach's (1995) identification of single text reading strategies; Afflerbach and Cho's (2009) identification of multiple text reading strategies

Strategy interplay newly considered in Internet reading contexts: Based on Afflerbach and Cho's (2009) identification of Internet hypertext reading strategies

2.4.2. Previous Studies with Adolescent Internet Readers

The subsequent sections present the result of the review on adolescents'
Internet reading strategy use, adopting the model of constructive Internet reading
strategy use with four strategy categories: Realizing and Constructing Potential Texts
to Read, Identifying and Learning Text Content, Monitoring, and Evaluation. The
purpose of this review was to offer descriptions of what research said about
adolescent reading, regarding each of the four categories of constructive Internet
reading strategies.

Sources of this review were primary research reports that examined the
process of reading in Internet contexts. The sources were collected from a
comprehensive search of reading research. This survey involved a hand search of
archival research journals in the diverse areas: reading and literacy, general cognitive
psychology, educational psychology, computer literacy, and information and library
science. Also, complementary Internet searches were conducted with related
keywords, using various educational research database (e.g., Journal Storage
[JSTOR], *Google Scholar*). Further, chapters from edited volumes that focused on
reading strategies in Internet-based contexts (e.g., a series of the *Yearbook of
National Reading Conference*) were identified.

As a result, fourteen studies were selected. These studies were satisfied with
criteria for inclusion: (1) sixth- to twelfth-grade adolescent participants (early and
middle adolescent years, middle and high school students); (2) Internet reading task;
and (3) data that indicate reading processes and strategies. These studies were from

different theoretical orientations, such as reading inquiry, library and information science, and hypertext research. The studies were all conducted with adolescent readers in diverse settings (e.g., history and science classrooms, individual performance task situation), each of which makes unique contribution to understanding how adolescents read on the Internet. The selected studies were analyzed in terms of their underlying theoretical perspectives, reader characteristics, tasks and texts, data collection methods, and major findings (Table 6), and the results were integrated into the theoretical model of constructive Internet reading strategies use.

Table 2. Profiles of the reviewed research studies on adolescent readers' Internet reading processes

Study	Participants	Tasks and texts	Data Sources	Major Findings
Bilal (2000)	Twenty two 7th-grade students	Finding science information in an assigned fact-based search task, using *Yahooligans!*	Screen recording; quiz; exit interview; teacher evaluation of student characteristics	• Many student readers (64 %) adopted keyword-search approaches and used concrete concepts from task prompts. • Many (43%) were confused and/or frustrated during the search. • Internet searching were influenced by reader characteristics, including Web experiences, topic knowledge, navigation styles, search strategy, relevance judgment criteria, cognitive overload and disorientation.
Bilal (2001)	Seventeen 7th-grade students	Finding science information in an assigned research task (more complex than a fact-based task), using *Yahooligans!*	Screen recording; questionnaire; teacher evaluation of student characteristics	• Student readers had more difficulty in the research task than fact-based task (69% were partially successful and 31% failed in the research task, while 50% succeeded and 50% failed on the fact-based task): The research task required complex topic-related prior knowledge to more effectively construct "meaning" from relevant sources found. • Students' failures on both tasks were more associated with a lack of engagement, than domain knowledge, topic knowledge, or reading ability.
Bilal (2002)	Twenty two 7th-grade students	Finding science information in a self-generated task, using *Yahooligans!*	Screen recording	• Students were more successful in the self-generated task (74 % success) than research-oriented task (69% partial success) and fact-finding task (50% success). • Reading processes were influenced by readers' familiarity, interest, and engagement in the task. • Reading success should be judged on information-seeking processes, strategies for "sense making" of the information found, in addition to the outcome of searching.

Brem, Russell, & Weems (2001)	Eighty one female students from grades 9 to 12.	Visiting six websites with different levels of credibility and choosing three useful websites	Observation; student website evaluation; and student self-reflection on their evaluation	• Students had weaknesses in assessing the author's argument: overreliance on surface features; metacognitive failures; and a lack of understanding the nature of science and publishing. • Students looked for "true" arguments and "real" scientists (absolutist epistemologies). • Students assessed accuracy using details: out-of-date pages and anonymous sources.
Coiro & Dobler (2007)	Skilled eleven 6th graders with high Internet experiences	Searching within the preselected website to answer questions; searching with *Yahoo! Kids* to locate a particular fact on a science topic	Think-aloud verbal protocol; observation; semi-structured interview	• Both shared similarities and notable differences between online reading and offline reading were found. • Additional complexities of Internet reading comprehension were found in terms of prior knowledge (e.g., informational website structures, Web search engines), inferential reasoning strategies (e.g., a high incidence of forward inferential reasoning, multilayered inferences), and self-regulated reading strategies (e.g., cognitive strategies intertwined with physical actions such as typing, clinking, scrolling, and dragging; rapid cycles of self-regulated reading within short text passages).
Damico & Baildon (2007a)	Two pairs of 8th-grade female students in a Web-inquiry-based social studies classroom	Developing a question about; reading a variety of Internet sources; constructing a historical narratives	Observation; think-aloud verbal protocol	• Students demonstrated proficiency in the operational dimension: locating the sites to check the author and source information and whether any new information was being offered. • Students' assessment of website credibility was influenced by their perception of the genre of Internet source, previous reading, and investigation of supporting evidence of the author's claims. • Students were less involved in the critical dimension: less attention to omitted perspectives or identified specific techniques such as loaded words that the author used to influence opinion. • Students rarely conducted a further research to corroborate multiple claims and evidence.

Damico & Baildon (2007b)	Three 9th-graders from humanities classes at an international school in East Asia	Developing a question related to current issues in Asia; researching with the Internet; reading three websites created by the researcher; and writing an essay and producing a final artifact	Observation; interview	• A number of factors (e.g., purposes for reading, inquiry questions, beliefs about topics, ability and willingness to consider multiple perspectives) converged to shape the ways readers transact with texts. • The process of reading, evaluating, and using web sources (e.g., acknowledging different or multiple claims exist, identifying sources that convey different or multiple claims, evaluating the sources) depended on the reader's different levels of understanding of claims and evidence. • Internet reading processes depended on the reader's purpose and stances toward his/her own perspective (e.g., instrumental, adaptive, self-reflexive).
Fidel et al. (1999)	Five 12th and six 11th graders	Identifying a specific topic-related website to answer questions; explaining possible uses of sources; and repeating the same task with a different topic	Observation; think-aloud verbal protocol; interview	• Students' searching were highly "reactive": the progression of a search was largely determined by what they saw on the screen. • Students tended to do "swift searching": scanning before clicking and making quick decisions about where to click next and whether or not a site was relevant. • Students used "landmarks": going back to safe and familiar sites (search engines or the results page) if getting lost. • The lack of skills to generate and manipulate search terms with limited knowledge hampered consistent and effective searching. • Students failed to reflect on their search.
Guinee, Eagleton, & Hall (2003)	One hundred sixty one middle and high school students	Searching for information using a Web search engine, to answer given questions	Student verbal description of the search process; audit trail lists of search strings; observation	• Different searching strategies were found: Web information searching (dot-com formula, shopping mall, and search engine); search term generation (single term, topic with focus, multiple terms, phrase, question, combination, and repeated concept); recovering from unsuccessful search attempts (switching topics, visiting additional websites, trying new keywords, and changing search engines). • Students tended to start with what they know, maintain paradigms from the physical world, and adhere to time-tested practices.

Hoffman, Wu, Krajcik, & Soloway (2003)	Eight student pairs from two middle school science classes	Searching researcher-developed online search engine that allows students access to pre-selected on-line resources and two different digital libraries leading primary sources	Yearlong observation; screen recording; videotaping; students' artifacts and online postings; interview transcripts	• Students tended to engage with inquiry strategies (ask, plan, search, assess, write, synthesize, and create). For students demonstrating better content understandings, • Students demonstrating better content understandings used "search" strategies to develop and use search terms, navigate into sites, and browse the contents (the poor use of search strategies might defer the development of content understandings) and "assess strategies" to judge whether information was relevant to their driving question before investing time on a site (based on a site's content rather than appearance or title) • Students judged trustworthiness of the source often solely based on the URL and provided a limited critique of a site's appearance and content. • Students could benefit from access to online resources for inquiry-based activities if they are able to use search and assess strategies appropriately, resources are thoughtful chosen, and support and scaffolding are extensively provided.
Kiili, Laurinen, & Marttunen (2008)	Twenty five upper secondary school students in Finland	Searching the Internet for two source material for an essay; writing an essay a topic	Think-aloud verbal protocol; observation; analysis of texts read; questionnaire	• Students seldom evaluated information credibility: They were more likely to evaluate source relevance (using predictive evaluation) rather than source credibility; frequently asked about authors and publishers but rarely evaluate the author's arguments; spent more time in reading pubic websites or websites by experts. • Credibility of some of the websites students read were questionable. • Students spent time heavily (80%) in reading Wikipedia, and disoriented readers spent the most least time on reading (39.2%). • Profiles: versatile evaluators (n=3), relevance-oriented evaluators (n=5), limited evaluators (n=8), disoriented readers (n=5), and uncritical readers (n=3)
Lazonder, Biemans, & Wopereis (2000)	Twenty five Dutch adolescents	Locating a website and information on the site using a Web searchd engine	Questionnaire; Dribble files; Written answer; Performance time	• Compared to novice users, experts with higher domain knowledge needed both less time and fewer actions to locate the website: Experts appeared to be more proficient in using domain-based search strategies • Readers' Internet experiences did not affect their search performance.

| Leu et al. (2008, April) | Fifty three 7th graders (Experienced online users) | Reading informational texts from the Internet in the three sessions of researcher-determined task, participants-determined task, and combination of both | Concurrent and retrospective think-aloud protocol; screen recording | • The taxonomy of online reading comprehension strategies was built: developing questions, locating information, evaluating the usefulness of information, synthesizing information, and communicating information.
• Skilled location were found: using Web search engines, constructing and manipulating search terms, and analyzing the results summary: Having limited ability to locate information made it difficult to successfully complete any online reading comprehension task.
• Evaluation took place at multiple points in time during reading: Most students reported that the given hoax site was reliable; only 6 out of 48 reported it was very reliable. |
| Wilder & Dressman (2006) | Six 9th-grade students (three are from struggling readers' class; the other three from college preparatory class) | Searching the Internet for basic factual information about Caribbean islands and nations | Observation; Field notes; Questioning; Internet caches | • Self-report showed that all students could be characterized as Internet users: They operated a computer and software proficiently, located specific websites, and conducted a search for topics of interest.
• A distinctive division between the performance of each group's students were observed: For college preparatory course students: the task was not easy but it largely within their competence; for struggling adolescents readers, the search process was much more labored and unproductive in terms of using search terms, previewing search results, and finding relevant information (e.g., lacks of abilities in spelling, generating key words, understanding concepts and vocabularies, identifying main ideas, clicking and browsing, judging usefulness of the information, webpage selection and evaluation, additional searches, and willingness to read print text online, recognize relevant information, and translate it into notes)
• Sources of differences were literacy abilities rather than technical skills. |

2.4.3. Realizing and Constructing Potential Texts to Read

Research resonates that "what texts to read and how to construct the texts" matters in successful Internet reading. When reading a book as typical print media, readers may process textual information following the reading order that the author creates: the sequential display of letters, words, phrases, paragraphs, sections and chapters. Of course, as reading is performed *in situ,* strategic readers can determine whether to read texts from the beginning to the end, to focus on a particular part of texts, to skim overall content, or to search for further sources. These strategic behaviors reflect readers' specific goals as well as the context of reading. In this reading, readers' strategic choices and the resulting paths occur within a boundary of the text that the author constructed.

In contrast, reading on the Internet can involve readers' exploration of uncertain information in a virtually unbounded space. Readers may read just a single page without any hyperlinks retrieved from a fixed place in cyberspace, yet much Internet reading involves searching for, locating, comprehending, and evaluating information across known and unknown texts. While reading in a complex Internet hyperspace, readers must investigate where and what texts are available on the system and in what order they might access and process the texts. The direction of their reading paths may be uncertain, and readers have the task of using minimal information, in the form of a title, subtitle or URL to strategically evaluate and plan their navigation, or reading path, among hyperlinks or websites. Internet readers must impose criteria of relevance and quality to judge this minimal information, in relation to goals for reading. These text construction strategies

involved in "realizing and constructing texts to read" are unique and crucial actions that Internet readers must be successful.

Text construction strategies reported in the previous studies are mostly involved in searching for and locating relevant Internet sources. All reviewed studies on adolescents' Internet reading directly or indirectly provide information on these strategies for searching and locating. Leu et al.'s (2007) seminal project investigated how adolescents comprehended on the Internet. In this project highly skilled seventh-grade students were asked to think out loud what they were thinking while reading on the Internet. Findings indicate that Internet reading is different from print reading and five strategies are newly required for successful online reading comprehension: (1) identifying or defining the problem, (2) locating information, (3) evaluating information, (4) synthesizing information, and (5) communicating information. Among them Leu et al., (2007) especially emphasize two strategies: location and evaluation. According to their analogy, these two strategies are like "decoding skills during print reading," without which it is difficult to accomplish successful comprehension. Text construction needs successful location of texts, during which the located texts and ones' text location processes should be self-evaluated by readers. Inefficient text construction may hinder subsequent and productive meaning construction with the texts located.

A majority of the studies reported both capabilities and difficulties that adolescent readers have in realizing and constructing potential texts to read on the Internet. On the one hand, many students are able to explore and identify Internet texts, using Web search engines and key word search strategies (Bilal, 2000; Coiro

& Dobler, 2007; Damico & Baildon, 2007a; Hoffman et al., 2003). Bilal's three consecutive studies (2000; 2001; 2002) indicated that although seventh-grade students' reading processes largely depended on task characteristics and reader variables, they tended to adopt keyword searching strategies and used concrete concepts from the query given to them. It is noteworthy that students' proficiency in searching became more strategic and sophisticated over the course of three research studies (Bilal, 2002). Coir & Dobler's (2007) study also reported that sixth-grade readers, with established reading abilities in print reading and rich experiences in Internet reading, were able to predict and infer where the texts were placed. The researchers labeled this group of strategies as "multiple-layered inferences," which allowed readers' anticipation of where possible sources were connected in the multiple-layered Internet hypertext structure (Coiro & Dobler, 2007).

On the other hand, the reviewed studies also reported adolescents' weaknesses in Internet searching. Adolescent readers often were not adaptive in generating and manipulating search terms to explore the Internet texts related to their task and goals (Fidel et al., 1999; Guinee et al., 2003; Lazonder et al., 2000; Wilder & Dressman, 2006). Fidel et al. (1999) reported that many of the adolescent students in their study were "reactive searchers" who did not systematically plan or make use of elaborated analytic search strategies. These students depended primarily on browsing strategies, without generating and using search terms in reflective of task topics. Less-strategic searchers tended to use an original task prompt, a form of sentence, as a search input, not to generate and use concrete and a combination of discrete search terms. This lack of proficiency may hamper an

efficient location of desired sources (Guinee et al, 2003). In addition to failures to use search terms, adolescent students seldom used multiple search engines in a flexible way (Bilal, 2001; Fidel, 1999; Schacter et al, 1999). Fidel et al. (1999) reported that students tended to use only one search engine, while a number of search engines were available on the Internet. These students rarely visited an alternative search engine even when they failed to find useful information during the initial search. Non-strategic students tended to iterate same keywords on the same search engine.

A reason that makes this challenge may be students' immature "metacognitive mindsets" to think about their own search processes based on the tasks and goals given to them. Non-strategic students, regardless of the types of task, to the large degree relied on browsing strategies rather than keyword strategies. Browsing strategies may be effective in exploring new ideas and problems but these are time-consuming and ineffective when readers should complete a problem-based task with limited time and efforts. Therefore, students need to use domain-based search strategies, with which they can guide their searching in efficient, goal-relevant ways (Lazonder et al., 2000). Also, students should recognize the utility of metacognitive planning prior to an actual search and prevent ineffective use of their cognition as much as they can (Fidel et al., 1999; Guinee et al., 2003). As Fidel et al. (1999) observed, many of the adolescent students had a weak sense of the importance of "planning ahead." This observation indicated that the progression of students' search would be largely determined by what they saw on the screen, rather than by a planned search. Without a

sophistication of their search processes in advance, the students followed situational interests that mostly arising from graphics.

The utility of location strategies may be enhanced when readers are able to activate relevant "domain-specific prior knowledge" on the task topic. Thus, provision of proper domain knowledge on the task topic to students may enhance the effectiveness of searching and reading (Coiro & Dobler, 2007). Research documented that students who have higher domain knowledge spent less time and search actions than their peers with less domain knowledge (Lazonder et al., 2000; Wilder & Dressman, 2006; Hoffman et al., 2003). In Lazonder et al.'s (2000) study expert students appeared to be more proficient in using search engines by generating domain-based search strategies. They were able to delve into the topic and generate key concepts. These strategies improved their search results as more specific and focused. Also, Wilder & Dressman's (2006) study indicated that adolescents who had already higher academic abilities performed a better search than their struggling peers. This result implied that regardless of forms and contexts of reading, the lack of general domain knowledge and strategies hamper students' performance in efficient text construction on the Internet. Struggles in print reading may be reiterated struggles for struggling adolescent readers in new literacy environments.

Also, the nature of task influences students' text construction processes. Bilal (2000; 2001; 2002) conducted examinations of adolescents' Web search engine use, with the same student population but with different types of tasks across three related studies. Bilal found that overall students had better achievement in the

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self-generated research task (2002) than the both fact-based search tasks (2000) and pre-defined research (2001). The fact-based task was much easier to perform than the pre-defined research task of a more complex topic requiring use of prior domain knowledge for constructing meaning of the relevant Internet texts found. So students had struggles with the lack of domain knowledge in such complex research tasks. However, when the students had opportunities to choose the task, they performed better. This result is not only because the self-selected topic was more familiar to them and they can use more domain knowledge, but also because availability in domain knowledge use and autonomy support allowed their engaged text construction processes.

More importantly, students' failures to use effective text construction strategies can be explained with the fact that they have a weak "epistemology of Internet reading environments" in which reading is embedded. The Internet may contain different sources that represent different perspectives, claims, and supporting evidence, other than what they are currently reading. When readers are aware of situational characteristics of Internet reading environments, they may demonstrate diversity and multiplicity in performing strategic actions. Weak awareness of reading environments may confine their reading into narrowed, limited acts only to look at what they are reading now. This ineffective strategy use hinder taking advantage of potential benefits for readers to build a global representation of multiple perspectives and ideas. Damico and Baildon (2007a) noted that in the situation to reconcile different perspectives on the same issue, adolescents did not conduct a further research and corroborate multiple claims and

evidence. Non-strategic student readers hardly sought for different texts containing alternative perspectives to the text that they were currently reading. These students were not aware that the Internet allowed them to search for and utilize multiple solutions, diverse scopes, and detailed depth of information.

Taken together, while many adolescents are able to generate search terms and use Web search engines, less strategic adolescent readers have the challenges: immature metacognitive mindsets, inefficient domain-based searching, and the lack of epistemological understanding of Internet reading environments. Adolescents' naïve information-seeking behaviors show that they lack metacognitive capacities to reflect on and adjust their own thinking processes. Less-strategic reading indicates that students may have a weak prior knowledge on content and system and often failed to activate the knowledge they have. These incapable performances sometimes may be augmented when students performed unmotivated tasks. A simple task of locating factual information may be easy to success, but the kind of task fails to stimulate students' wills for constructing alternative texts and learning from the texts.

2.4.4. Identifying and Learning Text Content

Across print- and Internet-based reading environments, the appropriate use of meaning construction strategies is essential to reading success. Internet reading requires meaning construction of each single text and simultaneously intertextual understanding from across diverse texts found. Multiple information structure demands "strategies for analyzing and synthesizing multiple informational sources and for combining disparate form of information into a coherent meaning."

Strategic Internet readers use awareness of web structure, relate texts to one another, and derive ideas and themes from across the texts. When readers fail to use these strategies, their understanding and learning on the Internet may be misled or hindered. These meaning construction strategies are hybrid strategies, modified from traditional print reading and situated within Internet reading environments.

Despite the importance of meaning construction strategies, scant studies inform how adolescent readers identify and learn text content. While many studies on adolescents' Internet reading examined information searching processes as a feature of Internet reading distinctive from traditional print reading, the importance of meaning construction strategies was indeed underrepresented in these studies (Bilal, 2000; 2001; 2002; Coiro & Dobler, 2007; Fidel et al., 1999; Guinee et al., 2003; Lazonder et al., 2000; Leu et al., 2007). For example, Leu et al.'s (2007) project identified two important groups of meaning construction strategies: synthesis and analysis.

However, in stark contrast to a high emphasis on "location" strategies, Let et al., (2007) offered insufficient explanations on the importance, nature, and variety of these meaning construction strategies. As Bilal (2002) noted, meaning construction or sense-making can motivate readers to use more sophisticated strategy use in Internet reading tasks. Research must pay more attention to how adolescents construct meaning through the entire course of Internet reading and how information text construction and meaning construction mutually reinforce their efficiency and quality.

Hoffman et al.'s (2003) study is notably informative to understand how students use meaning construction strategies in science learning with Internet sources. Hoffman et al. (2003) studied inquiry-based science classroom projects in which students read pre-selected online resources and used two different digital libraries giving an access to primary sources. In this study, a number of students developed inaccurate understandings in Internet learning environments. They had difficulties obtaining accurate conceptualizations and constructing a fuller understanding of the concepts they learn. These inaccurate understandings resulted from an incorrect construction of meaning from Internet sources. Some students used their preoccupied concepts without integrating any learning result from reading Internet texts. The results indicated that Internet environments presented the challenges of meaning construction and students should be supported with teachers' scaffoldings to help them learn domain-specific concepts on the Internet better.

However, Hoffman et al. (2003) also found that although the depth and accuracy of content understanding varied, content learning was fostered for students highly engaged with using Internet inquiry strategies (e.g., assessing and searching). Seventy percent of highly engaged students with the strategy use demonstrated some evidence of accurate understanding. In contrast, most students who demonstrated low engagement with using the strategies possessed partial understandings or inaccurate conceptions. It is noteworthy that the quality of Internet sources that students found and used was related to the degree of students' meaning construction from the sources. In contrast to less engaged students with using Internet reading strategies, their peers engaged with strategic Internet reading

were able to use not only high-quality websites and texts but they also made use of low-quality sites by extracting and synthesizing useful information from them. This result implies close relationships and dynamic interplays of text construction and meaning construction (and critical evaluation). In other words, high-quality text construction may enhance meaning construction, and well-constructed understanding based on effective text construction may allow students to use diverse Internet texts, even poor quality sources.

In summary, in Internet literacy environments the quality of meaning construction largely depends on the results of text construction, based on sophisticated monitoring of the processes and evaluation of the texts. Students who actively use strategies for searching and evaluating are more deliberate in the selection of Internet sources and learning about the sources. It is noteworthy that although successful meaning construction is crucial to successful Internet reading in intertextual environments, relatively a modicum of studies investigated on these strategies (e.g., analysis, synthesis) with an intensive, special focus. It is also noteworthy that none of the studies on adolescents' Internet reading strategy use examined abilities and difficulties in processing and synthesizing multimodal information, while the uniqueness and significance of multimodal strategies are highly argued in theorizing Internet literacy activities (Kress, 2003).

2.4.5. Monitoring

Success Internet reading requires sophisticated use of strategies for "monitoring readers' own reading and navigation processes in a complex hypertext structure." Scope and numbers of Internet texts connected by hyperlinks present

challenges to Internet readers. Readers must simultaneously perform a two-layered reading task: meaning construction and information management. Readers should invest their cognition in achieving the basic, primary goal of reading—that is, meaning construction. They also must pay attention to the management of informational sources that are hypertextually connected. Repeated failures to manage numbers of hyperlinks and Internet sources may lead Internet readers to disorientation in a hyperspace which misleads their reading and learning. Disorientation problems may have readers consume more cognitive efforts in orienting themselves that can be otherwise used for more productive meaning construction processes. Metacognitive monitoring on hypertext reading processes is crucial to a successful reading on the Internet.

In light of metacognitive strategy use, the intertextuality and multiplicity of the information structure yield both potential benefits and drawbacks in reading and learning those Internet materials. On the one hand, learning on the Internet may be enhanced in that its structure conveys rich and diverse information that can boost readers' interests and knowledge. Diverse web search engines and search functions in websites in the nonlinear hypertext structure may allow a survey of target information at anytime and anyplace. Multiple modes of information presentation, animations, images, and sounds as well as textual information may call for readers' attention and support their learning on the Internet. On the other hand, however, structural complexity and information overloads often cause readers' experience of getting lost in a labyrinth of the hyperspace. This drawback of the Internet hypertext structure demands more of readers' paying attention to monitoring and solving

disorientation problems, compared with traditional reading contexts. Failure to perceive and solve the problems may cause additional mental efforts that would be otherwise invested in more productive information processing.

While strategic readers are able to locate useful materials that help them build an in-depth understanding of the topic, these benefits often are not fully realized for less strategic readers who are unable to manipulate multiple documents. This ineffectiveness of locating and understanding multiple documents increases when students are unable to recognize the characteristics of the Internet as an open-ended information retrieval system. Internet space is an information storage that includes an infinite number of sources virtually. However, this advantage may be never realized for the readers who are not aware of the potential of this online information system. Before getting into this information space, it is almost implausible to know and recognize where the information readers need to understand something better is placed. While this limitation becomes an obstacle, however, readers who believe that the Internet links diverse and useful information and conduct proper information- seeking processes may transform such uncertainty into the possibility. In this light, the abilities to construct their own learning environments and to seek for alternative solutions are required abilities.

Disorientation is a major problem that causes adolescents' frustrations during the Internet reading. Fidel et al. (1999) documented that adolescents participating in the study frequently reported that they had experiences "getting lost" in hyperspace. While reading hypertext materials, the students used to question "Where do I go from here?" These students caught in this situation

experienced cognitive disruptions, which in turn hampered their searching and learning. However, some students applied the strategies to prevent disorientation problems by marking landmarks, comfort zones, or starting points. These students, when getting lost, went back a couple of times or click the "go home" function, and then restarted their searching and reading from the comfort zones.

Monitoring strategies involve self-reflection on and self-control of one's own thinking processes while reading on the Internet. Coiro and Dobler (2007) identified that Internet reading yielded a high incidence of forward inferences (e.g., prediction) and a complex metacognitive strategy use (e.g., monitoring). These researchers argued that a more complex and frequent use of such strategies stemmed from the nature of Internet reading. Observations of skilled adolescent readers indicated that self-regulated processes on the Internet operated quickly and recursively. While conducting the quick and recursive operation of self-regulatory processes, simultaneously Internet readers must construct not only meaning from individual texts. They also must build their own environments for successful reading and learning of text content by predicting, selecting, integrating, and evaluating sources. Therefore, when using metacognitive monitoring strategies to check and manage this complex information space is maladaptive, disorientation problems occur. Repeated experiences of disorientation would have negative influences on readers' self-efficacy and the decreased agency.

To sum, Internet reading environments are marked by a complex hypertext structure that requires readers' sophisticated use of metacognitive monitoring strategies. While the complexity of the Internet may enhance learning,

simultaneously it may limit learning when readers are not ready to self-asses and control their own reading and navigation processes. A weak strategy use at the metacognitive level causes disorientation problems that hamper or mislead reading and learning on the Internet. To orient themselves in this complex hyperspace, readers must employ metacognitive strategies, such as monitoring their searching and learning processes, refocusing task goals, checking the effectiveness of reading strategies and hyperlink selections, using proper navigation functions based on system knowledge, and repairing current strategies. An effective use of these metacognitive strategies in turn contributes to the enhancement of text construction, meaning construction, and evaluation. These strategies posses the entity entailed in print reading contexts but modifications that fit into new aspects of Internet reading environments.

2.4.6. Evaluation

Critical evaluations of Internet sources must be emphasized in Internet reading. Readers often encounter Internet sources commercial and politically biased. Many Internet sources are designed with the assumption that online users are potential consumers. Many websites provide valuable information but ironically they often are maintained with financial supports of commercial advertisers who link banners and blurbs to attract Internet readers. Numbers of advertising webpages exist on the Internet, and sometimes these deceive online readers. In addition, many unauthorized or simply immature writers post up different opinions and untested facts on the Internet. Managing agents of these sources can be public organizations with official Web sites, business companies with commercial

advertisements, or individuals with private journals on blogs. In many cases, it is unknown or unclear who has constructed webpages and how credible information is posted on websites. Since Internet readers may frequently encounter incredible information, strategic thinking to evaluate the quality of information and its sources would play key roles in learning on the Internet. Readers must have a critical sense that Internet texts can be created with biased perspectives and opinions and the lack of expertise.

The weakness of adolescents' critical awareness was reported in Leu et al.'s (2007) project. In this study, a spoof site *Save The Pacific Northwest Tree Octopus* (http://zapatopi.net/treeoctopus) was used to observe students' evaluative actions, in terms of website reliability. The result was that a majority of seventh-grade adolescent participants (42 out of 48) reported the site as reliable. Most of the participants did not find information that would help them assess whether the site was reliable or not, while they self-reported in pre-reading interviews that one should not trust information found on the Internet. Rather, these students quickly judged the website's quality only focusing on the amount of available information and conducted copy-and-paste actions in order to complete the task given. They received and used the information from the website for their work without critically looking at the aspects of the website to assess the quality of the information. The result indicated that students should assess the reliability of Internet texts by making use of author reputations, references, site URL, webpage properties, or contact information.

However, evaluating surface markers—for example, judging if the website is public or commercial, based on looking at whether the web address is '.org' or '.com'—is insufficient alone to investigate websites' qualities. Internet readers must assess the reasonableness, credibility, or relationships of opinions and supports of text content. Indeed, many adolescent Internet readers are not proficient to evaluate the text they read from this critical perspective. Even if they do, many tend to extremely rely on those superficial markers, rather than systematic evaluations of text content. This is because critical evaluation of Internet documents is the complex process and demands readers' considerable amount of attention and cognition. Adolescents often fail to assess the validity of the author's argument on the Internet. Critical appraisal of whether what the author says through the text is worth reading and learning is a major challenge that students may encounter in an Internet reading task.

Brem et al.'s (2001) study in science learning on the Web reported that participating students had weaknesses in a critical evaluation of scientific arguments posted on websites. Brem et al. (2001) argued that these weaknesses stemmed from a less awareness of the nature of Internet publishing and failures to conduct in-depth and systematic analyses. This study concluded that students should not only conduct author identification or using surface markers, but they also need to probe the accuracy and credibility of ways of reporting, that is, the nature of genre—in what way Internet news articles are published and what kinds of people are involved in the publishing. More importantly, Internet readers need to employ multiple criteria for text evaluation, such as the credibility, accuracy,

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reasonableness, and robustness of what they read. Brem et al. (2001) noted that these strategies seem not to be an easy competence for students to acquire without proper instructional supports. Special attention should be paid to teaching students to use these evaluation strategies proficiently.

Internet texts may contain limited information on themselves. This means that readers often should judge the credibility of Internet texts pages, only with the information available on the texts. Thus, actions to assess individual texts require a further use of other related texts. In other words, strategic Internet readers must conduct a further search of related sources that contain different perspectives and ideas. As research studies consistently noted (Brem et al., 2001; Let et al., 2007), further demanding evaluation strategies are to search for, use, and construct diverse sources that convey, present, argue, or verify different perspectives. These strategies are central to succeeding critical evaluation of the quality of the website (reliability, credibility, validity, etc.). When readers are able to acknowledge that multiple perspectives may exist and they can and need to use them to assess and understand the text they currently read, their evaluation become more critical and useful actions for a reading success.

Damico and Baildon's (2007a; 2007b) studies investigated how students transacted with multiple Internet texts and how they selected and processed them from a critical stance. In this study, participating students demonstrated some proficiency in locating key information on the website, identifying the author of the site, and checking the currency of the information. Their assessment of websites' credibility varied according to their perception of the Internet publication genre

(e.g., a newspaper website is credible), their previous reading (e.g., a frequent presence means the information is credible), and the logical relationships of websites' information (e.g., there is a lack of evidence to support the author's claim). However, it is noteworthy that the students in this study seldom discussed about possibly omitted perspectives on the website. Students did not deploy further strategic actions to construct texts that may contain different perspectives and ideas omitted on the site. They did not corroborate the website they were currently reading with an investigation of other sources related to the website's information.

Taken together, observations from the reviewed literature implied that critical evaluation strategies played a vital role in a successful reading on the Internet. In addition, research demonstrated that Internet reading environments demand that readers should take more active roles in evaluating the quality of Internet texts and use diverse criteria for the text evaluation. Furthermore, adolescents needed to have willingness to consider multiple perspectives, and abilities to corroborate texts they read based on the relationships with possible other sources.

2.5. Summary

Theory and research on new and traditional forms of reading has been synthesized to derive implications for anticipating Internet reading strategies. In doing so, a primary goal of this review process was to bridge the knowledge of both forms of reading, and to provide a theoretical account of how they are interrelated. With a review of current approaches, reading has been conceptualized as the situated literacy activity in which readers with particular goals for reading keep

interacting with their reading environments. Reading strategies are a means to achieve the goals for reading, and have the nature of situativity. A reading strategy use depends what situations in which readers reside and how they actively, consciously respond to the situations. Successful reading strategies are flexibly deployed based on readers' ongoing construction of themselves as mindful readers.

Theories and research on new and traditional forms of reading hinted that print reading and Internet reading share a large portion of strategies that are used and also both reading require different strategies due to their different characteristics of reading environments. Theories in print (general) reading informed that a successful strategy use involves various aspects of reading including text processing, prior knowledge use, inferences, metacognition, domain-based source evaluation, and critical mindsets. Strategies implied in these aspects of reading were still viable and central to a successful Internet reading. Internet reading, however, demands different types of new strategies because the new environments have different characteristics and simultaneously present different challenges and opportunities to the readers. Shaping Internet reading needs further knowledge about how people strategically and critically read with multiple, multimodal documents in a complex hyperspace in which the sheer amount of information are linked.

Built upon the idea of Constructively Responsive Reading informed by verbal protocol studies in reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995), the theoretical model was developed for the purpose of analyzing and describing constructive Internet reading strategies used in Internet contexts. The

model presents the four general types of strategies, including those for Realizing and Constructing Potential Texts to Read, Identifying and Learning Text Content, Monitoring, and Evaluation. Also, the model describes mutual relationships among these four types of strategies, which instantiate complexities of the constructive reading strategy use required in Internet contexts. Previous studies focused on adolescent readers suggested these complexities of Internet reading strategies need to be further examined, enough to accurately understand the nature of the strategy use. Based on the results from multi-faceted review of research literature, the current study formulates the following two research questions, in order to achieve an understanding of Internet reading strategy use and offer detailed descriptions of the complexities.

- *What types of constructively responsive reading strategies do proficient high school readers use in order to construct meaning and develop critical questions within Internet contexts?*

- *What insights about patterns of constructively responsive reading strategy use can be derived from proficient adolescent readers' Internet reading?*

Chapter 3: Methods

I observed and analyzed seven student participants to investigate research questions, employing verbal reporting methodology. In this chapter, I disclose the entire process of research conduction, including the principles, procedures, and techniques that were involved in participant selection, data collection, and data analysis.

3.1. Participants

3.1.1. Participant Selection

I used principles of "purposeful sampling" (Maxwell, 1996) in which study participants were selected to provide information on adolescents' Internet reading. Several criteria for selection were considered in the sampling procedures. First, I chose a smaller sample size because the purpose of the study was to conduct a finer-grained analysis of large numbers of strategies expected from each of the participants. A thorough analysis of strategy data was intended to contribute to an intimate understanding of the participants' constructive reading strategy use and building of the compendium of Internet reading strategies. A purposeful selection of fewer, focused participants was beneficial for an observation of dynamic, complex behaviors of Internet readers and a detailed analysis of strategy data as demonstrated in the previous studies (Coiro & Dobler, 2007; Leu et al., 2008).

Second, high school readers were considered because of task demands. The range of topics for reading to be chosen by participants was related to socially controversial issues that require more complex prior knowledge. Also, the task of

reading designed in this study demanded critical thinking and questioning when readers searched for, selected, interpreted, evaluated, and critiqued Internet texts. Previous research suggested that young adolescent readers without appropriate domain knowledge and reading strategies may have more difficulty generating and manipulating topic-specific search terms and thus struggling with subsequent searching and learning in this types of critical Internet reading task (Bilal, 2001; Guinee, Eagleton, & Hall, 2003). In addition, there may be a general tendency that readers' higher-order thinking and critical mindsets were better observed among older adolescent readers (even if they are maturing) (Brem, Russell, & Weems, 2001; Damico & Baildon, 2007a; 2007b), compared with children and young adolescents (Bilal, 2000; 2001; 2002). I decided to match participating readers' characteristics and maturity with the nature of Internet reading task used in the study.

Third, I selected participants with established reading abilities in both print and Internet contexts because of the theory-building purpose of this study. It was evident in research that there were remarkable differences in strategy use between good readers and poor readers. Strategic adolescent readers were able to employ conscious strategies to locate, analyze, synthesize, and evaluate among the sheer amount of information on the Internet (Coiro & Dobler, 2007). Yet non-strategic readers often were disoriented in a complex hypertext structure and hardly solved the problems with an appropriate strategy use (Azevedo, Guthrie, & Seibert, 2004; Balcytiene, 1999; Yang, 1997). Good readers were more likely to use a wider range

of strategies and introspect what they were doing while reading (Pressley & Afflerbach, 1995).

In addition, print reading and Internet reading share a large number of strategies (Afflerbach & Cho, 2009) so readers' print reading skills may have a critical impact on their Internet reading performance (Wilder & Dressman, 2006). I designed Internet reading tasks that evoke a wide range of strategies in both open-ended Internet search and more focused reading with limited sources. Thus, I planned to collect rich data covering an array of such reading strategies used by adolescent Internet readers with proficient reading abilities.

Lastly, participants with proficient verbal competences were selected in the current study using verbal reporting methodology (Afflerbach, 2000). Research suggested that more mature readers with proficient verbal abilities were capable of describing successful strategy use in an Internet reading task (Pressley & Afflerbach, 1995). A primary data collection method was verbal reporting in which participants were asked to think out loud their thinking processes during the entire course of Internet reading. This think-aloud task demanded participating readers' ongoing introspection on their own reading processes and verbal descriptions of their reading activities in front of others. Methodological literature suggested that any think-aloud protocol study benefited from a participant speaking out their thinking proficiently (Afflerbach, 2000). Previous studies demonstrated that students with high verbal abilities thought aloud about their cognitive processes while reading on the Internet, and that this provided suitable information to help a

researcher make inferences about reading behaviors from verbal reports (Coiro &

Dobler, 2007; Leu at al., 2007).

The overall process of purposeful sampling was intended to select an

optimal group of participants meeting the four selection criteria (Figure 4). A high

school located in a mid-east state of United States was contacted as a research site.

Two Advanced Placement (AP) classes taught by the same teacher of social studies

were selected. I informed students in the classes of general information about the

current study. The teacher Ms. Stacey (pseudonym) was deeply involved in this

participant selection. Ms. Stacey and I discussed research goals and procedures,

selection criteria, and student population in her classrooms.

Figure 4. Participant selection procedures

Site access	Participant-screening	Selection decision
• Contacting multiple numbers of high schools and teachers • Introducing research procedures and materials and discussing with teachers about participant selection criteria • Selecting target classes	• Asking the participating classroom teacher to nominate two times the number of participant students to be actually selected, based on (1) the teacher's classroom observations of student reading and verbal competency; (2) any information available from school report cards; and (3) state-wide standardized test scores • Conducting a survey to assess nominated students' reading abilities, strategy awareness, self-concept as a reader, and reading experiences and activities in both print and Internet contexts	• Synthesizing the information from teacher assessment of students and researcher-developed survey results • Selecting an optimal group of participants based on teacher assessment of students and survey results

After collecting signed student assent forms and parent/guardian consent forms, Ms. Stacey initially nominated 14 students from her two classes as candidates: seven sophomores from her AP world history class; one junior and six seniors from her AP US government class. She referenced students' statewide assessment results, quantitative information on report cards, and most importantly, her own informal observations of students' abilities and participation in diverse literacy activities in classroom settings (e.g., reading, writing, discussion, presentation).

I then asked the teacher-nominated students to respond to a researcher-developed pre-research questionnaire (see Appendix A. Student Questionnaire for Reading Experiences). The questionnaire consists of self-reporting items, related to basic demographic information, reading abilities, self-concepts, reading strategy awareness, and reading experiences in both print and Internet contexts. The students' statewide test scores, high school Grade Point Averages (GPAs), participant-responded surveys, and videotaped interviews with Ms. Stacey about students were collected to examine their reader characteristics. Finally, seven participants using English as first language from Ms. Stacey's AP U.S. government class were selected as participants because they were strong readers with strong verbal proficiency (Mean Age = 17.5).

3.1.2. Participant Characteristics

Ms. Stacey noted that the seven participants were proficient in expressing their own thinking in classroom settings. School achievement data and participant-

responded questionnaires indicated that overall these selected participants were

characterized as strong readers (Table 3).

Table 3. Characteristics of the group of student participants as readers

Items that indicate reader characteristics

School achievement
    Statewide test results
        Reading/English Language Arts (*N*=6): Mastery (n=1), Above Mastery (n=4),
            Distinguished (n=1)
        Social Studies (*N*=5): Mastery (n=1), Above Mastery (n=2), Distinguished (n=2)
    Self-disclosed Grade Point Averages (*N*=7): *M*=4.15
    Self-disclosed SAT Critical Reading scores (*N*=4): *M*=582.5

Reading experiences
    Number of hours per week spent reading out of school settings (*N*=7)
        Print reading: *M*=3.43
        Internet reading: *M*=2.8
    Two most frequently performed Internet reading activities
        Print reading:
            1st. Reading books and articles given by teachers for school work
            2nd. Reading novels and poetries for pleasure
        Internet reading:
            1st. Visiting social networking websites (e.g., facebook)
            2nd. Using Web search engines and visiting different websites for school work

Self-efficacy in reading
    Text comprehension (1 to 4 scale, *N*=7)
        Print reading: *M*=3.71
        Internet reading: *M*=3.57
    Text evaluation (1 to 4 scale, *N*=7)
        Print reading: *M*=3.43
        Internet reading: *M*=3.43

Note. The achievement levels determined in the state test include Novice (lowest), Partial Mastery, Mastery, Above Mastery, and Distinguished (highest); Most of the participants' GPAs are higher than 4.0 for weighted credit resulting from taking multiple honors and Advanced Placement classes.

School achievement data indicated that participants were accomplished in content area reading and school-related reading at the high-school level. Participants achieved at or above the level of mastery in both Reading/English Language Arts and Social Studies on the statewide test. The average of the participants' high school GPA) was over 4.0 points because they received weighted credit for honors and AP classes. Survey results show that participants self-reported that they were good at understanding and evaluating texts in both print and Internet reading contexts. While the most popular use of the Internet was for social networking for these participants, they also frequently used it as a learning resource for school-related works.

Participants appeared to be well aware of important reading strategies in both print reading and Internet reading (Table 4). Most of the strategies they self-reported could be classified to the strategy categories of the model of Constructively Responsive Reading. It is noteworthy that participants seemed to be aware that Internet contexts require finding and reading multiple numbers of texts, different from print contexts. Participants tended to use the singular "text" to describe print reading strategies but in contrast they used the plural "texts" or "sources" for Internet reading.

Table 4. Participants' self-reported strategies that they believe expert readers use in print reading and Internet reading

Print reading strategies	Internet reading strategies
<u>Identifying and Learning Text Content</u> • Skimming the material first • Comparing the text to previous knowledge • Using background knowledge to infer text-implicit meaning • Identifying unknown words • Looking for literary elements that give different meanings to the text • Identifying and highlight important information, key words, and thesis statements • Annotating and summarizing key points and arguments to get the depth of meaning • Asking questions to be answered further in the future • Comparing understanding with others' understanding <u>Monitoring</u> • Asking questions to yourself while reading • Using the context clues to understand the meaning of unknown words • Using dictionary to look up unknown words • Rereading the text to analyze content, understand certain situations and plot lines, clarify ambiguous meaning, and gain a better understanding <u>Evaluation</u> • Reading with an open mind but not believe everything read • Identifying bias • Checking the reliability of the source	<u>Realizing and Constructing Potential Texts to Read</u> • Looking up additional facts or questions related to the Internet text online • Looking for credible sources • Looking for unbiased articles • Finding reliable sources and database that are safe and useful • Saving useful websites' names <u>Identifying and Learning Text Content</u> • Focusing on selected materials • Highlighting key points as you read • Reading different articles from a variety of Web sources • Comparing texts from different sites they find online • Cross-referencing different texts' information • Note-taking on what you read in a word document <u>Monitoring</u> • Asking yourself questions while reading • Looking up words you don't know • Deciding continue to search and read or to conduct research on a particular website • Following up with background information on topics you don't understand or are skeptical about • Printing out and reread interesting articles <u>Evaluation</u> • Identifying bias in texts • Evaluating the credibility of website to read texts and do research • Evaluating the reliability of website to read texts and do research • Checking the reputation of the website • Checking the information about where the sources came from • Viewing the structure and flow of the website in terms of how easily it would be understood by the reader

Note. a. A minimal revision of wording was conducted in participants' actual self-reported strategies, and similar strategies were omitted in the course of categorizing all the strategies.

Six of the participants (except for one who transferred to the school) shared experiences taking the same AP class called "21st Century Symposium." This class was developed and offered by a group of teachers of English, social studies (Ms. Stacey), science, and math at the school. It was a multidisciplinary and inquiry-based class that covered diverse themes, including local and global communities and environments, information and media, and youth life and vision. Both conferences with student participants and Ms. Stacey informed me that they shared similar experiences of classroom activities in terms of critical-analytical reading of both print and digital media texts in the class.

3.2. Critical Internet Reading Task

I designed a critical Internet reading task that elicited participants' process of critical thinking when they locate, access, learn, and assess Internet texts. Research showed that question generation helped learning because it encouraged students to use its underlying processes (Andre & Anderson, 1978-1979; Palincsar & Brown, 1984); Rosenshine, Meister, & Chapman, 1996). Different types of questions help readers use different sources of knowledge and information and different levels of cognitive processes (Raphael & Pearson, 1985). Thus, critical questioning may foster readers' critical thinking when they read (Beck, Mckeown, Sandora, Kucan, & Worthy, 1996; Lee, 2001) and also reflect higher-order thinking skills and strategies used in their reading (Afflerbach, Cho, & Kim, 2011).

The critical questioning task in this study demanded participants' critical thinking of Internet texts related to a socially controversial issue. Critical questioning is an important "heuristic" of reading in Internet contexts because it

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may ask readers to be more skeptical, critical, and tentative about numerous texts connected in this unknown, untested, and ever-changing information space (Ikuenobe, 2003). The task to develop critical questions acts as a prompt to think more critically in search of relevant texts. The questions evolving in the participants' mind guides their information seeking to answer the questions and opens up an opportunity to ask further exploratory questions to enhance their understanding about the topic (Ikuenobe, 2001). This involves a process of critical strategy use to explore implicit meanings, hidden intents and motives, and underlying assumptions and perspectives in the texts they located, accessed, and read (Pressley & Afflerbach, 1995; Luke & Freebody, 1997; VanSledright, 2001; Wineburg, 1998).

Question generation has two important roles: It guides and assesses reading. The critical questioning task in this study serves these two purposes. On the one hand, it is intended to help participants read with Internet texts more critically as described above. On the other hand, participant-generated critical questions with justification, as an outcome of Internet reading, are used to assess an aspect of constructing meaning.

3.2.1. Topics for Internet Reading

The Internet reading task asked participants to identify, comprehend, and evaluate Internet texts and finally develop critical questions in preparation for a hypothetical classroom discussion on a contemporary controversial topic. This task was intended to be authentic (Brown, Collins, & Duguid, 1989) to help participants find a relevance from reading to their lives and experiences and to engage in an in-

depth reading of Internet texts from a critical stance (Fabos, 2008). In addition,

individual participants were given multiple numbers of controversial topics and

offered an opportunity to choose what to read about among them (Table 5). This

choice of topics for reading was planned to support participants' self-control and

engagement in reading (Guthrie & Wigfield, 2000).

Table 5. Socially-controversial topics to encourage participants' critical reading and engagement

Health/safety/life	Politics	Business	Environment
• Fast food • Obesity • Driving age • Drinking age • Physician-assisted suicide • Death penalty • Sports and drugs • Human stem cell research	• Illegal immigration • Felon voting • Israeli-Palestinian conflict • US-Iraq	• Big three auto • Global economy crisis	• Global warming • Alternative energy • Environmentally friendly industry

I interviewed each of the participants individually about the reason for topic

selection and their topic-related prior knowledge and experiences. While the depth

and breadth of knowledge varied, most participants seemed to have a good amount

of prior knowledge and related experiences. This appeared to make them

comfortable with the topic of reading (Table 6).

Table 6. Individual participants' topic selection for the current critical Internet reading task

Participants	Topics	Reasons for topic selection
Andy	Death penalty	The topic of death penalty is a widely acknowledged controversial topic so the research can go many directions and use a lot of sources.
Cindy	Alternative energy	Some amount of prior knowledge related to alternative energy will help to go more in-depth reading about the topic and produce more responsive critical questions.
Hannah	Physician-assisted suicide	Prior experiences conducting a successful research project and debate about assisted suicide will help the current research on it.
Katie	Obesity	Prior experiences and knowledge related to the topic are central to conducting successful research on it, and there is a lot of research to do on the Internet because obesity is a big problem in United States.
Maggie	Drinking age	Prior knowledge about the issue of what the drinking age should actually be motivates to research on both sides of arguments related to this topic.
Rachel	Environmentally friendly industry	Prior experiences taking AP environmental science, prior knowledge related to the topic, and future academic plan to major in sustainable agriculture will help create better critical questions.
Sam	Alternative energy	Understanding that alternative energy is a major part of our future and that we should move toward it motivate research on it.

Note. All names are pseudonym.

For example, Cindy and Rachel selected the topic related to "environmental issues" because both of them had experiences working as activists to argue against local companies' mountaintop removal coal mining. They prepared materials about the negative effects of this coal mining method on local communities and environments by researching about the issues, and lobbied Congress in Washington,

D. C. for banning the method. Active participation in a social practice and an amount of topic-related prior knowledge seemed to contribute to self-efficacy in conducting the Internet reading task.

3.2.2. Task Demands and Procedures

The task used in the current study was designed to encourage the reader to use critical thinking and strategic reading processes. The following prompt was given to participants prior to the Internet reading task.

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

Participants were asked to perform the Internet reading task in two sessions. In the first session, I asked participants to locate three websites deemed useful to learn about their topic in a completely open-ended setting; the second session then asked them to learn with those three selected websites. This task design was intended to gather the data that demonstrate diverse strategies both for information search and in-depth reading (Coiro & Dobler, 2007).

Participants were given up to 45 minutes to complete each of the sessions of Internet reading. Participants were allowed to stop reading at any point in the first session and move to the second session. Also, they were allowed to make a decision to end up reading at any point during the second session and start to type in their own critical questions. The two 45-minute sessions reflected typical high school course schedules and previous research in which skilled and strategic adolescent readers were expected to each task within the time limit (Coiro & Dobler, 2007).

Before, during, and after reading in each of the session, participants

performed reading-related tasks and responded to multiple measures (Table 7).

Table 7. Task demands and procedures: Design of the two-phase critical Internet reading task

Phases	Descriptions of participants' tasks
Session I. Open Website Searching	Before reading • Topic selection: Among the given topics, participants chose one that they wanted to know and learn through Internet reading. • Goal setting: Participants were told that the primary purpose of their Internet reading was to know and learn about the topic and further evaluate the Internet texts. Then they specified their reading goals, prompted in the pre-reading interview by the researcher. • Prior knowledge activation: Participants typed in a one-page report that represented their topic-related background knowledge. • Learning about critical questioning: Participants learned about expected quality of critical questioning in a brief modeling session. During reading (Up to 45 minutes) • Internet search: Participants searched the Internet to locate three most useful websites to know and learn about a self-selected topic. • Website selection: Participants selected three useful websites to read further, considering criteria of usefulness: How comprehensible, informative, and credible are the websites you found? After reading • Website evaluation report: Participants reported preliminary results of their website evaluation with supporting evidence, answering the Website Evaluation Questions. • Reflection: Participants were interviewed with questions to help them self-reflect on the process of their own reading, including what they learned and experienced during the Internet search and what challenges they were encountered during reading.
Session II. Focused Website Learning	During reading (Up to 45 minutes) • Website learning: Participants read and learn with the only three websites that they located in the previous session. • Website evaluation: Participants evaluate each of the three websites they read, focusing on the criteria for evaluating the websites' usefulness: How comprehensible, informative, and credible are the websites you read? After reading • Website evaluation report: Participants report their final results of website evaluation with supporting evidence, answering the Website Evaluation Questions. • Reflection: Participants were interviewed in relation to what they read and learned from the three websites and what challenges they experienced.

Prior to Internet reading, participants were introduced to the general procedures of the Internet reading task. I then introduced exemplary critical questions to participants and conducted a brief session about learning critical questioning (Appendix B). We compared and contrasted both superficial questions and critical questions about "Fast Food" and discussed what would make questions look more critical. I explained that I expected participants to develop critical question about the topic they selected and provide a written statement of why the questions should be asked in a paragraph or two the current, rather than exact answers to the questions. This pre-reading activity was intended to help participants understand final outcomes of reading.

Followed by an introduction to the task, participants chose one topic for reading, and typed in what they knew about their topic (default margin, 12-point Times new roman, one-page limit) in a Microsoft Word document. I interviewed participants posing questions related to their reading, including topic selection, goal setting, prior knowledge, and plans for reading. This pre-reading interview was intended to help participants prepare for Internet reading.

Individual participants performed the Internet reading task in the first 45-minute session (i.e., Open Website Searching). The intent of this session was to evoke reading strategies as much as possible that participants would use while searching for, locating, and selecting topic-related useful websites. Participants were given an assignment sheet that described major tasks to complete (Appendix C). A hypothetical situation encouraged participants to "identify and choose three useful websites to learn about their topic" in the following manner:

Suppose you are sitting in your classroom, and there is a computer connected to the Internet on your desk. You will prepare for a classroom discussion related to the topic that you have chosen. For this assignment, you will search for multiple sources about the topic from the Internet. Then, you will select the THREE MOST USEFUL WEBSITES that you believe as useful to learn about your topic.

During the session, participants were encouraged to think out loud about what they were doing and thinking. Additional prompts were given to participants, when I determined, to remind of their think-aloud task or to hear more about thinking processes (e.g., Would you tell me what you are thinking? Why did you click on the link? What are you looking at?). Participants were allowed to use any search engines or visit any websites in a completely open-ended Internet context (Zhang & Duke, 2008). They were also allowed to save and bookmark identified Internet texts using a web-browser and to type in any information using Microsoft Word. Although the time limit was 45 minutes, some of the participants used a few minutes more to complete the session.

After completing the first session, participants reported preliminary results of their evaluation of the selected three websites. Students rated the websites' usefulness in terms of three criteria (i.e., comprehensibility, informativeness, credibility), and marked on a 6-point Likert scale for each question on a worksheet for website evaluation (Appendix E). If needed, participants were allowed to look back over their Internet search recorded in the computer and to speak aloud more about their reading in a retrospective manner. I interviewed each of the participants individually. I used follow-up questions about their reading that emerged from my observation of their first-session reading performances. These after-reading

activities were intended to help participants' self-reflection on their reading and also to collect information about their reading in the first session.

Individual participants continued to read on the Internet in the second session: Focused Website Learning. Like the first session, the second session was intended to evoke diverse reading strategies involved in constructing the meaning of Internet texts. Participants were given another assignment to ask to read, learn with, and evaluate the three websites they selected as useful Internet texts in the first session (Appendix D). Following is the prompt used in the second session.

> You have selected the three websites you judged as useful sources for this assignment. In this session, you will conduct focused, in-depth READING OF THE THREE WEBSITES to construct a critical question that guides classroom discussion related to the topic. You can use UP TO 45 MINUTES for this focused Internet reading.

The assignment worksheet explicitly described that participants would be encouraged to evaluate the websites they read in terms of the three criteria for usefulness, the same as that used in the first session. Participants were allowed to refer to these criteria for website evaluation during the session. Again, participants were asked to verbalize their thinking processes while reading with the three websites. While participants were free to move to any place and select and access any available links or built-in search tools, they were not allowed to directly access general Web-search engines (e.g., Google) or another websites (e.g., Wikis).

Upon the completion of the second session, the same after-reading activities used in the first session were performed: website evaluation reports and post-reading interviews. For the final website evaluation reports, participants typed in evidence and criteria that they used to assess websites during reading using

Microsoft Word (Appendix F). They were allowed to look back to their reading with recorded files and think aloud further on their reading. A post-reading interview was conducted with questions about their learning and reading experiences during the session.

Finally, I asked participants to type in their critical questions and the rationale for the questions (What makes you believe the question(s) is important?). During writing, participants were allowed to use their notes to type the (multiple) questions in the MS Word document. There was no time constraint.

3.3. Data Collection

Multiple methods were used to collect the data, from which reading strategies are inferred (Afflerbach, 2000; Magliano & Graesser, 1991; Veenman, 2005). The primary method was participants' verbal reporting of their thinking processes during reading (Ericsson & Simon, 1980). Verbal reports were the data source to infer what and why particular strategies were planned and performed (Johnston & Afflerbach, 1984). These think-aloud verbal reports were complemented by "reader-computer interaction protocols" simultaneously recorded with verbal reports in the computer (Leander, 2008; Leu et al., 2008). These interactive data offered the information on where participants were reading, where they were navigating, and what strategic behaviors were actually enacted during Internet reading.

These two types of synchronized "real-time strategy data" (the data concurrent with the process of reading being examined) were complemented again by other data that were not concurrent with the process of reading being examined

but offer contextual information of reading, including pre-/post-reading interviews,

priror-knowledge reports, website evaluations, and critical questions (Afflerbach,

2000). These data provided the information on what participants' knew and newly

learned and what were experienced during Internet reading. This multi-method

design served for the purpose of triangulation to enhance inferences about strategy

use (Figure 5).

Figure 5. The plan for triangulated data collection to infer participants' reading strategy use in Internet contexts

Primary Strategy Data
(Real-time):
Think-aloud verbal reports

Inferences about Strategy Use

Complementary Strategy Data (Real-time): Reader-computer interaction protocols

Complementary Contextual Data: Pre-/post-reading interviews; Prior knowledge reports; Website evaluations; Critical questions
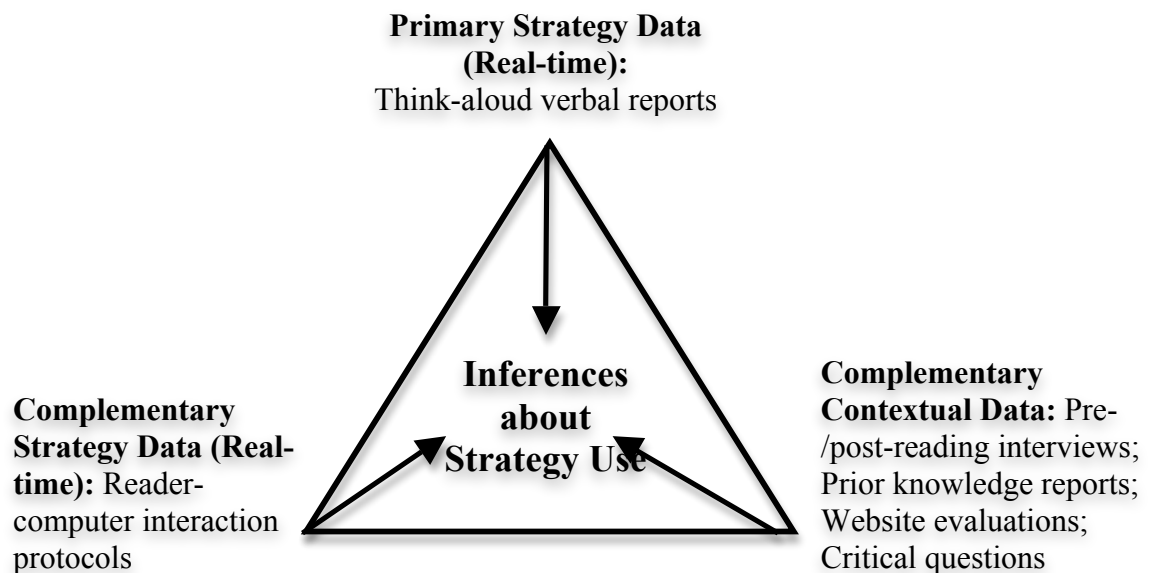
The multi-method data collection was sequentially ordered during the two sessions of Internet reading task (Figure 6). The two strategy data, verbal reports and reader-computer interaction protocols, were simultaneously collected during the each of the two sessions of Internet reading task. Other data were collected before and after each session, in conjunction with before- and after-reading activities to facilitate participants' Internet reading (see also Table 6. Task Demands and Procedures.).

Figure 6. The sequence of data collection along to the course of Internet reading task

| Prior knowledge report & Interview | **Session I. Open Website Searching** Verbal reporting synchronized with screen recording | Interview & Website evaluation | **Session II. Focused Website Learning** Verbal reporting synchronized with screen recording | Interview, Website evaluation, & Critical questioning |

☐ Real-time data collection   ▱ Contextual data collection
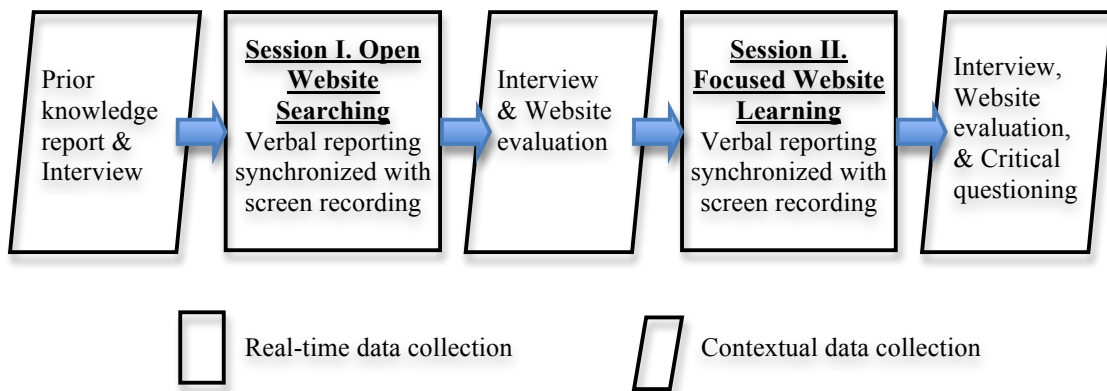
Different methods had different roles in this data collection plan. Each of the methods was planned to gather different types of data to be used in making inferences about participants' thinking and reading processes in Internet contexts (Table 8). The following sections offer further detailed information about why and how each of the data collection methods was implemented.

Table 8. An overview of multiple data collection methods and the data expected from the methods

Methods	Descriptions of collected data
Written prior knowledge report	Amount of participants' topic-related prior knowledge and experiences
Verbal reporting	Concurrent think-aloud protocols reflecting participants' strategy use in searching for the three useful websites and an in-depth website reading.
Screen recording	Time spent reading and dynamic reader-computer interactions in the course of Internet search and in-depth website reading and dynamic e.g., visited websites, mouse use, clicks to hyperlinks, cutting and pasting, highlighting, scroll bar use, typed web addresses, typed search terms, saved files, bookmarked web-pages)
Pre-/post-reading interviews	Participants' self-reflections on what they learned, how they conducted Internet search and website learning, what challenges they experienced, what focus they maintained, and how they planned and modified their reading in the entire course of Internet reading.
Website evaluation questionnaire	Participants' preliminary and final evaluations related to the quality of the websites that they found and selected: comprehensibility, informativeness, and credibility of the website.
Participant-generated critical questions	Participant-constructed critical understanding of the topic-related issues, which is represented in their critical question(s) and the rationale for the questions (why the questions are important to ask in relation to the issues.

3.3.1. Written Prior Knowledge Report

Prior to conducting the Internet reading task, participants were asked to type in their topic-prior knowledge related to the selected topic, using Microsoft Word. The following prompt was present on a computer screen:

You have selected one topic that you want to learn. Please tell me what you know about the topic as much as you can on the one-page blank word document.

Typed reports, saved in the computer, were analyzed by parsing it into the units of idea and used to roughly measure the amount and quality of topic-related prior knowledge. Although the length and number of idea units varied in their reports, overall prior knowledge reports indicated that participants possessed general background knowledge, controversial issues, and interest in particular aspects of their topic. The prior knowledge data were used in interpreting individual participants' strategy use and their outcomes of reading.

3.3.2. Verbal Reporting: Think-Aloud Protocols

The primary method to collect strategy data was verbal reporting (Afflerbach, 2000; Ericsson & Simon, 1980). This method is maturing (Pressley & Afflerbach, 1995) so possible concerns about verbal reports as data and the tactics the current study used to complement the concerns were considered in designing and implementing the method (Afflerbach, 2000) as described in Table 9.

Prior to the Internet reading task, I offered participants a short pre-training session of think-aloud. I encouraged participants to connect their previous experiences about think-aloud (e.g., teacher modeling in a Language Arts class) to the current research situation. I then modeled think-aloud procedures, using a sample website. I conducted this pre-training on "how" to provide verbal reports in a non-directive way to avoid explicit demonstration of "what" participants should report (Afflerbach, 2000). The goal of pre-task training was to increase participants' familiarity with think-aloud procedures.

Table 9. Methodological challenges in the use of think-aloud verbal reporting

Related factors	Methodological concerns and complementary tactics
Subjects	• Verbal ability: Participants are highly verbal. • Familiarity with the methodology: Participants have pre-training in which the researcher models how to verbalize thinking processes. • Knowledge of text content and structure: Participants' prior knowledge about the topic is assessed through pre-reading interviews and the result is considered in the data analysis stage. Participants are experienced Internet users who have a level of familiarity with different website structures in general. • Relationship with researchers: Participants do not have any particular relationship with the researcher that might conflict their interest (e.g., teachers). The researcher builds a safe and comfortable atmosphere.
Texts	• Degree of intactness: Participants read in an open-ended Internet environment so that they can read un-manipulated texts appeared in a real Internet space. • Difficulty or familiarity: Participants read websites about a typical high school classroom topic that they select. • Mode of text representation: Participants read digital, multimodal texts on the Internet that represent the nature of Internet texts (e.g., written texts, graphics, images, or video clips connected through hyperlinks).
Tasks	• Influence of verbal reporting task on designated reading task • Automatic or non-automatic processing: The researcher focuses on participants' conscious, goal-directed strategies as well as automatic reading skills implied in their performances. • Novelty of task: Participants read on the Internet about socially controversial issues, different than contexts of reading with one single print text usually assumed in the schoolwork. • Amount of text available for previewing or rereading: Participants are allowed to visit any websites on the Internet and use any navigation function available.
Directions to subjects	• Focus on specific or general reading strategies: The researcher encourages participants to verbalize as many strategies as they are using while reading on the Internet. • To read as one "normally would": The study sets up open Internet environments in which people usually read digital texts for information gathering and understanding.

Note. This table has been adapted from Afflerbach (2000, p. 171) and modified to the current study.

During each of the two sessions of Internet reading task, I asked participants to think out loud while they read on the Internet. Participants received the following prompt, both written and verbal, ahead of starting their Internet reading task in each of the sessions, respectively.

> I would like you to THINK OUT LOUD what's going on in your mind while reading on the Internet. Your think-alouds will become invaluable research data from which I can infer what adolescents like you strategically and critically read in Internet contexts. I encourage you to spontaneously verbalize your thinking as much and detailed as you can.

Participants were encouraged to verbalize their thinking processes at any point of their reading. If I observed their silence continued longer or felt to query more about their thinking, I gave participants additional prompts to encourage their thinking out loud (e.g., Would you tell me what you are thinking now? What made you click on it?). Participants' concurrent verbal reports were recorded in the computer, using screen recording software Camtasia Studio 6.0 (For further information on this software, refer to http://www.techsmith.com/camtasia.asp). A large amount of verbal reports was collected, and each of the participants averagely spoken 7, 407 and 4,125 words in two sessions, respectively (Table 10).

Table 10. The number of spoken words produced in verbal reporting

Participants	Open Website Searching	Focused Website Learning	Total
Andy	7,504	4,059	11,563
Cindy	7,515	3,359	10,874
Hannah	10,301	5,519	15,820
Katie	6,770	7,518	14,288
Maggie	4,281	2,530	6,811
Rachel	6,544	4,238	10,782
Sam	8,934	1,649	10,583
Total	51,849	28,872	80,721

3.3.3. Screen-Recording: Reader-Computer Interaction Protocols

I recorded participants' navigation behaviors synchronized with their verbal reports during both sessions of Internet reading task, using the same software Camtasia Studio 6.0 (Table 11). Lengths of individual participants' Camtasia video clips recorded in the computer for the two sessions were averagely 41 minutes 32 seconds and 31minutes 5 seconds, respectively.

Table 11. The length of recorded Camtasia video clips

Participants	Open Website Searching	Focused Website Learning	Total
Andy	45m 32s	37m 42s	1h 23m 14s
Cindy	43m 48s	33m 37s	1h 17m 25s
Hannah	48m 36s	32m 29s	1h 21m 5s
Katie	36m 53s	38m 33s	1h 15m 26s
Maggie	26m 27s	22m 15s	48m 42m
Rachel	41m 42s	35m 51s	1h 17m 33s
Sam	46m 44s	17m 09s	1h 3m 53s
Total	4h 50m 42s	3h 37m 36s	8h 28m 18s

Note. h = hours, m = minutes, s = seconds.

Recording of "reader-computer interaction protocols" generated during the entire course of Internet reading was intended to gather the information on how actively (or passively) participants were interacting with their Interne text environment mediated by a computer (Leander, 2008; Leu et al., 2008). Reader-computer interaction protocols were visually represented participants' strategic moves, including mouse use, search terms use, website and link selections, scroll

bar use, and so forth. These interactive protocols was used to complement verbal reports, indicating what search terms were applied and modified, what links were examined and selected, what web pages were accessed and read in what order, what part of texts were focused first and next, and so on.

3.3.4. Pre- and Post-reading Interviews

Both strategy data (verbal reports and reader-computer interaction protocols) were complemented by interviews. Reading strategies are goal-directed processes and influenced by readers' initial and evolving understanding of what he or she read. Thus, it was necessary to hypothesize and interpret possible impacts of goals, knowledge, interest, and beliefs that the reader brings into reading and the meaning constructed during the course of reading on the constructive strategy use.

Pre- and post-reading interviews were intended to gather the information on reader characteristics and contextual information of reading that may or may not affect choices of strategies and patterns of strategy use (Table 12). Pre-reading interviews with individual participants were conducted before they read on the Internet (before the first session). These interviews were intended to gather the information on what participants would bring to the task, including prior knowledge, goal setting, topic interest, and plan for searching and reading. Two post-reading interviews after each of the two sessions of Internet reading task were to gather the information on their evolving and constructed meaning and understanding through the task, including what they learned and what they experienced and how the goals of reading may be modified (or maintained).

Table 12. Questions used in the semi-structured pre- and post-reading interviews

Sequence	Questions
Before session I	• Would you tell me the reasons that you chose the topic? • What would you like to learn about the topic? How would you specify the goal or focus of your reading? • What do you expect from the Internet in terms of this task? • What specific plan would you make for the current Internet search?
After session I (before session II)	• What did you learn about the topic from the first session? • What information did you encounter? Was it expected or unexpected? • Would you describe the process of your reading in the first session? What was focus of your reading? What challenges did you have? • Why made you choose the three websites and how did you judge them?
After session II	• What did you learn about the topic in the second session? • What information did you encounter? Was it expected or unexpected? • Would you describe the process of your reading in the second session? What was your focus? What challenges did you have? • Do you still believe that these websites are useful?

3.3.5. Website Evaluation Questionnaire

Participant-responded website evaluation questions were collected to gather the information on their critical assessment of Internet texts. A worksheet was given to participants as soon as they completed each session, respectively (Appendix E and F). It asked participants to evaluate the usefulness of each of the three websites in relation to comprehensibility, informativeness, and credibility by marking on the Likert scale items (0-6) for each of the criteria. While both worksheets contained identical information and questions, the one for Session II included an additional open-ended question about criteria and evidence used in website evaluation. This

website questionnaire was designed to implicitly assess participants' preliminary and confirmatory website evaluation results.

3.3.6. Critical Questions

Participant-generated critical questions were collected, with a one- to two-paragraph written justification. My study is mostly process-oriented so these critical questions were only analyzed in a descriptive way. The results indirectly indicated an overall success of the critical Internet reading but not provided accurate information about the outcomes of reading. The questions were also compared with written prior knowledge reports to trace how much participants constructed meaning through Internet reading, with an assumption that the questions may reflect the readers' understanding of the topic.

3.4. Data Analysis

Data analysis was conducted in three phases: (a) data transcription and Internet Reading Strategy Matrix development, (b) analysis of the matrices, (c) in-depth case analysis (Figure 7). Participants' verbal reports, reader-computer interactions protocols, and interview protocols were transcribed. Two sets of strategy data transcripts, verbal reports and reader-computer interaction protocols, were integrated into a structured matrix of each of the seven participants. These matrices included a timeline, transcripts of verbal reports and reader-computer interactions, encoding slots, and spaces to note-take my initial interpretation.

Figure 7. A graphical representation of data analysis procedures
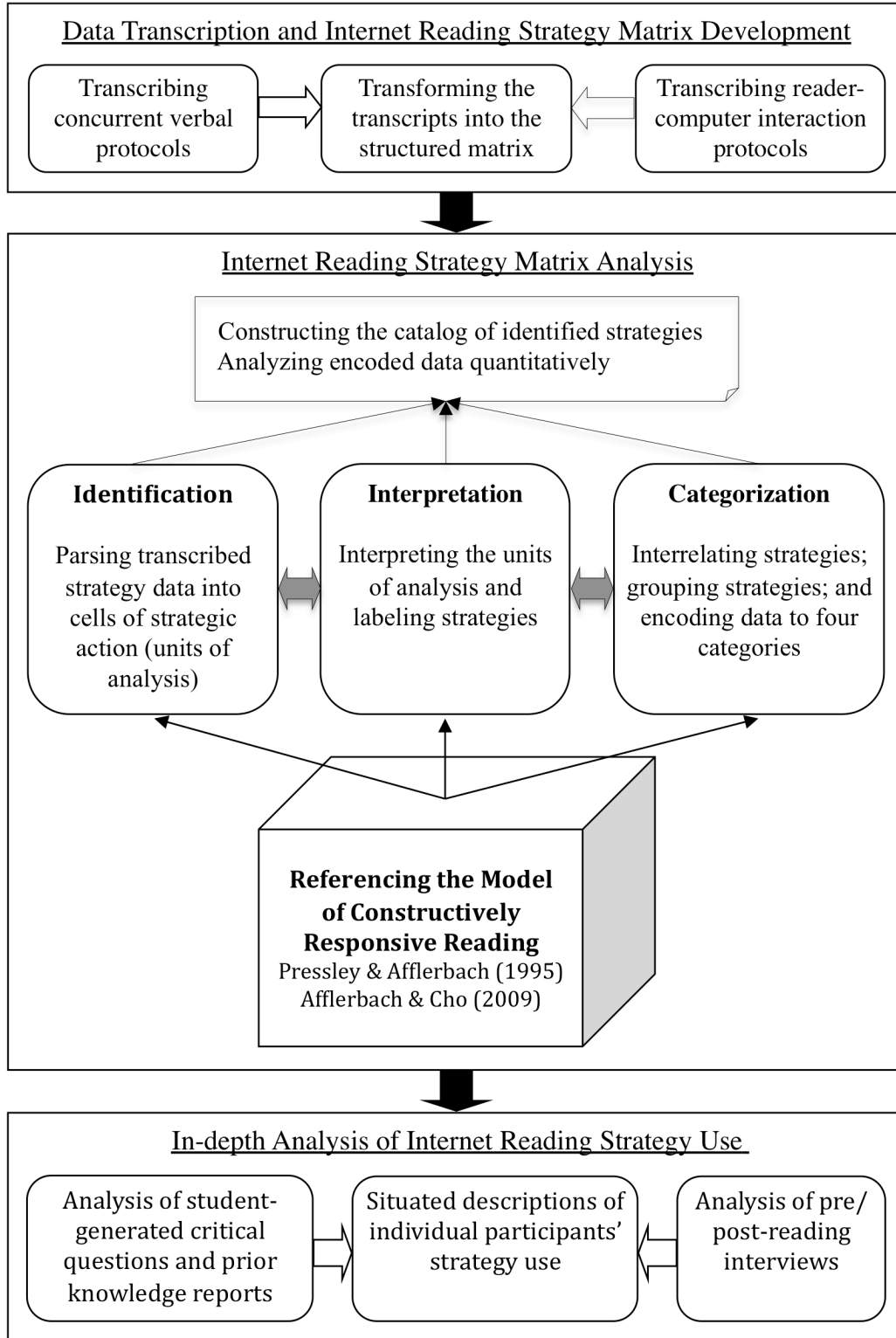
These Internet Reading Strategy Matrices of individual participants were then analyzed through a recursive process of using both the data and the reference model, to examine types and patterns of strategies. Strategy data on the matrices were analyzed through identification, interpretation, and categorization of constructive strategies for Internet reading, from a grounded-analysis approach. During the entire course of analysis, strategies inferred from the strategy data were constantly compared with the model of Constructively Responsive Reading and the accompanying accounts of reading strategies constructed in Pressley and Afflerbach (1995) and Afflerbach and Cho (2009).

Finally, results from the analysis of Internet reading strategy matrices were combined with their other complementary data, including pre-/post-reading interviews, website evaluations, and critical questions. This was to build an understanding of each participant's reading performances and profiling the readers.

3.4.1. Data Transcription and Matrix Development

Data transcription. An initial glimpse of strategy data revealed that Internet reading involved dynamicity in both their mental strategy use and navigation behaviors. This demanded me multiple times of watching Camtasia video clips and categorization of their verbal utterances and screen behaviors. Finally, I came up with general principles of data transcription and developed a more complicated transcription convention was developed to reflect the dynamic nature of strategic moves (Table 13).

Table 13. Transcription convention of verbal protocols and reader-computer
interaction protocols

Meaning and Symbols	Examples
Elapsed time: [minute:second-minute:second]	[12:15-12:31]

Speaker:
  Participant: Pseudonym:
  Interviewer: I:
	Sam: I'm just reading this site … I: What are you thinking?

Verbal Protocols (VP)	
VP excerpts: Regular font; no functuation at the end of the verbal report excerpt, except for exclamation points (!) and question marks (?)	Where is it? oh here's a good one arguing against the death penalty!
Quotes from text (or read-alouds of text): ' '	It says 'There is no question that the up front cost of the death penalty are significantly higher than for equivalent LWOP cases' I don't exactly know what LWOP means!

Omitted words in the quotes from text:
  Words: ' (words) '
  More than a sentence: ' (…) '
	Here it helps I guess 'causing a person's death by performing an action such as (…) by giving a lethal injection' .. I guess that would kinda be like death row people,

Inserted words in the quotes from text:
  Words: ' {words} '
  Long VP excerpts: ' ' VP ' '
	'Descriptions {um ..} common law is based on principles, customs, case law' I guess this is how they decide how to react to it? 'A person commits the crime of manslaughter if the person intentionally aids another p- (person to commit suicide)'

Pause (approximately):
  . (1 second)
  .. (2 seconds)
  … (longer than 3 seconds)
  -- (No pause between words)
	It's gonna be mor--it's gonna be biased towards .. the people who are against it but it still gonna give me some information about … you know . why they don't like it

Speaker emphasis: UPPER CASE	Okay in my first session I was wondering if it could be proven that the death penalty is MORE expensive than life in prison, would the justice system of united states outlaw it
Transcriber-noted comments/references: { }	Um .. there's the Glucksberg thing {Washington v. Glucksberg} again .. but I don't really want that

Reader-Computer Interaction Protocols (RCIP)

RCIP excerpts: (Regular font; no functuation at the end of the excerpt)	(Scrolling down the webpage slowly)
Sequences of RCIP: (; ;)	(The Google main page shows up; typing in *physician-assisted suicide* the Google search box; the Google search result page shows up; scrolling down the page slowly)
Search terms typed in the search box: *Search terms*	(Typing in *Information in the death penalty*)
Web searching result pages [Search engine+*search terms*]	([Google+*drinking age lowered*])
Entries resulting from web searching (e.g., from Google): ENTRY: Entry title shown: web addresses before the first /	(Clicking on ENTRY: AFSP-Struggling in Silence-Physician Suicide and Depression: www.afsp.org)
Webpages currently opened: [Website name-webpage title (or heading): web address]	([Euthanasia.com-Euthansia Definitions: euthanasia.com]) those {the listed words on the webpage} are just uh terms
Hyperlinks: Written word(s) links: LINK: words Image links: IMAGE: caption Icon links: ICON: description	(Clicking ←; clicking on LINK: Murder Rates by State: 1996-2008)
Website menus: Level 1: MENU: menu name shown Level 2: Menu: menu name shown Level 3: menu: menu name shown	(Moving the pointer on MENU: LEARN MORE; clicking on Menu: Mountaintop Removal)
Web addresses types in the URL bar: Web address	So I'm going to open up a search engine Google dot com! (typing in www.google.com)
Tabs opened on the browser: TAB: Title shown	(Opening TAB: Euthanasia suicide mer...) let's just look at the site again
Buttons on web search engines/websites/webpages: +name	(+Search Again)
Backward and forward buttons: → and ←	I don't think this site is useful (Clicking ←)
Notes written on a scratch paper or into a word document: Notetaking: *words written down*	(notetaking: *Look up types of death penalty execution*)

For example, in terms of verbal reports, while following general convention used in the previous study (Afflerbach, 1990), I considered "pause" and "accent" of verbalization to be important. It seemed to me that the phenomenon of think-aloud verbal reporting was continued utterances of what readers were doing and thinking, unlike written sentences. Thus I did not use a period as punctuation mark but used it to denote certain amount of time paused by readers in the middle of their verbal utterances: that is, a single period referred to approximately a one-second pause. Also, a strong accent on a certain word or phrase appeared to reflect readers' emphasis and attention so I marked these emphases using upper letters.

In terms of reader-computer interaction protocols of participants, I considered it to be important to accurately transcribe what they wanted to seek, where they read, where they go, and where possibly they could move in a complex hyperspace. Thus, I used various combinations of different symbols to denote texts, links, and reader actions. For example, all types of hyperlinks (including hyperlinked menus and entries) were underlined so that transcripts indicated the possible choice of the links (e.g., menu: Learn More). All types of Internet texts (including a webpage, website, web-search engine) were denoted in a bracket '[ ]' which indicated where participants accessed and stayed on the Internet (e.g., [Siemens: www.siemens.com]). All typed language (including search terms and ULRs) was italicized so it indicated so that it could be easily observed in the analysis of search terms (e.g., [Google+*obsesity*]).

I used transcription software InqScribe (http://www.inqscribe.com/) to work with Camtasia video clips (Figure 8). I inserted a video clip into the software and

transcribed participants' verbal reports and reader-computer interaction protocols while watching the video. During the transcription, I tried to parse out the data into a smallest unit, using time stamps. Also, I tried to integrate my insights about a particular strategy use into a transcript whenever it popped up in my mind, using observation notes right behind each chunk of transcript. This recursive process between transcription and interpretation helped later in-depth analysis of transcribed strategy data.

Figure 8. A snapshot of interface of the software (InqScribe) that was used in transcribing think-aloud verbal reports and reader-computer interactions

A Camtasia video clip imported into InqScribe

Transcripts of verbal reports and reader-computer interaction protocols, with time stamps and nota-takings of insights
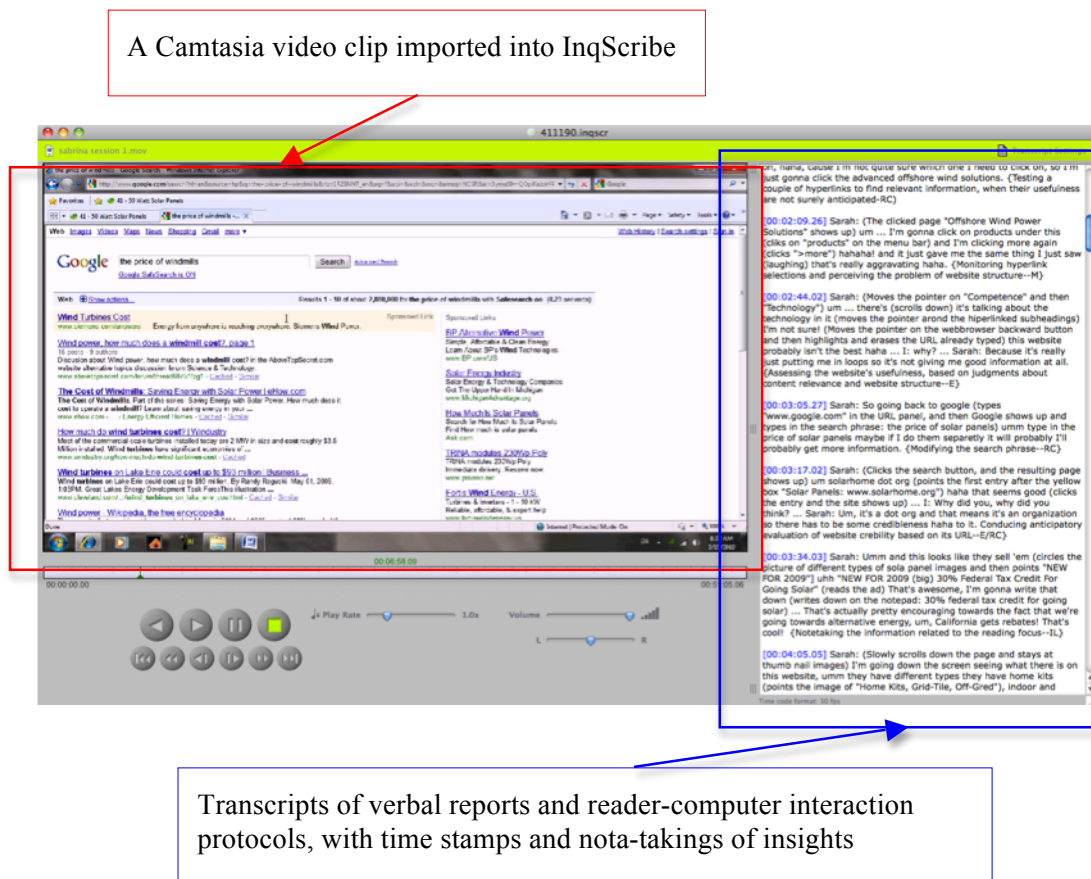
Internet Reading Strategy Matrix development. I integrated these two transcripts of strategy data into a structured matrix that allows triangulated analysis of data. I exported transcripts of verbal reports and reader-computer interaction protocols of each participant into an Excel sheet to develop an initial strategy matrix. This aligned both strategy data to the time course of Internet reading. This integration of data afforded observations of how strategies related to screen behaviors and (in)consistency of both strategy data.

Initially, strategy data were parsed out according to the time stamps created in the process of transcription. However, it was incomplete and premature so that I repeated a process of chopping a strategy matrix into meaningful segments that represented strategic actions. The following section further explains this process, which actually became the process of analyzing the matrices.

3.4.2. Internet Reading Strategy Matrix Analysis

The Internet reading strategies of each of the seven participants were identified, categorized, and coded into their Internet Reading Strategy Matrices, using modified grounded-analysis techniques. While using a constant-comparison method (Glaser & Strauss, 1967), I considered following two important principles modified to the current study to be important to conducting a complicated and dynamic process of coding and interpreting the data organized in the Internet Reading Strategy Matrices.

The reciprocal process between the data and the model. I adopted a way of "abduction" or "inference to the best reasoning" (Harman, 1965) during the course

of data analysis. Abductive reasoning is "a form of inference that goes from data describing something to a hypothesis that best explains or accounts for the data. Thus abduction is a kind of theory-forming or interpretive inference." (Josephson, 1996, p. 5) The purpose of adopting this reasoning principle was to make model-based inferences about participants' constructive Internet reading strategy use from the data.

I conducted a grounded-analysis of strategy data by constantly referencing the model of Constructively Responsive Reading. Internet Reading Strategy Matrices developed with verbal reports and reader-computer interactions provided a structure of coordinated data that informs an understanding of Internet reading strategy use. The model of Constructively Responsive Reading was used as a reference point to explain the strategy data in the matrices. Over the course of analysis, the model continuously informed my actions to identify, interpret, and categorize strategy data (in the strategy matrix) and results from the analysis assisted a test of the model grounded in the data. This reciprocal approach was intended to serve a theory-building purpose of this study.

The recursive process between identification, interpretation, and categorization. I conducted analysis in a constantly recursive manner, by moving back and forth between the actions of identification, interpretation, and categorization of strategy data (Glaser & Strauss, 1967). For the first step, I repeated a process of segmentation of strategy data into individual "cells of strategic action." Each of the cells represents the smallest meaningful chunk of strategy use, that is, units of analysis (Chi, 1997).

I then identified and interpreted each of the cells of strategic action, based on the involved strategies. Although the majority of the cells entailed a single strategy, some of them represented multiple strategies. This process of identification, interpretation processes often asked a revision of segmentation of strategy data. I took notes on my insights about strategy and incorporated them into the matrix. This interpretation helped me recall my initial thoughts whenever I revisited certain cells of strategic action. At the same time, these identified strategies were coded into a scheme informed by the model of Constructively Responsive Reading.

The coding scheme was developed, building upon the model of Constructively Responsive Reading and the comprehensive research synthesis conducted for this study (Table 14). The contents of the coding scheme included definitions of each of the four strategy categories, general indicators to determine particular strategies, and relevant examples that helped encoders' determination. I developed the coding scheme initially, using the theoretical model and relevant research literatures, but then I constantly revised it, based on the insights from my ongoing data analysis. I also updated the coding scheme, after conducting a series of discussions about its coherence, clarity, and comprehensiveness with another encoder.

Table 14. The coding scheme emerging from the model of Constructively Responsive Reading

- **RC**: Denotes a line of strategies for *Realizing and Constructing Potential Texts to Read.* These strategies represent the activity for search for, locate, and select links and texts entailed in the course of path construction and navigation on an information space. To code a strategy into RC must require 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)

- **IL**: Denotes a line of strategies for *Identifying and Learning Text Content.* These strategies represent the activity for constructing the meaning of Internet text, including paraphrasing, comprehending meanings of words, literal and inferential comprehension, interpretation, analysis and synthesis, use of text or website structure, identifying main ideas, comparing and contrasting different information, questioning, and so on. To code a strategy into IL does not necessarily involve explicitly generated screen behaviors but requires significant involvement of "text content or information," "reader knowledge and understanding," or both in verbal reports.

- **M**: Denotes a line of strategies for *Monitoring*. These strategies represent knowledge, perception, or awareness of text characteristics, task-related factors, goals for reading, reading situations, and readers themselves. Monitoring strategies also represent the activity for planning search and reading, monitoring and regulating thinking processes, detecting reading problems, and identifying and applying fix-up or alternative processes that are entailed in the entire act of reading. To code a strategy M does not necessarily require interactive screen actions but verbal reports should reflect a level of readers' self-assessment.

- **E**: Denotes a line of strategies for *Evaluation*. These strategies represent the activity that readers use in valuing, appraising, critiquing, assessing any objects presented on the Internet. The objects include units of information (e.g., texts, pictures and graphics, audio and vide clips), links (e.g., search entries, menus, button, image links, hyperlinked references), structures and tools (websites, general web-search engines, built-in web-search engine). To code a strategy E must require any sorts of evaluative judgment in verbal reports but does not necessarily require interactive screen actions.

Figure 9 is a first page of the complete Internet Reading Strategy Matrix for Andy's first session. It includes a timeline, transcripts of verbal reports and reader-computer interaction protocols, single/multiple coding of individual cells of strategic action, and my notes on interpretation of particular strategies.

Figure 9. An example of the analyzed Internet Reading Strategy Matrix

Andy session 1

In	Out	Verbal Protocols (Reader-Computer Interaction Protocols)	RC	M	E	IL	Initial Interpretation
00:01.3	00:16.2	Ardath: ([University of Maryland: www.umd.edu]) so I'm going to open up a search ... in the web address bar; [Google: www.google.com])	RC				
00:16.2	00:42.3	Ardath: (Typing in *Information in the death penalty*; + Search) I typed information on the death penalty ([Google+*Information in the death penalty*; clicking on 'Did you mean: Information on the death penalty') um I only want sites that give me information on it right now so I can get a better idea	RC				...... {She generates a search phrase that reflects her needs for finding websites to get general information about the topic which might provide her with background information of the topic.--RC-M}
00:42.3	01:06.1	Ardath: ([Google+*Information on the death penalty*]; scrolling down) and hopefully that by looking at these sites (pointing at the first ENTRY: Death Penalty Information Center: www.deathpenaltyinfo.org) I'll be able to ... (clicking on the same entry) ... I: Why did you click it? ... Ardath: It was the first one that came up and usually um .. the first ones .. I always check out .. sometimes they're not that good .. but	RC				...... {She attempts to find general topic-related information immediately, and tries to check whether the selected website contains what she wants, by reflecting on her own previous Internet searching experience.--RC}
01:06.1	01:13.2	Ardath: ([DPIC Death Penalty Information Center: www.deathpenaltyinfo.org]; scrolling up and down a bit; moving the pointer to the video clip from MSNBC-TV prompted by DPIC's recent report Smart on Crime') what's it? ... (the pointer moving around the video clip; moving the pointer to a body of written texts in the main block)	RC				..........{She checks the information on a video clip but immediately get away from it.--IL}
01:13.2	01:23.3	Ardath: This is an editorial um (pointing at the heading of the first article 'EDITORIAL: Death Row's Elimination Would Save State Money') ... BUT the website is the death penalty information center (pointing at the title of the website 'Death Penalty Information Center' above)			E		
01:23.3	01:45.0	Ardath: Um .. let's see um (pointing at the menu MENU: Issues; pointing at the MENU: Home; the pointer moving on the first article 'EDITORIAL: Death Row's Elimination Would Save State Money' in the main block) hm ... I: What are you thinking? ... Ardath: Um I'm thinking that this isn't exactly what I want right now		M			{She conducted a tentative evaluation of website's usefulness based on her quick investigation of the genre and source information of the selected short text among many texts posted on the website, relationships of the hosting website and content of the texts in it, using a goal-relevance standard.--E}
01:45.0	01:51.0	Ardath: (Scrolling down the page) but I'm just going to continue to go down to find information	RC				{She decides further overviewing of the website content to test her tentative hypothesis about the website.--IL}
01:51.1	02:25.1	Ardath: Uh let's see ... (pointing around the article 'Governor Postpones Execution of Inmate Found Unconscious in Death Row Cell') right now they're talking about specific people like ... who were supposed to have the death penalty... (the pointer moving around the text) for example um this man 'Lawrence Reynolds' uh murdered someone in nineteen ninety four and he was supposed to get the death penalty .. um (the				IL	... {She selectively read an article and briefly skims the content.--IL}

Prereading **Session 1** Post 1 Session 2 Post 2 +

Normal View   Ready

Timeline   Transcripts of strategy data   Coding   Researcher notes on strategy

A cell of strategic action

Note. RC = Realizing and Constructing Potential Texts to Read, M = Monitoring, E = Evaluation, IL = Identifying and Learning Text Content.

During the entire course of data analysis, identified Internet reading strategies from seven participants' Internet Reading Strategy Matrices were constantly compared and contrasted with Pressley and Afflerbach's (1995) catalog of print reading strategies and Afflerbach and Cho's (2009) identification of strategies for both multiple text reading and Internet hypertext reading. Based on the reciprocal process of comparing and contrasting the data with the model, I assigned single or multiple codes (using RC, M, E, and IL) to each cell of strategic action.

Inter-rater reliability. Although I coded all of the 14 Internet Reading Strategy Matrices to ensure "consistency," I also collaborated with an expert reading faculty (co-encoder) to enhance "reliability" of my coding and inference about strategy use. First, we shared and discussed the rubrics of strategy coding to make sure that we had an understanding of the rubrics in the same way. In doing so, we discussed about task demands and procedures and affordances and constraints of the tasks, and this helped him become familiar with the task. I reflected feedback from the co-encoder and modified the rubrics into my subsequent data analysis, based on the model of Constructively Responsive Reading.

Next, we practiced together on a small subset of participants' strategy data (a Internet Reading Strategy Matrix for one session of a participant). The percentage of agreement obtained in this training was 75% so we talked through any disagreements about coding until we felt comfortable that we would encode strategy data identically. We continued with this step until we reached 100% agreement. We coded together four sets of matrices of two participants.

Finally, we chose one participant's strategy matrices for both sessions and coded them independently. I then compared these four sets of encoded matrices and obtained 98% agreement between the two encoders. We, again, identified and discussed our disagreed encoding and resolved it.

Inter-rater reliability was measured about "coding" with only complete Internet Reading Strategy Matrices. This is because, as it has been described above, a process of identification, interpretation, and categorization of strategies took place in a recursive and complicated way. However, in a series of meetings about coding and reliability, the expert encoder and I discussed a whole process of development and analysis of strategy matrices and possible challenges of segmentation of strategy data. Based on our discussion, I revisited the process of data segmentation and repeated the process with an improved understanding of data analysis when needed.

3.4.3. Construction of the Strategy Catalog

After eliminating redundant cells of strategic action on the matrices, I found and labeled several constructive strategies for Internet reading used by seven participants. I then again related these strategies to one another and generated subcategories that subsumed those individual strategies. Those subcategories were finally grouped into the four strategy categories suggested by the model of Constructively Responsive Reading in Internet contexts. This complete strategy catalog was used in the detailed descriptions of different types of constructive strategies for Internet reading.

3.4.4. Quantitative Analysis of Encoded Data

I performed statistical analysis of patterns of strategy use, with the encoded strategy matrices, following a procedure described in the previous verbal protocol study of the reading of multiple texts (Stromso, Braten, & Samuelstuen, 2003). First, in order to detect an association between strategy use and session task for the group of seven participants, I performed a chi-squared test with the encoded strategies from all seven participants' matrices. This test used two variables: "Session" (Session I: Open Website Searching; Session II: Focused Website Learning) as the explanatory variable, and "Strategy Category" as the response variable (Realizing and Constructing Potential Texts to Read, Identifying and Learning Text Content, Monitoring, and Evaluation).

Next, I conducted subsequent two sets of chi-squared tests to detect an association between strategy use and individual participants. Each of the tests was performed within each session, using "Case" (seven participants) as the explanatory variable and Strategy Category as the response variable. While the previous chi-squared test was used to observe group characteristics in strategy use across the two sessions, the purpose of these tests were to observe whether there were individual differences in strategy use within each of the sessions.

3.4.5. Descriptive Case Analysis

I conducted an analysis of participants' Internet reading strategy use by incorporating their strategy matrices with other measures. In doing so, I aimed to find unique or shared characteristics between (among) individual participants in terms of their strategy use. To profile the participants as Internet readers, I

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incorporated my understanding of the strategy use of each of the participants and insights from their interview data and critical questions. This case analysis was intended to have an opportunity to describe what kind of challenges they encountered and how they addressed the challenges by use of pertinent strategies. I considered following guiding questions in the analysis:

- How effectively did readers use critical evaluation strategies to identify websites and evaluate their usefulness? Did they evaluate the website's comprehensibility by looking at the structure, layouts, designs, presentation formats, etc.? Did they evaluate the website's information value by looking at goal-relevance, richness, level of details, clarity, accuracy, currency, etc.? Did they readers evaluate the website's credibility by looking at the authors, purposes or intentions, and contexts or influences, etc.?
- How did Internet searching and focused website reading contribute to readers' understanding? Did they construct meaning and update their understanding while searching on the Internet? Did they conduct an in-depth reading with the three websites and update their understanding? What insights can be derived from relationships of strategy use and their critical questioning?

3.5. Summary

This study used a critical Internet reading task that encouraged participants think more critically in order to develop questions worthy of asking and responding. Triangulation of multiple data collection methods was planned to better infer strategy use from the data. Verbal reporting was the primary method, complemented by reader-computer interaction protocols. These strategy data were also complemented by interviews and other measures. Strategy data were incorporated into a structured matrix that afforded a systematic analysis of data. Participants' strategy matrices were analyzed, both qualitatively and quantitatively, with a goal to examine different types of constructive strategies for Internet reading

and patterns of the strategy use. Finally, case analysis was conducted with an integration of strategy data and other complementary data for each of the participants. The entire process of analysis were grounded in the data and also guided by the theoretical model of Constructively Responsive Reading.

Chapter 4: Types of Constructively Responsive Reading Strategies in Internet Contexts

In this chapter, I report the results related to the first question: *What types of reading strategies do proficient high school readers use to construct meaning and develop critical questions in Internet contexts?* I present an overview of participants' performances in the critical Internet reading task of the current study. I then report the results from the grounded analysis of all seven participants' Internet Reading Strategy Matrices, concerning the diversity of their reading strategies. Finally, I offer accounts of an array of constructive Internet reading strategies identified in the data analysis, with representative examples.

4.1. Critical Internet Reading Performance

Prior to detailed accounts of diverse constructive strategies used by the proficient adolescent readers participating in this study, I report an overall description of their reading performances. Seven participants selected their own topic, and set a certain goal to achieve through the Internet reading. They then located and selected three websites deemed useful to the learning of the topic. Based on this Internet reading, participants generated multiple critical questions that they considered to be important to addressing the problems and issues related to their topic. Table 15 presents reading performance data, including topics and goals, prior knowledge of the participants based on pre-reading interviews, participant-selected websites, and participants' critical questions as outcomes of reading.

Table 15. An overview of participants' reading performances in the critical Internet reading task: Their goals, prior knowledge, selected websites, and critical questions

Participants	Topics and goals	Prior knowledge	Selected websites	Critical questions
Andy	Death penalty To explore different directions to make critical questions about the topic; to find a lot of relevant information through judging bias and credibility; and to look at various sources and opinions, not just reading one website	1. Controversial subject 2. One's own morals 3. Right to punish someone 4. Determined in a court of law 5. Methods of execution 6. Not practiced in some states 7. Practice is questioned 8. Pros and cons to it	• ProCon.org www.procon.org: The page "Top 10 Pros and Cons of Death Penalty" • The Clark County Prosecuting Attorney www.clarkprosecutor.org: The page "Methods of Execution" • Death Penalty Information Center www.deathpenaltyinfo.org: The page "Costs of the Death Penalty"	• 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	Alternative energy To explore why alternative energy is more sustainable that other ways to get energy now and the nation's policy with alternative energy	1. AP Environmental Science 2. Types of alternative energy 3. Becoming popular 4. Mountain Top Removal (MTR) 5. Destructive to the Earth 6. Releasing harmful chemicals 7. Regulating coal companies 8. Reducing coal use 9. Looking for alternative energy 10. Lobby against the MTR 11. Sustainable 12. Using solar panels at home	• iLoveMountains.Org www.ilovemountains.org: The main page • Sustainable Energy Coalition www.sustainableenergycoalition.org: The page "Introduction to SEC factoids" • GreenEnergyChoice www.greenenergychoice.com: The page "Renewable Energy: What are My Options?"	• 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 US?

Hannah	Physician-assisted suicide To find if a doctor's participating in physician-assisted suicide is illegal and how a majority of people think about it morally and ethically (finding court cases)	1. Medical expert assists 2. Terminal disease 3. Patient's will 4. Painless death 5. Controversies 6. Family belief about doctor's right 7. Doctor pledge 8. Court cases on the matter 9. Ethical and moral	• Euthanasia.com www.euthanasia.com: The page "Euthanasia Facts: The Basics" • Oregon Public Health Division www.public.health.oregon.gov: The main page • Serendip www.serendip.brynmawr.edu: The page "Euthanasia: Should humans be given the right to play God?"	• 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 feels about assisted suicide?
Katie	Obesity To find and learn about new laws and regulations about what they may have come out with that I'm not aware of	1. Big problem in the US 2. US the most obese country 3. Fast food 4. Convenience 5. Lack of exercise 6. Lack of consciousness 7. How to prevent	• MedlinePlus www.nlm.nih.gov: The page "Obesity" • Centers for Disease Control and Prevention www.cdc.gov: The page " Obesity and Overweight" • PubMedCentral www.ncbi.nlm.nih.gov: The page "Legal themes concerning obesity regulation in United States: Theory and practice"	• How could parents/guardians of children take action into their own hands to encourage a healthier lifestyle for the children at a younger age? • What incentives can the parents/guardians give as a reward for a healthy lifestyle? • How can the parents/guardians and the children make a difference in their community environments to help encourage healthier living across the United States?

Maggie	Drinking age To figure out what both sides of cons and pros of the death penalty are arguing and which one is more effective	1. Drinking age 21 in US 2. Low as 18 in the past 3. Arguments for lowering to 18 4. Military service age 5. Arguments for staying in 21 6. Brain development 7. Consequences of alcohol use 8. Alcohol-related deaths and injuries	• CBS News.com www.cbsnews.com: The page "60 minutes: The Debate on Lowering The Drinking Age" • TIME www.time.com: The page "Should the drinking age be lowered?" • Choose Responsibility www.chooseresponsibility.org: The main page	• 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	Environmentally friendly industry To find a way to help other countries do better agriculture businesses	1. Agriculture as environmental industry 2. Not sustainable today 3. Not economically efficient today 4. Local farms 5. Local economies 6. Big businesses 7. Pesticides 8. Unnatural products 9. Bad for the planet and people 10. Monoculture farms currently 11. Not a full healthy variety 12. Additives 13. Junk into the plants or animals 14. Ways to avoid this problem 15. Sustainable methods currently	• USDA National Agricultural Library-Alternative Farming Systems Information Center www.nal.usda.gov: The page "Sustainable Agriculture Organizations and Information Providers" • Fresh www.freshthemovie.com: The main page • Cornell University Agricultural Experiment Station www.cuaes.cornell.edu: The page "Operations"	• What is the most sustainable and environmentally friendly method of feeding our country? • Does American agro business cause dependency of other countries on the U.S.? • What are some ways to ensure agricultural independency of all people?

		expensive and not preferred 16. More efficient eventually 17. Bigger picture of energy 18. Local farms saving resources 19. Energy efficient cycle 20. Chemical runoff		
Sam	<u>Alternative energy</u> To know whether it would be economic problems that delay the world moving toward green energy, or if there is a way we can make alternative energy sources cheaper	1. Vital part of our future 2. Eco-friendly world 3. Electricity cheaper 4. Windmill power 5. Large sources of power in southwest 6. Living in Texas 7. Researching alternative energy 8. Huge cost of windmills to fix it 9. Advanced technology 10. AP environmental science class 11. Solar panels 12. Greenhouse in the school 13. Internship related to greenhouse 14. Costs of alternative energy 15. Solar panels at least $4,000 16. Problem with moving forward with the "green" 17. No legislation	• solarhome.org www.solarhome.org: The page "Solar Panels" • WINDUSTRY www.windustry.org: The page " Wind Basics: Know Your Economics" • The New York Times www.nytimes.com: The page "Environment"	• How is the economy right now affecting the sales of alternative energy resources? • What kind 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?

Note. All participants' names are pseudonyms; Goals of reading are analyzed based on pre-reading interviews prior to the Session I (Open Website Searching); Idea units of prior knowledge were analyzed, based on participant-typed one-page prior knowledge reports; Critical questions are identical to the questions that participants actually typed in the MS word document.

Overall, participants completed this critical Internet reading task successfully, by selecting relevant websites and generating important questions based on their prior knowledge and their Internet reading. Most of the participants chose websites that contained rich and detailed information related to their topics, so their choices maintained some level of usefulness in terms of comprehensibility, credibility, and informativeness. Based on the reading of these sites, in addition to what they learned while locating these sites, participants raised important questions to be investigated in addressing controversial issues.

What websites participants selected as useful sources

Many websites selected by the participants were the official sites created and managed by government or independent nonprofit organizations. These public sites displayed the information indicating authorship and sponsorship on the site. The readers in this study judged that these government or organization sites were more reliable than other commercial or private sites. For example, Katie selected three 'dot gov' sites to ensure reliability of the information she could use. These websites were public information repository sites relevant to one another, such as, branch sites of the National Library of Medicine, so Katie was able to gain abundant information and lots of sources for the leaning of "obesity." Cindy also chose a public site from an organization called Sustainable Energy Coalition, which provided numerous links and references about alternative energy, the topic of her reading. She accessed and located relevant information from this site, using its built-in search engine.

Some of the participant-selected websites were of media companies. These were "dot com" sites but maintained a level of reliability because of their publicity. For example, Maggie selected the page "60 minutes" in the CBS (Columbia Broadcasting System) news site as useful because she knew it as a well-known inquiry news program created by one of the most popular broadcasting companies in the nation. Although she used only the article about drinking age, she was able to obtain an idea of the discourses surrounding the issue of drinking age from the article that integrated facts and opinions on both arguments for and against lowering the drinking age. Sam also picked NYTimes.com, the official website of the New York Times. She found a couple of useful blog posts on alternative energy from the site, and this positive experience influenced her decision to use the site more. She used its built-in search engine to find more blog articles on the newspaper company site because she felt that the site was reliable.

However, not all the sites participants selected were useful. Some of the sites contained superficial information, which sometimes was not well organized. This lack of structural effectiveness hindered readers accessing information on the sites. Thus, learning occurred less. For example, Rachel accessed and selected the site about the movie "Fresh" about alternative farming, but she did not use the site in her learning of the environmentally friendly agribusiness as much as the other sites she located. The site provided limited itemized information on alternative farming, but it did not further provide detailed information (statistics, examples, research findings, etc.) and controversial discourses (e.g., multiple perspectives and arguments).

The sites participants selected sometimes were not effectively organized and did not clearly disclose the authorship. Hannah found the sites "Serendip" and "Euthanisia.com" that posted and connected a lot of information about physician-assisted suicide and euthanasia. Hannah spent a large amount of time reading these sites but she was often frustrated with their ill-organized information structure because she unintentionally accessed the same pages on the site, repeatedly. She hardly found indicators of who created them and the intents of the sites, and this made her feel less confident in using the information. This ineffective information organization and the lack of source information seemed to hinder her learning of the topic.

Commercially created websites hardly informed the readers of original intents and authorship. For example, one site that Sam selected was "dot org" indicating a certain organization, but the actual contents of the site were mostly about solar panel products and it was not much different than business companies' commercial websites. Since she found this commercial intent of the site, she did not make use of this site in the learning of alternative energy. The site was not met with her reading focus to learn the cost-effectiveness of using alternative energy products, rather than just price information.

Most of the time, participants selected websites by examining and accessing multiple website entries retrieved by Internet search engines, but some of the sites were directly retrieved from their prior knowledge. Cindy generated the name of the site "iLoveMoutains," based on her prior experience with the group of people who organized and managed the site. She used the site to locate information relevant to

her current focus of reading. Rachel also activated her prior experience in watching

the movie related to alternative farming and then accessed the site to gather relevant

information.

Among the selected websites, some were secondary sites gathering and

organizing large amounts of information on a certain topic in a certain structure.

These sites were created for the purpose of information dissemination for online

users' leaning of certain issues and topics, rather than providing the information

created by the sites. Two of the sites Andy selected were this kind of secondary site

intended to provide online users with information on a certain topic or to persuade

them to take certain perspectives. One was ProCon.org, which provided both

arguments for and against the death penalty, with relevant articles and references.

The other one was the site of the organization Death Penalty Information Center,

which focused on presenting multiple perspectives (mostly against the death

penalty) and organizing findings from research, news articles, statistical

information, and other informational materials (that mostly supported arguments

against the death penalty). Andy spent most time of her reading using these two

sites so that she could gather and use well-organized information in her critical

questioning.

Roughly speaking, participants' website selections were goal-relevant while

some of the sites varied in relation to informativeness and reliability. To select

better websites, participants did not only use strategies for identifying surface

markers that could indicate authorship, maintenance, and credibility, but they also

performed critical examination of text content to judge the quality of the sites. These strategic acts of reading will be further described later.

What questions participants generated building upon their Internet reading

Participant-generated questions reflected readers' knowledge and thinking through Internet reading. Most of the participants were conscious about this critical questioning task during reading. They attempted to generate questions worthy of discussing and responding in relation to related problems and issues. Their questions as final outcomes of reading were critical to understanding the problem of certain topics and addressing related issues.

It was difficult to track changes in existing and constructed understanding in readers' minds before and after Internet reading. The current study did not control participants' prior knowledge so they brought varying degrees of depth and breadth of their prior knowledge to the task. Participants also chose different topics so the involved prior knowledge largely depended on the topic. Texts and links identified throughout the Internet reading depended on the topic to some degree, so that each of the participant encountered varying degrees of scope and amount of topic-related information.

Despite these challenges, critical questions of the participants were interpreted in relation to the sources of the questions, that is, whether the questions were built more upon participants' own prior knowledge or what they gained from the current Internet reading. This analysis involved comparison of individual participants' prior knowledge reports and their typed critical questions, and it helped draw a rough sketch of knowledge change through before and after reading.

Some of the participants' questions were based more on what they read and learned from Internet texts in the current task. For example, Andy originally reported her interest and knowledge of the controversial nature of the death penalty issue, approaching it as a moral issue. However, during Internet reading, she read multiple informational texts about how the death penalty was economically efficient and yielded reliable effects on crime deterrence. Upon completion of Internet reading, she generated questions about how the US justice system's responses would depend on the cost-effectiveness and deterrence rates of the death penalty practices in comparison with the life imprisonment. The difference between Andy's prior knowledge reports and critical questions reflected that she constructed meaning and gained an understanding of the death penalty from the multiple Internet texts that she read.

In contrast, some questions were more influenced by their prior knowledge, rather than the meaning constructed from Internet texts in the current task. Hannah's Internet reading and questioning seemed to be guided by what she believed and knew about physician-assisted suicide. After the two sessions of the Internet reading task, she generated three questions about the topic. However, these questions seemed nearly identical to the ideas that she constructed in the prior knowledge report and her goal setting. Hannah originally took three aspects of the problem of physician-assisted suicide into important consideration: ethical judgments of the practice, legal consequences of the practice to the physician assisting in the suicide; and the patients' families' responses toward the physician. These three aspects were reflected in her goal so that her activity of searching for

and reading Internet texts was directed toward finding the information that directly explained or addressed those aspects of the problem. As a consequence, her questions as outcomes of reading seemed not much changed, compared with her prior knowledge and beliefs.

Despite the differences in terms of major sources of the question generation (prior knowledge or Internet texts read), critical questions overall reflected participants' thinking geared to pointing out important aspects of the topic. Each of the participants' patterns of strategy use and possible inferences about the relationships with their critical questions will be explained in the later part of chapter 6.

4.2. Diversity of Constructively Responsive Reading Strategies in Internet Contexts

Participants' website selection and critical questioning involved large numbers of reading strategies that contributed to their goal attainment. In fact, a variety of constructive reading strategies were identified in the analysis of the participants' Internet Reading Strategy Matrices. From the grounded analysis of these matrices with a total 1,784 encoded strategies, 114 versions of strategies were labeled "individual strategies," mutually exclusive with one another. Each of these strategies was interrelated with one another during which I constantly referenced the theoretical model of Constructively Responsive Reading. Finally, several subcategories of constructive Internet reading strategies falling under the four general strategy categories emerged. Based on the fuller version of constructive

reading strategies identified in the current study (Appendix G), Table 16

summarizes these strategies.

Table 16. An overview of the constructive strategies for Internet reading resulted in the grounded-analysis of data

Strategy categories	Subcategories of strategy identified in the study	Iterations of strategy
Realizing and Constructing Potential Texts to Read	• Exploring goal-relevant information space	9
	• Selecting hyperlinks and navigating toward useful information	11
Identifying and Learning Text Content	• Meaning making from hyperlinks	5
	• Comprehending information within an Internet text	23
	• Constructing intertextual meaning across multiple Internet texts	6
Monitoring	• Monitoring the determination of reading paths	15
	• Monitoring the construction of meaning	6
	• Monitoring the self	4
Evaluation	• Examining the usefulness of hyperlinks	7
	• Judging the information value of Internet texts	6
	• Assessing the quality of websites	11

Table 16 represents top-level strategies in the comprehensive catalog of

constructive reading strategies constructed from the analysis of strategy data. This

table consists of three components: Categories, Subcategories, and Iterations of

strategy. The four super-ordinate strategy categories come from the model of

Constructively Responsive Reading used as a reference point. Each of the four

strategy categories has its own multiple numbers of subcategories generated from

seven participants' Internet reading strategy matrices. Each of these subcategories

has multiple numbers of strategy iterations, that is, different "versions" of a

particular strategy subcategory. These versions of strategies are not exactly the same as one another but, overall, they jointly operate in the same direction. For example, the subcategory "Monitoring the self" has five strategy families in terms of readers' perceptions of their own progress toward goals of reading, cognitive strengths and weaknesses, self-confidence and motivation, and epistemological stance. These five aspects of self-perception reflect and contribute to the conscious monitoring of themselves as readers.

Overall, the resultant catalog of constructive strategies identified from seven readers' Internet reading fit into the model of Constructively Responsive Reading in Internet contexts. The diversity of strategies was demonstrated in this catalog, and this diversity indicates that participants used numbers of constructive strategies serving the completion of Internet reading tasks. The strategy catalog also demonstrated that the array of strategies grouped in the four categories were required while "reading on the Internet." More specifically, this grounded-analysis of strategy data affords multiple observations related to types of constructive reading strategies in Internet contexts in the following aspects:

- Strategies that indicate psychological reality of Realizing and Constructing Potential Texts to Read
- Strategies that indicate modification of Identifying and Learning Text Content, Monitoring, and Evaluation to Internet contexts
- Strategies that indicate continued importance of Identifying and Learning Text Content, Monitoring, and Evaluation to Internet reading

First of all, multiple groups of strategies demonstrated psychological reality of Realizing and Constructing Potential Texts to Read in Internet reading. The participants in this study accessed and managed an information space, using primary and complementary search engines, generating and modifying search terms, locating topic-related websites or visiting open sources to gather relevant and useful information: *Exploring goal-relevant information space*. In addition, they chose a series of hyperlinks aligned to their strategic moves toward potentially useful information to be used for meaning construction and task completion: *Selecting hyperlinks and navigating toward useful information*. These strategies were instances of the activity of Realizing and Constructing Potential Texts to Read in Internet contexts, which was central to the critical Internet reading task in which readers must have constructed their text environment by dealing with a series of possible texts, possible links, and possible decisions, beyond a limited number of pre-selected and pre-determined texts.

In addition to these newly demanding strategies, multiple groups of strategies modified to Internet contexts were also found in Identifying and Learning Text Content, Monitoring, and Evaluation. The readers participating in this study consciously processed often minimal information of hyperlinks before selecting them (e.g., link titles and subtitles with 2 to 3 lines of written information about the connected sources), and overviewed a topic-related information space by reading a webpage constituted by a series of website entries (e.g., Google page with multiple search entries): *Meaning making from hyperlinks*. These Internet readers constantly reflected on and regulated their own thinking processes in search of useful links and

texts: *Monitoring the determination of reading paths*. They were able to perform

critical prediction and evaluation to determine whether particular links were able to

offer them an access to useful information, before and after accessing the links:

Examining the usefulness of hyperlinks. These strategies indicated that the acts of

reading were situated in the contexts of reading. Even though the basic

psychological nature of strategies between different contexts was similar, strategic

readers modified their strategies, to a varying degree, by responding to the contexts

of reading.

The continued importance of the strategies similar to those for reading print

text(s) was demonstrated through multiple numbers of strategy subcategories. First,

the readers in this study used a variety of strategies in the construction of meaning

from a single webpage(s). These readers used literal comprehension strategies and

often made inferences about implicit meaning to understand the contents of web

pages: *Comprehending information within an Internet text*. Furthermore,

participants built intertextual links in their minds along with a course of accessing

and reading various Internet texts, and they identified shared or often conflicting

ideas and perspectives among the texts: *Constructing intertextual meaning across*

multiple Internet texts. These acts of reading for understanding with both single and

multiple texts were regularly used in the course of Internet reading intended to learn

about a self-selected topic and to generate critical questions.

Monitoring strategies were consistently entailed in readers' self-perceptions

and self-regulations in Internet reading. The participants in this study perceived

processing problems, identified the source of the problems, and applied alternative

strategies to amend reading impairments: *Monitoring the construction of meaning*.

During the course of Internet reading, they often reflected on their cognitive

resources (e.g., prior knowledge, information searching strategies), interest and

motivation related to the topic, epistemological beliefs about knowledge and

knowing, and reading progress toward goals of reading: *Monitoring the self*. These

strategies performed at the metacognitive level guided reading and enhanced the

effectiveness of strategy use.

Multiple numbers of evaluation strategies similar to those for print reading

were also found. The participants in this study valued and/or critiqued information,

based on judgments of both internal and external features of web pages, including

validity of author argument, credibility and trustworthiness, and overall usefulness:

Judging the information value within Internet text. These readers also determined

the value of websites they located and read, and characterized the websites in lights

of informativeness, comprehensibility, credibility, or connectivity: *Assessing the*

quality of websites. Multiply layered strategies for evaluation indicated the roles

and functions of these critical acts of reading.

In summary, the grounded analysis of strategy data demonstrated a variety

of constructively responsive reading strategies in Internet contexts. These strategies

played their own unique roles in the completion of Internet reading task, with

varying degrees of "novelty." Identification of numbers of constructively

responsive reading strategies and the diversity revealed in the strategies supported

the model of Constructively Responsive Reading in Internet contexts. Subsequent

sections offer detailed descriptions of each of the categories and subcategories of

strategy, with excerpts of verbal reports and reader-computer interactions (for the full version of strategy catalog, see Appendix, G).

4.3. Strategies for Realizing and Constructing Potential Texts to Read

4.3.1. Exploring Goal-Relevant Information Space

Seven participants, without an exception, started their Internet reading by exploring an information space. This information space is hypothetically imagined and intentionally explored, in relation to how readers set their goals for learning, using the Internet. Accessing, overviewing, and managing a goal-relevant information space—as well, topic-related—necessitate diverse strategies, including using Internet search engines, generating and modifying search terms, accessing particular websites, surveying on open sources, and seeking information in a website. These strategies helped readers control the universe of Internet texts and reduce it into a manageable chunk of information.

Accessing a goal-relevant information space in the beginning of Internet reading

From the beginning of the first session, the readers in this study overviewed the range of possible target information related to their topics or surveyed different perspectives and debates surrounding the issue. They accessed a general Internet search engine and generated and applied topic-related keywords, utilizing their prior knowledge and awareness of the initially constructed goal of reading.

By default, participants started Internet reading with Google as their primary search engine, typing in its web address or simply using the Google search panel installed in the web browser. Participants reported that usually they used this particular search engine for an Internet search, both in and out of school settings.

This prior experience guided their choice of a search engine. They recognized the

popularity and benefits of using search engines for Internet searches but also

reported a concern with search engine use. They noted problems and challenges that

might be encountered in using the search engines currently available on the

Internet: It may have given them access to relevant information they are seeking,

but it often could present uncertainties or ineffectiveness in identifying a focal

range of information.

Using an Internet search engine, the participating readers overviewed

chunks of information available on the Internet. They usually used topic words as

the initial search term, in order to access a broad range of general information as

much as possible as Cindy does in the following excerpt:

> Cindy: (Typing in *alternative* in the Google search box; several auto-complete search terms) um .. the first thing I'm gonna search is alter-- alternative energy . it's kind of a broad term but it might give me a general idea of different things (choosing *alternative energy* among the auto-complete search terms; +Search)

Also, the participants generated initial terms, slightly modifying topic

words. For example, Andy came up with, "Information in the death penalty," in

order to locate a specific website offering general information about the death

penalty that could complement her prior knowledge.

> Andy: (Typing in *Information in the death penalty*; + Search) I typed information on the death penalty ([Google+*Information in the death penalty*; clicking on <u>Did you mean: Information on the death penalty</u>) um I only want sites that give me information on it right now so I can get a better idea

This helped her retrieve a list of websites that provided a summary of

multiple perspectives and arguments both for and against the death penalty.

In another example, Sam applied a more specific search term into the search engine to access a possible information space that she sought. Initially, she was interested in the cost-effectiveness of alternative energy and desired to obtain information that could directly address her interest. Thus, she constructed the search term "The price of solar panels and windmills" by combining examples of alternative energy products (or facilities) and important aspects of the topic (economic perspectives).

Although the readers in this study most of the time continued to use their primary search engine (e.g., Google), they replaced it with another search engine when they perceived additional information needs. This strategy served readers when they navigated an unexplored information space in the primary web search engine use, attempted to solve the problem of repeated difficulties and failures in an information search, and planned to enhance the effectiveness of an information search by changing formats of search terms.

> Sam: ([Google+*energy bill with alternative energy*]) maybe if I tried a different search engine! (moving the pointer to the web address bar) like uh bing dot com! (typing *bing.com* in the web address bar) ... it's a search engine that's always advertised on t v . because they make fun of google because they like come up with a bunch of random things

Participants perceived a possibility that the range of information may depend on what search engine they used, and that changing the search engine might give them an opportunity to solve difficulties locating sought information in the previous search engine use.

> Sam: Uh ... maybe if I go back to google (typing *google.com* in the Web address bar) ... sometimes it's good just to like switch up different search engines because they come up with like way different things . which is hard to believe

Hannah: ([Penthius: www.penthius.info]; typing in *euthanization* in the Penthius search box) .. you never know what might be on one search engine and not the other one .. or what might come up on like the first page and not like fiftieth page after it

However, Internet search engines did not always lead readers to new information spaces, and it was not always useful for their Internet reading. While most of the participants had a certain level of system knowledge helping them access a particular search engine, they warned themselves of the possible ineffectiveness in using the alternative. For example, Andy used a search engine modified to question-type search terms while she noted both promises and limitations of the search engine use.

Andy: (Clicking <--; [*Google+Forms of death penalty*]; erasing *Forms of death penalty*; typing *ask.com* in the Google search box) um ... I typed in ask dot com (+Search; clicking on the ENTRY: Ask.com Search Engine-Better Web Search: www.ask.com) because sometimes whenever I have a question I--it's a better site to ask questions on and um sometimes they'll answer it really well . but sometimes they won't

Most participants used more than one search engine but they controlled unnecessary access and use of multiple search engines. They perceived that many search engines currently available on the Internet might not be comprehensive enough to retrieve useful information, and might even mislead readers to unreliable and inaccurate texts. These readers adjusted their mindsets to be "tentative" about judging and using search engines so that they could prevent themselves from wasting time and efforts due to unintended wandering on an irrelevant information space.

Managing the range of possible information by modifying search terms

The meaning evolving in the mind informed readers of possible directions of additional searches to manage an information space. The adolescent readers in this study often attempted to find unsought information when they went through successes and failures in search of relevant information, by comparing what information had been located and understood thus far with what information should be identified and read further. When these readers determined that a fair amount of general background information was gathered, they redirected their information search and path construction toward finding more specific information.

Sometimes they narrowed down or broadened a possible resultant information space. Redirecting the information search helped them open up an exploration of more specified or diverse approaches to understanding the topic.

> Andy: Um ... I'm gonna type in pros and cons (erasing *Information on*; typing in *Pros and cons on* before *the death penalty* in the Google search box; +Search) ... I: Because? ... Alicia: ([Google+*Pros and cos on the death penalty*]) um I wanna see if I can find the site that has (moving the pointer on the entries) ah ha! (clicking on ENTRY: Top 10 Pros and Cons-Death Penalty-ProCon.org: deathpenalty.procon.org) that has both pros and cons laid out

In the above excerpt, Andy refocused on her reading goal to find debates and issues that may help her critical questioning. She applied a modified search term that reflected her information needs and adjusted her reading focus, upon completion of scanning the information space from the initial search engine use.

In another example, right after her search of information about common arguments surrounding the topic of drinking age, Maggie changed the current direction of Internet reading and launched an evolving approach to understanding

numerical "evidence" that may support (or repute) both pros and cons of lowering drinking age.

> Maggie: (Clicking <--; the second page of [Google+*driking age stay at 21*]; slowly scrolling down and up) ... okay I'm gonna type in um .. drinking age statistics (typing in *drinking age statistics* in the Google search box; +Search) ... I: Because? ... um .. I wanna see um .. how effective um cos the drinking age hasn't always been twenty one .. they raised it I'm not sure when maybe in the eighty's or something .. um so I wonder-I wanna see um what that's done um maybe to lower .. the amount of deaths and injuries and accidents because of alcohol

Using topic-related words as search terms, Maggie went through an information search to retrieve basic information about arguments both for and against lowering drinking age. She then attempted to test these claims gathered from texts, linking the claims to the evidence to be sought. These search terms reflected her analytical thinking related to delineating claims and evidence and building an argumentation.

Search terms evolved along with an evolving understanding. Once the participants gathered general information and finished scanning the related arguments and debates, they started to find the answers to the questions generated in their minds.

> Andy: (Typing in *Is the death penalty really more costly than life in prison?*; +Search) .. uh I think that ... if um one could find . a reason for the death penalty being .. like less expensive than life in prison .. that America would keep the death penalty .. because America is MONEY! and uh .. I think if one could find . could really prove that .. the death penalty was ultimately MORE expensive than life in prison then it should be taken OUT!

In the above excerpt, Andy's search terms directly reflected her evolving questions. Through the reading of several links and texts, she realized that the "cost" of the death penalty is one of the central issues in the discourses surrounding

the death penalty. Thus, she decided to investigate this question more and applied

the question-type search term into the search panel. This is a representative example

that the process of realizing and constructing potential texts to read co-develops

with the meaning being constructed in an ongoing way, throughout the Internet

reading.

Ways of modifying search terms varied according to the aspects of

information that readers particularly attended to. Participants in this study often

used language that reflected certain types of genres and Internet publishing (e.g.,

blogs, websites, news articles research reports), types of information based on

epistemic judgments (e.g., factual, scientific, credible), or particular authorities

(e.g., government, interest group, just "people"). For example, Katie changed her

reading focus from gathering general information to understanding policies and

regulations related to the topic of obesity. This changing focus is mirrored in the

search term use.

> Katie: 'obesity weight loss' (pointing at ENTRY: Obesity (Weight Loss)-Complete medical information on this all..: www.medicinenet.com) .. okay I think the next thing (scrolling up) I'm going to research will probably be (scrolling up to the Google search box) .. something about what the government may be doing

> Katie: So I'm gonna type that into the search bar .. government um maybe regulations on obesity in America (erasing *obesity*; typing *government regulations on obesity in America* in the Google search box) .. kind of specific . probably gonna bring up a lot of information but we'll see! (+Search)

> Katie examined multiple entries in the previous search, most of which were

linked to general information about obesity or that originated from commercial

websites. She perceived emerging needs to find the information created by more

legitimate authorities that may have give her the chance to learn public actions performed to address the problem of obesity. Thus, she generated the search term reflecting this focus of reading and applied it to the Internet search engine in order to access more specified information.

The readers participating in this study came up with multiple competing terms in the modification of previous search terms. They chose the best one that could yield the best results. This process mostly occurred in the readers' minds but was sometimes featured when the readers were taking advantage of the feature provided by the search engine, for example, "auto-complete." It is noteworthy that these readers tended to first type in a couple of words and then wait to examine and choose the best one among auto-complete search terms immediately generated in the search box.

> Cindy: (Typing *why is alternative energy* in the Google search box) um .. there was a--I started to type in why is alternative energy .. um more sustainable . BUT um there's different questions here (the pointer moving on the five different auto-complete search terms) that says 'why is alternative energy so important' (selecting the auto-complete search term *why is alternative energy so important*) and I think I'm gonna search that first!

> Maggie: (The second page of [Google+*drinking age lowered*]) ... um okay (the pointer moving around the first three entries) ... okay I'm gonna go here (moving the pointer to the Google search box) um ... and I'm gonna type in drinking age (typing in *drinking age*) … (choosing the auto-complete suggestion *drinking age to stay in 21*; +Search) … just to stay at twenty one . so to see if I can get a different .. you know um a variety of .. sources

In the above excerpts, Cindy and Maggie made use of this auto-complete feature that Google provided. Initially, these readers typed in topic words but took the time to compare and contrast the Google-generated suggestions, rather than immediately clicking the search button. These readers spent time to anticipate

possible results of using particular terms and the suitable sequential order of their

information search. In other words, they determined more suitable search terms by

interacting with the search engine. In this reader-computer interaction, technology

suggested and guided human decision-making processes. This interaction is a novel

situation of Internet reading that would not happen in reading traditional print texts.

Accessing particular topic-related websites using prior knowledge

The adolescent readers participating in this study activated and used their

topic-related prior knowledge and experience for information searches. Although

the main activity for the information searches was the Internet search engine use,

these readers sometimes directly accessed a certain website that they knew and

experienced. Direct access to topic-related websites was possible because readers

used their judgments of the websites in light of authorship, reputation, and

usefulness, building upon their prior experiences related to the websites. For

example, Rachel used her prior knowledge about a movie related to the topic, and

then accessed the site of the movie to gather information about environmentally

friendly farming.

> Rachel: So there's actually a MOVIE that I watched once .. that I'm gonna search! because I really LIKED it! .. it's called FRESH! (typing *Fresh* in the Google search box on the web browser tool bar; +Search) .. hopefully just typing in fresh will be enough

> Rachel: ([Google+*Fresh*]) fresh the movie! (clicking on ENTRY: FRESH the movie: www.freshthemovie.com) .. this guy actually the farmer . in this movie who lives close to where I used to live and he .. has a really cool method of .. um .. friendly farming .. friendly environmentally friendly farming

Rachel accessed her prior knowledge and recalled the name of the movie

that she watched before. A positive experience with the movie guided her to search

for the site about the movie. She sought to access a more useful source, using her prior experience, and to get some ideas from the site that may contain useful information.

In another example, Cindy directly generated a website that she believed to be relevant to her topic of alternative energy. She judged that the site could give her useful information, based on her prior experience related to the website's authorship.

> Cindy: Now I'm gonna look for (moving the pointer to the Google search box in the Web-browser tool bar) um maybe interest groups that are .. um for .. alternative energy
>
> Cindy: Oh no! actually first I 'm gonna look um look up a website that I already know of called .. 'I love mountains' (typing *ilovemoutains.org* in the Google search box) .. um this deals with why--another reason why you would want alternative energy ([Google+*ilovemountains.org*]; clicking on ENTRY: iLoveMountains.org-End Mountaintop Removal Coal Mining: www.ilovemountains.org) .. um a big thing I'm-I'm-that I am already aware of is mountaintop removal in west virginia .. and um they're really involved with using alternative energy .. um of course these people are SOMEWHAT biased because they want um uh to end mountaintop removal . so of course they're going to support alternative energy BUT um it's kind of already it's okay that they are partly biased because it's been proven that it does um .. it is destruction of the earth and of biodiversity

These excerpts described that reading is situated within the reader's experiences, interests, and goal. Cindy wished to know about activist perspectives from the websites managed by interest groups. This near focus of reading triggered her recall of a website created and maintained by a local non-governmental organization (NGO). In fact, she met a group of people involved in the NGO and went to lobby with politicians in Washington, D. C. against the mountain top removal method that local coal mining companies practiced. She believed that political actions of the NGO were related to valid perspectives not just on coal

mining and its severely destructive effects on the environment, but she also believed that the site could inform her why alternative energy should count as an urgent issue and how that can be buried in a shortsighted economic logic. Cindy's experiences and beliefs fueled her research on the NGO website as a potentially useful source. This prior experience afforded her the connection between the current topic of reading and the information that the website offered.

Accessing open web sources to survey topic-related information

Participants used the sites opened to the general public, (sites that were jointly created and edited by multiple online users), in a process of accessing potentially useful information. These open web sources, such as wikis and social networking sites, acted as the information repository in which multiple sources and references are collected and organized or online users' perspectives and opinions on diverse topics are shared and responded.

> Katie: (Opening a new tab; clicking the Google search icon in the Web-browser tool bar; [Google+*obesity*]) now I'm probably going to check out the wikipedia (clicking on ENTRY: Obesity-Wikipedia-the free encyclopedia: en.wikipedia.org) .. even though .. sometimes people say it's not a good source but you gotta check their sources cos they're supposed to cite them {references} at the bottom of the page

For instance, Katie accessed Wikipeda to overview links and references that may be useful for her reading, but not to read and learn the written information organized on the site. She was aware of the potential use of online encyclopedia in a quick survey of sources related to a certain topic.

Some of the participants showed ambivalence toward open web sources. One the one hand, all participants (except for Rachel who had newly transferred to the school) noted that wiki sites might not be reliable and credible because anyone

could add, delete, and modify information on it. They reported that they have been taught that wiki-type of sites can be utilized for surveying references listed on the bottom of the page, but they are not reliable sources. At the same time, many participants reported that they actually have used wikis and have often found some useful information from the sites.

> Andy: (Clicking <--; [Google+*Forms of death penalty*]) .. I'm going to click on this wikipedia site (clicking on the first ENTRY: Capital punishment-Wikipedia the free encyclopedia: en.wikipedia.org) .. some of my teachers tell us not to look at wikipedia BUT I find it very useful .. even though people can change it

This incidence indicated that, concerning use of certain types of websites, student readers might have to deal with conflicts between what they learned from their school and what they learned from their own experiences. These participants learned from their teachers that wikis are not necessarily credible sources in general, but often used these sites for information gathering, even though they were tentative in using the site.

This tension was also present in using social networking websites. Sam visited a popular social networking site, Twitter, to look at what people are saying about alternative energy.

> Sam: ([Google+*Why people do not purchase alternative energy*]; the pointer moving on the entries) ... um ... hm! ... I: What are you thinking? ... Sam: Maybe! I'm going to twitter! (typing *www.twitter.com* in the Web-address panel) ... because you can find out what people are thinking through their status updates .. and it's actually helpful!

> Sam: If we could get on Facebook I could use Facebook right now ... we've been trying to get Facebook in schools for a while . cos it actually is helpful!

Initially, she hesitated to access Twitter because she was not so sure if the access was allowed on campus. Sam also showed her feelings about school Internet

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policy that blocked access to Facebook, another popular social networking site. In an interview, she reported that actually many students learned from these social networking websites. She pointed that this site might enable readers to see what people thought of a particular issue and to see the diverse perspectives and ideas there could be on the same topic. The participants' perceptions and uses of open web sources or social networking sites indicated a gap between their out-of-school reading and in-school reading contexts, and different perspectives of schools and student readers, concerning what should count as "information" and "learning" in a digital world.

Conducting an information search with a website-specific search engine

Information search happened not only with a general web search engine but also within a particular website providing a built-in search tool. For the participants in this study, once they determined a currently accessed website as promising to gather relevant information, they invested more time and efforts in browsing the site and locating information with available search tools. The use of built-in search engine helped these readers access target information quickly and conveniently within the site.

> Sam: (Moving the pointer to the 'Search All NYTimes.com') .. maybe if I look up here .. it can tell me why does- why do people not purchase alternative energy (typing in *why do people not purchase alternative energy*; +Go)

Sam applied search terms into the search box installed in the site of New York Times, to find the answer to her question related to the reasons that people are reluctant to purchase alternative energy products. Sam performed this action

because she found the site useful in the previous search of topic-related blogs and

anticipated that the site could give more information about what she was asking.

Using website-specific search tools allowed readers to conduct an

information search within a particular website. The information search using a

search engine took place not only in a completely open-ended setting (Session I:

Open Website Searching) but also within a website that limited its text boundary

and the scope and amount of information (Session II: Focused Website Learning).

> Rachel: I wonder if I can search like ... imports and exports .. of goods ..
> (typing in *Exports of agricultural products*; +Search AFSIC) okay 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 ... in
> my .. explaining why I'm asking this question

In the later stage of reading in the second session, Rachel developed a

question related to the (harmful) effects of various food production businesses on

environments and economy in both the United State and the world. She sought the

information supporting her questioning, and she accessed multiple times the website

of AFSIC (Alternative Farming Systems Information Center), a branch site of

USDA (United States Department of Agriculture). In the AFSIC site, Rachel used

its built-in search engine to retrieve target information connected on the site. Rachel

anticipated an opportunity to meaningfully connect the information to be found

within this site to her question generation. The activity for Realizing and

Constructing Potential Texts to Read using search engines happened even in a

limited information space on a website because hypertext structure and information

search instruments supported easier and faster access to information within the site.

4.3.2. Selecting Hyperlinks and Navigating Toward Useful Information

Information searches using web search engines gave readers an opportunity to access and overview a relevant information space, but this overview was then followed by subsequent decision-making processes: What links and texts would be meaningful to understanding? Examining and selecting the links appearing in front of readers were moment-to-moment processes necessary to the determination of multiple pathways to get to where useful information was stored and connected. In this study, participants scrutinized and made choices among multiple numbers of entries (and links) resulting from Internet search engine use or available within particular sites. These critical hyperlink selections contributed to sequencing reading in the course of realizing and constructing potential texts to read.

Scrutinizing and selecting hyperlink entries resulting from a search engine use

Participants actively used both their prior knowledge and minimal textual information available on search entries. Combining these sources of information, participants generated inferences about the usefulness of links in relation to relevance (e.g., Does it relate to my reading?), credibility (e.g., Would it lead me to believable information?), and connectivity (e.g., Could it allow me an access to diverse texts and links?).

Prior knowledge is instantly used in hyperlink selection. Prior knowledge guided judgments of the relevance of links and the credibility of authorships (e.g., a group of people, government institutions, public and private organizations, or companies that create, organize, and manage information and sponsor the website).

Cindy: (Stopping around the site 'Greenpeace') ... uh greenpeace dot org uh I've heard of that! and um it's an organization site so I'm going to see if that has anything (clicking on LINK: Greenpeace)

Hyperlink selection often required active use of knowledge-based inferences. Participants generated inferences about the content of the text connected through each of search entries, often with minimal textual information (e.g., entry titles, a couple of lines of written texts under the title). Based on this "link reading," these readers anticipated the texts that the entry will lead them.

Katie: (Opening a new tab; clicking the Google search icon; [Googe+*obesity*]) hm okay back to google .. (scrolling down) ... there's a website . that is a government website . it's called 'obesity medline plus' (pointing at ENTRY: Obesity-MedlinePlus: www.nlm.nih.gov) .. brief description says 'Obesity means having too much body fat' . seems like .. almost like a magazine article title .. but we'll check it out (clicking on the same entry)

Cindy: ([Google+*alternative energy*]; clicking on ENTRY: Alternative Energy: www.NESEA.org in the Sposored Link) ... I: Why did you click it? ... Cindy: I .. uh .. clicked the first one because um the initials they're all in capitals .. kinda looks like a um usually when it's an acronym like that .. it tends to be an official site or a group an organization

In these two excerpts, Katie and Cindy first looked at the URL and the title of the site entry. This strategy was popular among participants and was regularly observed in the participants' reading. These readers quickly judged the credibility and reliability of information connected through the link.

However, this anticipatory evaluation of links, based on URLs and titles, was not enough to make a better choice of link. Thus, readers inferred about the content of the text that the link might lead to by reading several lines of written information.

Cindy: ([Google+*types of alternative energy*]; slowly scrolling down) ... I'm gonna click on this 'green energy choice dot com' (pointing at the ENTRY:

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Types of Renewable Energy-GreenEnergyChoice's Green Guide:
www.greenenergychoice.com) .. um cos it says I can learn about the
different types

Making inferences about potential texts connected through search entries
required readers' reflections on their focus of reading, information to be sought, and
evolving understanding of what they read and learn. This inference-making process
was an advanced and sophisticated strategy to determine the usefulness of links.

Rachel: ([Google+*Environmental Industry agriculture*]) uh okay 'hidden
cost of industrial agriculture' (pointing at ENTRY: Hidden Costs of
Industrial Agriculture-Union of Concerned Scientists: www.ucsusa.org)
that's good .. I think economically environmental--I mean even though
environment-friendly is what I'm focusing on .. economically is also really
kind of important too because .. you have to take that into account .. no one
will want to fix a problem if it costs too much money (clicking on the same
entry)

In this excerpt, the reading of minimal information in the entry triggered
Rachel's thoughts about economic aspects of environmentally friendly industry in
agriculture. This evolving meaning fueled her movement toward realizing and
constructing the potential texts to read about economic perspectives of the problem
she was investigating. While a primary role of hyperlinks was to build a bridge that
connects text and text or information and information, hyperlinks by themselves
also conveyed certain information. This information loaded on a hyperlink was
comprehended and interpreted by readers, and transformed into meaning. The
meaning constructed from a link often stimulated readers' thinking and guided their
search and reading.

Selecting useful menus and links within a website

The activity for selecting hyperlinks (e.g., multi-layered menus, reference
links, links acting as subheadings and keywords embedded in the text) also took

place while readers were browsing the websites. Hyperlink selection was performed

with multiple intents, including overviewing the contents of the website to

determine its usefulness, locating information stored in different parts of the

architecture of the site, or accessing source information of the site.

Once a site was accessed, the readers in this study increased attention to

scanning and comprehending the contents on a currently accessed webpage,

selecting a series of menus. Participants tended to browse multiple numbers of

menus available on a website to overview the kind of information it contained,

constantly reflecting on a focus of reading as shown in the following excerpt:

> Cindy: (Scrolling up the page to the top) .. I'm just gonna scroll around the
> site a little more um .. (pointing around <u>MENU: Switch to Green Energy</u>)
> there's a tab up here that says 'switch to green energy' .. seeing if that will
> tell me more reasons why people would switch (clicking on <u>MENU: Switch
> to Green Energy</u>)

By selecting a series of menus, readers moved forward and backward

between different parts of website. These interactive moves became more

complicated and active when readers were seeking particular information.

> Maggie: (clicking <-- three times; [CR Choose Responsibility-Links:
> www.chooseresponsbility.org]; scrolling down) ... okay (scrolling up to the
> top of the page; clicking on <u>MENU: HOME</u>; [CR Choose Responsibility:
> www.chooseresponsibility.org]; scrolling down and up; the pointer moving
> on the menu bar including <u>MENU: LEARN MORE</u> and <u>MENU: LEGAL
> AGE 21</u>) ... I'm gonna click on this (clicking on <u>menu: Myths and Realities</u>)
> to see .. maybe more um arguments FOR lowering the drinking age

In the above excerpt, Maggie accessed a website managed by an interest

group arguing for lowering the drinking age. While reading on this site, she

particularly focused on seeking the author's argument and the evidence by a series

of menu selections.

Information gathering happened not only with website menus but also with informational links contained or retrieved within the site. The websites that contained a rich amount of informational sources often presented a long list of links. These links allowed readers' moves to different texts existing inside and outside of the site.

> Rachel: ([USDA National Agricultural Library-Alternative Farming Systems Information Center-Publications-Sustainable Agriculture Organizations and Information Providers: www.nal.usda.gov]) okay 'research extension' (pointing at <u>LINK: Agriculture, Food, and Communities-Cornell University</u>) 'in the areas of small farms, community food systems, community agriculture development and agro forestry' ... 'agriculture marketing resource center' {<u>LINK: Agricultural Marketing Resource Center-AgMRC</u>} .. 'information research for developing sustainable agro-eco-systems emphasizing international training, research and application of agriculture (...) California (...) programs' {<u>LINK: Agroecology Home-University of California Santa Cruz</u>} .. I'm just gonna go ahead and click on Cornell ... because it .. has a good explanation for what's .. what I'm clicking on (clicking on <u>LINK: Agriculture, Food and Communities- Cornell University-htttp: media.cce.cornell.edu/hosts/agfoodcommunity</u>)

The above excerpt describes Rachel's examination and selection of links presented on the website "USDA National Agricultural Library Alternative Farming Systems Information Center." The current page provided a list of hyperlinks connected to several different research centers, each of which exhibits its title, URL, and a brief written description of a linked research center. Rachel closely examined each of the links, and then decided to select a link deemed relevant to her reading focus.

In addition to textual links, readers also examined the links represented through images. For example, Sam looked at multiple image links with written textual captions and integrated this information with her prior knowledge, to make

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sense of what the links jointly meant to her and what texts she will be led to by the

links. She then chose among the image links, based on a reflection of her current

focus of reading.

> Sam: Um .. they have different types . they have 'home kits' (pointing at the IMAGE: Home Kits, Grid-Tile, Off-Gred) . 'indoor and outdoor lighting' (pointing at IMGAE: Indoor and Outdoor Lighting) . 'battery chargers' (pointing at IMGAE: Batteries, Chargers) .. that's pretty cool! I want one for myself .. 'water heaters and water pumps' (pointing at IMAGE: Water Heaters, Water Pumps) . we're actually getting one of those for our greenhouse in the school .. 'pool heaters' (pointing at IMAGE: Pool Heaters, Covers) . and 'solar panels cells' (pointing at IMAGE: Solar Panels, Cells, PV) .. I think that's sort of what I want (clicking on IMAGE: Solar Panels, Cells, PV) ... I: Why did you click it? ... Sam: Umm because .. I think these are the kind that you can put outside and like . have um produce electricity for your house

Menu and link selection also took place in a process of "selecting" useful

websites. In this study, participants accessed and read the amount of information

enough to judge the usefulness of website in the first session: Open Website

Searching. These readers, for this evaluative reading, often attempted to check

authorship and sponsorship of the site.

> Katie: (Stopping at the top of the page) actually I almost wanna find out (clicking on MENU: About Us) what they're about

> Cindy: (Stopping around 'copyright @ 2010 powered by Renewable Energy and AEoogle!' at the bottom of the page) it's powered by Renewable Energy but oh! I can click on that (clicking on LINK: Renewable Energy within the copyright information) so I'm gonna click on what it's actually powered by

Both Katie and Cindy checked the authorship before moving to information

gathering or subsequent deeper processing of information. They postulated in part

these surface markers as evidence to determine credibility or reliability of the site,

as an initial standard of goodness-of-fit, to make a decision of whether to continue

to navigate, browse, read, and use the site.

Deciding whether to continue to read or reject a website

Participants reserved the websites accessed and read for future references or further reading. The task of the first session, to select and bookmark three websites deemed useful to learning about the topic, demanded participants to perform a process of website selection. This decision-making process involved many strategies for understanding and learning the contents of the website and the examination of its usefulness in diverse aspects.

The readers in this study were tentative before making a choice. As described above, these readers selectively read written texts (and other information) on a webpage and sampled a series of menus and links to access and overview different parts of the site. Based on this overall understanding of the site, they made a decision whether to keep or reject the site. Once they judged that the current website would not give information useful to achieving their goal, they quickly went back to their search and restarted to find other websites. However, participants made a tentative decision once they found the current site useful.

> Maggie: (Scrolling down) okay I'm gonna bookmark this one {[CBS News.com-60 Minutes-The Debate On Lowering The Drinking Age-60 Minutes-CBS News: www.cbsnews.com]} .. just . I don't know if I'm gonna keep it but I'll come back to it (bookmarking the webpage)

> Katie: (Scrolling down) the scientific community website that's pretty much what this is (scrolling up) .. can be helpful so I'm gonna put that page and leave it there and keep researching (keeping the [The Obesity Society-About The Obesity Society: www.obesity.org] opened in TAB: The Obesity Society)

This website selection reflected readers' plans for "sourcing." These readers saved multiple sites as a collection of useful references, and later compared and contrasted these websites when they were finished with website searching. While

sometimes readers firmly decided the sites' usefulness after reading each of the sites, strategic readers conducted an intertextual activity to have more useful ones by comparing and contrasting different aspects of websites, valuing merits and critiquing weaknesses, and assigning a unique role to each of the sites for future use.

In summary, strategies for realizing and constructing potential texts to read were used when readers sought relevant and useful Internet texts to construct their own text environments for learning. The purpose of this activity was to identify and access a goal-relevant information space, using Internet search engines and other websites acting as the information repository. On this accessed information space, the adolescent readers participating in this study constantly pursued useful texts by asking themselves what links were useful and how the texts could be accessed. Based on their experiences of reading and searching, these readers judged an overall goodness-of-fit in currently accessing information space on which numerous links and texts are interconnected.

Realizing and constructing potential texts to read became essential to determining the order of reading (e.g., Which should I read first?), and to constructing multiple paths to useful information (e.g., Where should I go?). This strategic activity was driven by readers' immediate (more automatic) or delayed (more effortful) responses to diverse links and texts presented in front of them. These strategies occurred as moment-to-moment processes, and were guided by the readers' intentions in seeking desired target texts.

The participants in this study used the group of strategies for realizing and constructing potential texts to read, making use of its unique roles and characteristics in both selecting and understanding links and texts. However, the effective use of these strategies required the other strategies for identifying and learning important information, monitoring the process of reading, and evaluating the different aspects of reading. Without using these strategies, these readers were not able to complete the original functions and roles of the strategies for realizing and constructing potential texts to read. A better choice of texts necessarily entailed readers' more accurate reflections on the evolving meaning, pursued goal and focus, and critical mindsets. The following sections describe the other three types of strategies that contributed to the constructive reading strategy use in Internet Contexts.

4.4. Strategies for Identifying and Learning Text Content

4.4.1. Making Meaning from Hyperlinks

I found two important functions of hyperlinks, based on observation and analysis of participants' reading strategy use related to hyperlinks. The primary function of hyperlinks was to build a bridge that relocated readers to other parts of information space on the Internet. The place to be reached through link selection was within a page, within a site, or beyond the current page and site. Hyperlinks made it possible to interconnect chucks of information and transform it into the structure of information. This "connective" function of hyperlinks afforded readers

selection of certain links and relocating themselves in a hyperspace. It helped

readers' strategy use to realize and construct potentially useful texts.

In addition, hyperlinks conveyed certain information, which guided readers'

link selection. This created another function of hyperlinks concerning readers'

meaning making. Hyperlinks were represented through written texts or visual

images. While some of the hyperlinks offered the only information denoting what

they were, many links better served readers by conveying briefly organized details

that described what sort of information was connected through, where the

information was stored and accessed, and/or who was managing and mediating it.

This "informative" function of hyperlink asked readers to make sense of minimal

information attached to links.

Making meaning from hyperlinks was a necessary and important component

of the process of hyperlink selection. This section describes a line of strategies to

identify and learn important information from hyperlinks that served readers

accessing useful texts on the Internet.

Comprehending minimal textual information with hyperlinks and inferring the

connected information

Participants routinely examined hyperlinks (what kind information might be

connected through the link), prior to selecting and accessing the link. These readers

comprehended minimal textual information, including link tittles, captions of image

links, brief written descriptions, previews, author information, and source

information. They read hyperlinks by using both literal and inferential

comprehension strategies. These strategies helped them anticipate relevance and

usefulness of hyperlinks, guided by readers' current reading focus and goal.

> Katie: (Slowly scrolling down) ... 'nutrient contribution to food' (pointing at <u>LINK: Nutrient contribution of food away from home in the reference no. 80</u>) ... hm .. (slowly scrolling down) another things that just popped into my mind . reading one of these {links} . you are . what you grow .. one of the ways to prevent obesity would be how everything is changing to organic foods . being green maybe that can be tied in somehow .. to researching

In the above excerpt, Katie encountered a series of hyperlinks related to

food and nutrition while browsing a site. The information conveyed through these

links reminded her of the idea of the food-obesity relationships and the possibility

that this newly generated idea was tied to her current research focus. The reading of

these links stimulated her thoughts about a possible pathway to understanding the

problem of obesity.

The readers in this study often had to read links that were not quite closely

relevant to their current reading focus but this situation sometimes helped readers

revisit heir goals.

> Sam: (Scrolling down) ... I'm trying to find the cost of home solar energy ... (moving the pointer to <u>LINK: Residential Solar Power or Saving Energy at Home?</u>) 'residential solar power or saving energy at home' .. that sounds something like I want … but not quite ... I kinda want something more broad than that like .. I want the cost of having sol-like .. alternative energy with like your regular energy bill

Sam identified a series of links related to types of alternative energy

products within a website. She initially thought that they were relevant but reserved

it as a tentative judgment toward the link. She reflected on her current focus of

reading "the cost of having alternative energy products" so that she was able to

perceive her needs for information beyond just facts about different types of

products. When readers perceived this mismatch between sought information and located information through the reading of minimal information available on a link, they were able to initiate a complementary information search.

Participants inferred the meaning of a hyperlink and its usefulness, based on reflections on their task (i.e., critical questioning). In the beginning stage of reading, these readers developed a broader research question to be investigated. This evolving question guided readers making meaning from hyperlinks and generating inferences about the usefulness. Whenever readers encountered links and entries, they attempted to judge how much information could be connected through the links related to their evolving questions.

> Cindy: ([Google+*why alternative energy is so important*; scrolling down; the pointer moving around ENTRY: Why is Alternative Energy Important: whyisalternativeengeryimportant.com; the pointer going up to the previous ENTRY: Alternative Energy Sources-Natural Gas., Hydrogen, Solar, Wind, Power: www.alternative-energy-engineering.com) … I'm gonna click on this site 'alternative energy engineering dot com' .. because it kind of gives a direct answer . just this part that they're showing me {the written text 'Why Is Alternative Energy Important? … with alternative energy solutions. Many alternative energy sources are renewable so the supply never diminishes …' under the same entry} is a direct answer to my question

Cindy was developing the question, "Why is alternative energy so important?" building upon her previous search of general information about alternative energy and her topic-related prior knowledge. She applied the question as a search term in the search engine and gained a series of website entries. Most of those entries had a similar title that reflected the question, but she found one promising link because she gave a quick reading on a couple of lines of textual information below the links and determined which link was able to help her get an answer to the evolving question.

Understanding a list of hyperlinks collectively to overview the information

connected through the links

Prior to determining whether to select and use particular links, participants

scanned a list of website entries resulting from a search engine use or a group of

links listed up on a particular webpage.

> Maggie: (The second page of [Google+*drinking age debate statistics*]; the
> pointer staying on the first ENTRY: The Over Under-A Back-Story Behind
> the Drinking Age Debate: www.acacamps.org; slowly scrolling down the
> page) ... I: What are you thinking? ... Maggie: Um just kind of reading the
> the websites to see .. if there are really any ones that stand out to me as
> being really .. credible

Participants made a judgment about what information (link) was new to

them and what information (link) was already known and accessed. Through this

overview of multiple links, these readers sometimes gained new information.

> Rachel: ([USDA National Agricultural Library-Alternative Farming
> Systems Information Center-Sustainability in Agriculture:
> afsic.nal.usda.gov]; scrolling down) ... 'briefing room' {LINK: Briefing
> Room: Global Climate Change} .. 'biodiversity' {LINK: Agricultural
> Biodiversity in FAQ} .. 'food and Agriculture Organization' that's the United
> Nations (pointing at the source information of the LINK: Agricultural
> Biodiversity in FAQ) interesting! I didn't know they dealt with that type of
> stuff

Furthermore, these readers examined a group of entries and links to create

an overall sense of common topics, themes, and characteristics among those

hyperlinks.

> Andy: Okay there is a death penalty paper (pointing at ENTRY: Death
> Penalty Paper: www.prodeathpenalty.com) .. and I (scrolling down the page)
> see they're already starting to pop up .. like PRO death penalty dot com
> (pointing at ENTRY: Pro-death penalty.com: www.prodeathpenalty.com)
> and then we have an ANTI death penalty dot org (pointing at ENTRY: Anti-
> Death Penalty Information: www.antideathpenalty.org)

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In this excerpt, Andy read through multiple website entries in the beginning stage of her Internet search and hypothesized the both pros and cons of the death penalty would be available on the Internet. She found the currently identified information space (connected through those multiple links) relevant and useful, to get a balanced understanding through accessing both arguments for and against the death penalty.

This activity of reading "conjoined" hyperlinks was similar to that of overviewing the content of a single print text. In Internet reading, the text was comprised of multiple website entries resulting from a web search engine use. This text was constructed in part by readers' web search engine use. This text was unlikely to exhibit coherence among its parts (actually different entries co-existing on the page). Also, its authorship was not single because multiple artifacts created by different authors were coexisting on the page. The adolescent readers in this study read and gained new information from this page of multiple links by multiple authors and sponsors. In this link reading, they were able to build an understanding of the information space available for them.

In similar way, link reading was performed when readers examined a series of links pre-selected and organized by the author of a particular website.

> Katie: (Pointing around the text box with the heading 'Other Healthy Life Style Topics') and at the bottom it has 'other healthy lifestyle topics' .. which include 'nutrition' (pointing at LINK: Nutrition) .. 'physical activity' (pointing at LINK: Physical Activity) .. 'division of nutrition physical activity and obesity' (pointing at LINK: Division of Nutrition Physical Activity and Obesity) .. um these things here can also help with how people can prevent cos nutrition of course physical activity are very important in helping to prevent it

In this excerpt, Katie made inferences about the information connected through the links. These inferences helped her understanding across the texts that were not yet accessed but anticipated from link reading. Through the reading of the multiple links that were to some degree related to one another, Katie identified important issues to build a better understanding of the topic.

> Katie: (Scrolling down; stopping at the text box 'Overweight and Obesity'; moving the pointer on the box) um .. let's see .. overweight and obesity has 'data and statistics' (pointing at <u>LINK: Data and Statistics</u>) .. 'causes and consequences' (pointing at <u>LINK: Causes and Consequences</u>) .. 'childhood overweight and obesity' (pointing at <u>LINK: Childhood Overweight and Obesity</u>) .. 'state based program's (pointing at <u>LINK: State-Based Programs</u>) .. which is what I was probably gonna be gearing towards

Katie was aware of possible multiple pathways to get an understanding of obesity through multiple links presented in front of her. Based on her goal reflection, she noted that there was information being sought and the possibility that some links would fuel her research on obesity.

In summary, the reading of the hyperlinks co-existing on a page involved two aspects of meaning construction. On the one hand, this activity was similar to the reading of a single text because multiple links were conjoined into a page, which jointly presented certain information to be understood by readers. On the other hand, this reading was an intertextual activity because it served readers who were anticipating, overviewing, and judging available texts connected through multiple links. The participants in this study gained information and built an understanding through reading multiple links, even though the meaning should be further developed in the follow-up reading of texts.

4.4.2. Comprehending Information in an Internet text

Participants used a variety of strategies to construct meaning from a webpage. They brought general comprehension strategies to the reading of individual pages, including overviewing the contents, identifying important information, generating inferences to enhance the construction of meaning, analyzing and synthesizing different parts of the page, and updating the meaning constructed thus far. These strategies were similar to those for reading a single print text. Although many strategies were found at the local level of comprehension (e.g., understanding words, paraphrasing sentences), this section focused more on the construction of meaning involved understanding the overall text content.

Scanning a webpage to make an overall sense of its relevance and usefulness

Participants scanned the contents of a particular webpage once they accessed it. Handling a scroll bar, these readers skimmed the page and noted its characteristics in relation to length, amount of information, commercial features (advertisements and banners), diversity of information through available menus and links, authorship and maintenance, and design and layout.

> Cindy: ([NESEA Northeast Sustainable Energy Association: www.nesea.org]; scrolling down to the bottom of the page) .. uh first thing I'll do is .. I'll go to the bottom to see if it's credible .. and um it's the 'North East Sustainable Energy Association' and it gives an address and a phone number and a fax number and an email

> Cindy: (Scrolling up and down to the bottom of the page) ... um it also gives the date of when it was last copyrighted {'Copyright @ 2007'} .. it's a couple of years old since it was last copyrighted (scrolling up; stopping at the top of the page in which the information on the 'BuildingEnergy conference in 2010' is posted) but they have stuff on here that um shows that they're updating it

In this excerpt, Cindy skillfully identified "surface markers" that indicated quality of the accessed webpage. She looked at the bottom of the page in order to find explicit information about the author, indicating the credibility of the site (e.g., name of the association, contact information). Also, she confirmed the up-to-datedness of the site by attending to the copyrighted year and the date of a currently posted article on the page.

Once the initial, tentative judgment of the page or site was made, participants skimmed its contents by a selective reading. These readers noted important parts of text, based on the reading of headings, subheadings, highlighted and boldface words, table of contents, or an interactive overview.

> Andy: Let' see (slowly scrolling up; stopping around the table that compares the cost of life without parole cases and death penalty cases under the subheading "D. THE COST OF LIFE WITHOUT PAROLE VS THE DEATH PENALTY") .. here's another good topic! . 'the cost of life without parole versus the death penalty'

> Maggie: (Slowly scrolling up) ... I don't even know {where the table of contents is} .. let's go back to the beginning so I can see (scrolling up to the first page; slowly scrolling down) … okay (stopping at 'Detailed Contents'; the pointer moving on the written text)

The above excerpts indicated quick, selective reading on a particular webpage. Andy, after accessing a website that organized multiple arguments for and against the death penalty, intended to find basic and explicit information about the author of the site. Andy then selectively read the content of the site by looking at each of the subheadings. She scrolled down the page to overview the content, and paid attention to the particular information deemed useful and important. Maggie found and downloaded a document but not read it from the beginning. She noted the length of the document and tried to find the table of contents to overview the

content. She looked through the table of contents and directly located the information she was seeking.

Based on this initial selective reading performed in the very beginning stage of reading of a webpage, participants planned a subsequent reading of the page. These readers summarized what was gained from the overview and used the summary as a knowledge base to generate a hypothesis about what the webpage was about and what it was trying to do. They assigned varying degrees of importance to different parts of the webpage, and then determined what to read in what order, what to read in detail, and what to skip.

Identifying important information in a webpage that contributes to the construction of meaning

Participants used a variety of strategies for identifying and researching important information from Internet texts, in order to enhance an understanding of the current text and to better learn about the topic eventually. These readers used prior knowledge related to the topic, text structure, and the author, to decide what information should need more attention. These readers often repeated, restated, and paraphrased the content of text they read, to clarify the main idea of the text.

Participants particularly attended to keywords and central concepts, domain-specific vocabularies, and topic sentences and paragraphs. These readers persistently sought the information they believed as important. Their thinking was triggered once they encountered the information (that they believed) relevant to their evolving meaning and questions. These readers initiated deep thinking to reason about how the information could explain, support, or repute what they

understood thus far, and also what aspects or perspectives should be considered to be important.

> Katie: (Scrolling up to the subheading 'Behavioral Factors') I think two of the most important things about studying obesity are .. you know the FACTORS of it . um what CAUSES you to do this? like right here the MEDIA . being in front of the TV . um . not getting enough exercise . and you know your environmental factors (pointing at the subheading 'Environmental Factors') what your environment is cos it's a big factor! I mean if you're not .. put in situations where you can have physical activity or healthy foods then you're not going to

This excerpt showed how new information stimulated readers' use of prior knowledge, questioning generation, and identification of an important problem. The majority of links and texts that Katie accessed and read before this moment were related to biological and individual approaches to the problem of obesity, including nutrition, diets, symptoms, overweight, and the magnitude of the obesity problem in the United States. However, when Katie read these written texts under the headings of "Behavioral Factors" and "Environmental Factors" on a webpage, she brought her prior knowledge concerning the problem of obesity to the surface. The reading of this information helped her impose a critical perspective related to the problem of obesity and guided her subsequent reading of texts and identification of important ideas to be used in her critical questioning.

> Katie: '(8) creation of communities that support healthy lifestyles' .. I think it's REALLY important! if any money should be put into a community for .. um .. reducing the obese rate .. it should definitely be done um as a priority .. if they wanna do something about it . they need to get to the root of the cause . which is not only um things that aren't being done but the convenience of it as well

Katie persistently sought the information as fit her evolving meaning after reading information about behavioral and environmental factors in the previous site.

This increased attention to a particular aspect of the topic guided her in an ongoing way, both in the determination of importance to certain information and the construction of meaning.

Generating inferences and questions to enhance the construction of meaning

Participants generated inferences and questions about the contents they read. Inference making and question generation involved readers' active use of prior knowledge, self-reflections on the evolving understanding, and critical mindsets to better understand text contents and to investigate hidden meaning in the text.

> Maggie: (Pointing around the paragraph beginning with 'It's like the old days') ... oh they're referencing like prohibition of alcohol um .. I think it was like in the twenty's or maybe before that .. when alcohol was made illegal in the United States and people would like sneak around and have like special places they would go to get alcohol so they're breaking the law um even more

> Andy: (Scrolling down; moving the pointer to the written text of the PRO in the '4. Retribution') ... um this is saying that .. the pro side .. 'Society is justly ordered when each person receives what is due to him' .. so that kind of saying what goes wrong comes wrong . and if you do it you're going like an eye for an eye like Hammurabi's code something like that

In these excerpts, the readers used their prior knowledge to understand text content. Maggie reserved a judgment of how the claim and the evidence were tied into building an argument. For this, she first made an effort to understand in what way the evidence was able to support the author claim, using relevant prior knowledge. Andy also used relevant prior knowledge to better understand and summarize the claim presented in a written paragraph. This helped her clarify the main idea of the text.

In the following excerpt, while reading written texts about executions accompanied with a world map representing the distribution of death penalty

practices, Andy generated inferences about what made differences between United

States and other countries.

> Andy: A lot of countries call it 'cruel, inhumane, and degrading punishment'
> um ... (scrolling down) ... I: What are you thinking? ... Andy: Thinking
> about my question .. and .. a lot of countries have eliminated death penalty
> (moving the pointer to the graphic world map 'Use of the death penalty
> around the world') ... and I can see why because .. um especially in really
> religious countries it might seem like it would be against their religion and
> even though united states based off of Christianity, it's not as religious as
> other countries, um very very diverse in religions.

Andy inferred one possible reason that could make differences between

countries. Andy assumed that most religions would not allow the death penalty. She

originally approached the problem of death penalty as a moral issue and cruelty,

and this influenced her association of text content and prior knowledge to infer

implicit information.

Andy's inferences sometimes went beyond text content. For example, when

reading written texts about state-governed research reports on the death penalty

practices, she questioned why certain states provided limited information about

their practices in comparison with other states.

> Andy: ([DPIC Death Penalty Information Center-Financial Facts:
> www.deathpenaltyinfo.org]; the pointer staying around the subheading
> 'Texas') but it's interesting because .. Texas has a sentence .. and I don't
> understand WHY because I mean I don't know if it's the fact but .. they just
> feel strongly that they should keep the death penalty so they don't wanna
> offer any .. kind of study .. because all the other states have studies that have
> shown .. like .. that they've gone through an incentive to find out whether
> they should have the death penalty or not . and then Texas just says that is
> about . it has a quote from the Dallas Morning News {the source
> information 'Dallas Morning News'}.. that's it! .. so obviously people in
> Texas want to keep it and they're not doing any kind of research to find out
> anything else hhm

This website, referred in this excerpt, organized major findings from research studies on the death penalty in each of the states in which it was administered. A good deal of information was presented under the subheading of each state, including outline of research, statistical information, and findings and discussions. However, the subheading of Texas had only one written sentence about the death penalty, cited from a local newspaper. Andy thought that the reason of this imbalance of available research information between Texas and other states was that Texas had a conservative stance toward the death penalty, so they did not invest on research or disclose the research findings. Although there could be other alternative explanations (e.g., the site intentionally under-represented research in Texas, or it did not have pertinent information about Texas for any reasons), Andy's inference was interesting because it reflected her prior knowledge about a particular state's political stance and how that could have an impact on their actions on the death penalty, and how this situation could be represented through language and text.

Participants made inferences about hidden meaning, often related to examining commercial intents of Internet texts. The sites that participants encountered, even organization sites, sometimes were sponsored by commercial companies or posted commercial advertisements to sell products and services.

> Sam: (Scrolling down slowly) umm ... (pointing at LINK: Choosing Energy Efficient Washers) 'choosing energy efficient washers' .. okay ... um this is 'an energy star water heater can save you a bundle' (pointing at LINK: An Energy Star Water Heater Can Save You a Bundle) but I think that's just trying to sell something!

In this excerpt, Sam accessed the site managed by an organization. Sam initially anticipated that this site might be useful because its title seemed relevant to her (*Beating High Energy Costs-How to Save Electricity With These Little Known Tips*) and the URL also seemed reliable (www.howtosaveelectricity.net): She guessed that "dot net" sites might be more reliable than at least "dot com" sites. However, Sam found that this site was created for commercial purposes, through browsing the site, reading written texts, and examining multiple links. Thus, the reading of the site content helped her revise her judgment about the usefulness of the site.

Participants also generated questions about text content to enhance understanding. Their questioning reflected their engagement in higher-order thinking in comprehending text. Questioning boosted these readers' deep thinking because it required integration of the evolving meaning and the text information while they usually did not initiate a search of the answer to the questions immediately.

> Andy: (The pointer staying on the written text of the CON in the '5. Irrevocable Mistakes') um '87 people have been freed from death row because they were later proven innocent' . so they're making the claim that eighty seven have been freed . how many more were really innocent but weren't freed and died because of the reason

> Katie: (Scrolling down; stopping around the table '2008 State Obesity Rates' below the map) .. uh this is kinda leading to a question for me about .. how um .. maybe .. why doesn't weather affect it? huh .. just .. as an extension

In the above excerpts, both Andy and Katie generated questions, building upon comprehension of text content. Their questions were related to the information that was missing in the text but should be answered for better interpretation of text

content. Andy pointed out a possibility that there might be people innocent but not freed. This question reflected her thoughts about negative consequences of the death penalty. Katie, upon completion of examining the U.S. maps representing the distribution of obesity by different counties and states, respectively, found that her hypothesis about relationships between weather and obesity should be answered further because the maps did not support her hypothesis.

Analyzing and synthesizing text segments into a meaning

Analysis and synthesis were both observed mostly in the reading that involved processing detailed information in the text. While moving back and forth and up and down on the site, these readers integrated what they gained from different parts of text into a coherent meaning. These readers compared multiple perspectives and arguments in the text, and analyzed logical relationships between claims and evidence. They also compared the degree of agreement between perspectives, arguments, and questions presented in the text with their own stance, perspectives, and questions toward the same issue.

Analysis of information featured especially in reading tables and maps that contained detailed information often represented in numerical and symbolic manner. Participants translated non-continuous information, including graphics, symbols, notations, and numbers contained in tables and maps, into a narrative by making interrelationships to build meaning, as Katie did in the following excerpt:

> Katie: Um .. here they have a table (pointing at the table for an example showing Heigth, Weight Range, BMI, and Considered) .. it has your weight range {the column 'Weight Range'} .. and this I guess is an example .. If you're five foot nine {'5' 9'" in the column 'Height'} .. and your weight range between .. it has like four different categories {the column 'Weight Range'} .. it gives you your BMI {the column 'BMI'} and it considers uh you as

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'underweight' . 'healthy weight' . 'overweight' or 'obese' {the column 'Considered'} .. so pretty much it's saying at '5 foot 9' .. you should be around '125 pounds to 168 pounds' .. and it's saying that will give you a 'healthy weight' which is a 'BMI between '18.5 to 24.9' .. now if you are '5 foot 9' and you're '203 pounds or more' .. your 'BMI is 30 or higher' and you're considered 'obese'

Analysis and synthesis often occurred together. Analytical thinking contributed to identifying a basis for making meaning from multiple pieces of information, and this meaning was integrated with readers' knowledge and perspectives into a composite understanding of what was analyzed. Andy's reading of a series of detailed numerical tables on different pages reflected her thinking for analyzing and synthesizing the information on the tables.

> Andy: (Slowly scrolling down and up) okay um .. that asterisk (pointing at the note on the table with *) I'm reading it says it "Includes Kansas and New York in the years AFTER they adopted the death penalty' um ... (the pointer moving along to the subsequent sentence) 'New Jersey and New York ended the death penalty in 2007 and will not be counted as death penalty in 2008' . so .. huh! .. I wish I would go by the state but (pointing around the numbers in the table)

While reading the table comparing murder rates in death penalty and non-death penalty states, Andy found an overall tendency that states without the death penalty had consistently lower annual murder rates than non-death penalty states. Andy was tentative in accepting this information and wanted make sure to have more convincing evidence. Andy read written notes on the table, and learned that New York and New Jersey ended the death penalty in recently. She then decided to find and read more specific information on each of the state's trend in murder rates through the years. Andy went back to the previous page that listed multiple links connecting different tables, and then selected the link, "Murder Rates by State: 1996-2008" because she wanted to see if the end of death penalty in these two states

actually contributed to the crime deterrence. This hyperlink selection led her to the

two tables related to statistical information on murder rates by different regions and

states.

> Andy: ([DPIC Death Penalty Information Center-Murder Rates 1996-2008: www.deathpenaltyinfo.org]) ... (scrolling down; stopping around the table "Regional Murder Rates, 2001-2008') hm ... so overall .. murder is more prevalent in the south! .. and ... it hasn't really gone UP .. at all .. and ... the south executes by far the most . people (pointing at '970', executions in the South since 1976) ... um ... and the places that have execution the most . they still have the highest murder rates (pointing at '6.7' in the South, 2001) ... and uh like and the northeast (pointing at '4', executions in Northeast since 1976) which is on the other end of the spectrum . they've only executed four people since nineteen seventy six and they have the lowest murder rates

In the above excerpt, Andy was reading a table that presented statistical

information about murder rates of each of the regions in United States, between

1996 and 2008. She found two tendencies: Murder rates were higher in the South

across the years, compared with other regions; the murder rates in the South were

not much changed during the time period of 2001-2008. She then compared the

South (the highest murder-rate region) to the Northeast (the lowest murder-rate

region) because she wanted to find if there were any differences between the

highest and lowest murder-rate regions, and to gain some clues to infer the effect of

the death penalty practice on the crime deterrence.

Andy then slowly scrolled down the page and read another table on the

murder-rate tendency by state. When she encountered this table, she directly located

the information on New York and New Jersey, states not using the death penalty,

which she learned from the notes on the table that offered comparison of murder

rates between death penalty and non-death penalty states in the previous page.

Andy: (Scrolling down; stopping around the table 'Nationwide Murder Rates, 1996-2008') let's see ... um okay we know New York dropped the death penalty in two thousand seven .. so two thousand seven is this column (pointing at '2007') so . gonna go down to New York (scrolling down; pointing at the 'New York') .. they had the death penalty here (pointing at '4.2') .. but don't have it here and it went up a little bit {'4.3 in 2008', compared to '4.2 in 2007'} .. so (scrolling up) .. let's see what's another state New Jersey? (scrolling down; pointing at 'New Jersey') .. there's went down just slightly {'4.3 in 2008', compared to '4.4 in 2007'}

Andy identified corresponding cells and numbers, and found that there was not a remarkable difference before and after dropping the death penalty in these two states: New York and New Jersey. While noting the limited evidence that she found, she attempted to synthesize what she learned from those multiple tables in the following manner:

Andy: Uh let's see what conclusion can I have from this {what I've read so far} um ... it is very apparent that the states . that . HAVE the death penalty .. still have higher murder rates ... therefore . you have to ask yourself the question . is the death penalty really deterring people from crime . and you could look at specific states and then dates and when they practiced it or they stop practicing it . in comparing them .. I tried doing that with New York and New Jersey BUT . they barely changed at all . but that was just a year span . um ... but those are just two instances ... (scrolling up and down) okay hm

Although Andy reserved her conclusion and maintained tentativeness, she summarized her understanding based on the analysis of the information presented in a series of tables. She put the pieces of information together, and integrated it into the meaning that the practice of death penalty was not effective in deterring murder. This analytical and integrative reading done by Andy involved her persistent focus and thinking to investigate a particular aspect of the problem of death penalty.

As demonstrated in the above examples, diverse strategies were used in understanding the contents of Internet text, similar way to comprehending a single

text in print. Participants used both literal and inferential comprehension strategies. They entailed thinking strategies to analyze, synthesize, and interpret different information to better understand the text. They generated questions about possible alternative interpretations of events or facts, delving into validity and reliability of the author argument and the logical structure. Sometimes, participants identified necessary but actually omitted information in the text, and interpreted the author's intentions in relation to that. These comprehension strategies occurred with narrative texts and also with diverse tables, maps, graphics, and charts.

4.4.3. Constructing Intertextual Meaning across Internet texts

In addition to a variety of strategies for understanding the information within Internet text, participants analyzed and synthesized information across multiple texts, as they should read these multiple texts to identify and learn important information from the texts. Most of the participants committed to building intertextual links among the multiple texts encountered on the Internet. This intertextual reading was central to constructing meaning related to the reading of those texts.

Interrelating different texts to construct an ongoing construction of understanding

Participants used strategies to interrelate more than one Internet text and conducted an ongoing construction of coherent and intertextual understanding. The intertextual meaning construction significantly contributed to the identification of important themes and issues related to the topic and to the development of critical questions. As they determined that they gained the fair amount of information from

multiple texts, these readers attempted to group those pieces of information into larger chunks of meaning.

> Katie: (Scrolling down) ... um right now I'm thinking in my head how I'm going to classify all of my obesity information whether it be .. what causes it um .. the outcomes .. there's so many different perspectives of obesity

Katie attempted to categorize multiple pieces of information gained from different texts in an easier way to comprehend and remember. She then integrated the sorted information into a more global understanding. This higher-order thinking, involved in the construction of intertextual meaning, facilitated Katie's reflections based on what she had learned so far and what needed ongoing attention.

In the very beginning of the second session, Maggie planned the order of reading among three websites she selected. She was aware of which site contained what information and how that information might be connected to one another.

> Maggie: (The third page of [CBS NEWS-The Debate On Lowering The Drinking Age: www.cbsnews.com]) .. okay I'm going to start with the CBS .. um .. article ... um it it quotes this guy again John McCardell who was the founder of this (pointing the TAB: John McCardell-Drinking age) .. this was quoted in this one (pointing at the TAB: Should the Drinking Age Be Lo..) too

This excerpt reflected Maggie's intertextual understanding of her collection of websites. During the first session, she found that "John McCardell" was repeatedly cited in a multiple number of texts that presented arguments for lowering the drinking age. She recognized this and built intertextual links among the three websites, all of which cited him in a different way. The interrelationship she built in the mind helped her plan for reading.

Maggie's intertextual reading also happened across the sessions. In the first session, she encountered the information on legal drinking ages in the world and

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generated a question that what problems and consequences were caused by the

lowered drinking age in other countries.

> Maggie: Um .. (scrolling up and down along to the table on [Alcohol Problems and Solutions-Minimum Legal Drinking Ages around the World: www2.potsdam.edu]) .. so with this huge list of countries that have drinking age of eighteen I wonder if like .. if .. um .. if there's any um .. how do I wanna say like .. do they have more problems? since the um drinking age is lower with drinking do they have less problems?

In the second session, while browsing and reading on a site, she encountered

similar information again and connected the current text to the previous text she

read.

> Maggie: (Pointing at <u>MENU: LEARN MORE</u>; clicking on the <u>menu: International Comparisons</u>) .. 'International Comparisons' let's look at that .. um like before I saw the list of the .. drinking age in different countries {in the first session} and I wondered how that affected .. um the country's health as a whole

Although she did not investigate the relationships between drinking ages

and health problems (due to the limited text boundary and task setting), Maggie

continued her focus on the statistical evidence representing possible consequences

of staying in or lowering the drinking age.

> Participants constantly refreshed their memory of previous readings

whenever they judged whether certain information in the current text was related.

> Cindy: (Pointing at the item '4') ... here's another um another point that agrees with the other site that I'm using or one of the other sites that I looked up earlier um about eliminating all the imports {the written text with the subheading 'Socially' in the website [DMA Alternative Energy Engineering-What is Alternative Energy?: www.alternative-energy-engineering.com]}

In the above excerpt, Cindy referenced the texts previously read, to build

intertextual links with the current text. This strategy use indicated that readers

utilized the meaning constructed or information gained from the previous texts to

enhance their understanding of the current text. Cindy also identified common themes across the texts. This intertextual reading improved her understanding and self-confidence in making good questions.

> Cindy: ([iLoveMountains+*renewable energy*]) uh .. here we go (pointing at <u>ENTRY: New Report Shows Green Jobs are a Better Deal Than New Coal Plants</u>) .. here's one about um JOBS again! (clicking on the same entry) .. Americans are all about jobs right now .. you can actually see that all these websites {the websites opened in the tabs} are really taking that into account .. really catching up on their news uh talking about jobs ...

As reading progressed toward a certain level of understanding across diverse information that were explored, selected, and read, Cindy was more convinced that economic perspectives in approaching to the problem of alternative energy was worthy of debating and researching. Based on the reading of both arguments for developing and using alternative energy products and for using traditional fossil fuel industry, she found that creating jobs was an important basis for both sides of arguments. This understanding helped her generate questions about economic and social impacts of alternative energy use on local and global communities.

Intertextual understanding certainly helped participants summarize what they read, identify important ideas from the texts, and clarify conflicting information or insufficient understanding.

> Andy: (Looking back on her notepad) ... okay in my first session I was wondering if it could be proven that the death penalty is more expensive than life in prison . would the justice system of united states outlaw it . and ... it seems pretty apparent according to the study that I've looked at that . the death penalty is more expensive than .. um .. life in prison .. um . BUT states still practice it! so I guess the answer to that question would be .. um .. that it doesn't--their {the death-penalty states'} cost ... this is complicated! their cost doesn't exactly affect .. but some states have dropped it because they've probably realized it {the fact that the death penalty costs more than life in prison}

In the later stage of learning the selected websites, Andy reflected on her own reading and understanding in relation to how the costs of the death penalty related to the practice. Andy learned, with multiple sources, that many states in US were practicing the death penalty while the cost of the death penalty overall was higher than that for the life imprisonment. She attempted to build a connection between the costs of the death penalty and the practice of the death penalty, and interpreted why states were practicing the death penalty even though it was not economically efficient. This intertextual understanding fueled her further research on the information on each state's death penalty practices to see if there were any other reasons of using the death penalty (e.g., the crime deterrence of the death penalty).

Using the meaning constructed across multiple Internet texts into the critical questioning task

Participants applied the meaning constructed from the reading of multiple texts into their task of creating a critical question. Not all the texts were used in their task completion because these readers were selective about the information they accessed and read, instead of accepting it unconditionally. These readers constantly regulated their reading toward the achieving the goal, that is, eventually to generate critical questions central to addressing the issues investigated. This strategy use implied that participants' reading was not only for gathering and comprehending information but also for using the meaning constructed from texts in a certain problem-solving task.

For example, while accessing and reading several informational texts related to alternative energy, sustainability, and mountain top removal coal mining, Cindy identified common themes across the texts and built a global understanding in the following manner:

> Cindy: (Moving the pointer on the written text of the article The Potential for Renewable Energy in Iowa') .. um here they're talking again about um .. 'generating high-paying jobs' .. um 'clean' .. so I'm seeing a PATTTERN here on all these sites about CLEAN energy . JOBS . and SAVING the planet! um so I'll definitely include those three points in my critical question!

Cindy identified important aspects of the problem of alternative energy, building upon her reading of multiple texts throughout the course of Internet reading. She found similar information appearing multiple times in different places on the information space she accessed, and developed themes, grounded in the information from the texts. This was used to inform her critical questioning about the economic and environmental impacts of developing and using alternative energy on local and global communities.

In another example, Andy incorporated information about the costs of the death penalty from multiple texts, including research reports, articles, and statistical charts and tables, in her critical questioning task.

> Andy: Um ... (the pointer moving along to the first paragraph under the subheading 'Tennessee') ... okay this is what my critical question is about! um they are asking it says 'A new report released by the Tennessee Comptroller {I didn't really know what that is} 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 (looking at her notepad} um .. if it could be proven that the death penalty was more expensive that life in prison with the death blah blah blah . and then I asked . or would we continue to practice it because we feel that it is a good deterrence of crime ... and here Tennessee is questioning whether or not it's really effective in preventing crime

When Andy encountered a newly released research report in Tennessee, she noted that many research reports documented the inefficient cost-benefits of the death penalty practice. Andy then integrated this information into her evolving question that the rationale for practicing the death penalty was an economic perspective. Andy understood that it would not be supported if the costs were proven higher than that for the life imprisonment. This intertextual understanding boosted her self-confidence in justifying the importance and significance of her critical question.

Participants' Internet reading was the activity of reading multiple texts and constructing a global meaning across the texts based on an understanding of each text. Adolescent readers participating in this study tended to interrelate different texts and identify mutually supporting or conflicting information from the texts. They built meaningful connections of the texts, constantly reflecting on their goals and evolving understanding. Furthermore, they used these intertextual understanding for their question generation and task completion.

Intertextual links, sometimes more loosely or sometimes more tightly, were constructed in the readers' minds. The distance between the references connected by these cognitive constructed links varied. The meaning intetextually constructed sometimes directly guided subsequent activities of reading, but often the distance of the two activities was far to trace (e.g., texts read in the first session triggered readers thinking and interpreting certain text(s) encountered in the second session.). Yet, participants' verbal excerpts and their critical questions showed that these readers actively used what they read and learned from the previous texts to update

their knowledge, to focus on important ideas, to plan for subsequent activities, and finally to construct meaning. Strategies for building intertextual links in the mind and constructing a global meaning based on understanding multiple texts were necessary and central to successful Internet reading because these strategies made important contributions to readers' task completion (i.e., critical questioning).

In summary, a group of strategies for identifying and learning text content were used not just in learning text content and constructing meaning but also in locating and selecting useful links and texts. Hyperlink selections necessarily required understanding minimal information available on hyperlinks and informed-decision based on the understanding. Comprehending the information within Internet text was a follow-up activity once readers chose a certain link, which informed readers' evaluation of texts and subsequently their information-seeking processes. Understanding individual texts provided a knowledge base on which readers built more global understanding across the texts.

In Internet contexts, intertextual reading occurred all around. Internet readers should not avoid their responsibilities to deal with multiple links and texts. The meaning was emerging through the course of working on these links and texts. Internet readers performed dynamic moves between the current text and the previous text, located and constructed meaningful links in the mind. Internet reading was marked by intertextual strategy use, not just because text were explicitly connected by hyperlinks but also because readers should be able to cognitively construct intertextual links that semantically tied multiple texts together, the texts that were often located from different places on the unknown information

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space. In this light, the use of the strategies for identifying and learning text content was central to successful Internet reading.

4.5. Strategies for Monitoring

4.5.1. Monitoring the Determination of Reading Order and Paths

As demonstrated in the previous sections, Internet reading required realizing and constructing potential texts to read, in addition to identifying and learning text content. This means that readers should be cognizant of their reading processes not just involved in meaning construction, and in the process of searching for, locating, accessing, and determining useful texts (see also 4.3. Realizing and Constructing Potential Texts to Read). Participants' reading strategy use showed that monitoring, entailed in realizing and constructing potential texts to read, was necessary and important to the metacognitive and self-regulatory process of Internet reading. *Perceiving that Internet reading needs attention while realizing and constructing potential texts to read*

Internet contexts called for readers' attention for several reasons. Multiple chunks of texts displayed spatially on a webpage required readers' attention and decision-making, related to what to read first, and next, and how to incorporate information from across texts in a coherent manner. Readers responded to spatial designs of webpage by allotting their attention according to judgments of importance of different parts of the webpage. Readers also used an interactive feature of hypertext design that enabled them to access and overview the

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information on the site more easily. In addition, the readers perceived these benefits

of webpage design while browsing the page.

> Katie: ([MedlinePlus-Obesity: www.nlm.nih.gov]) I didn't know this how ..
> (scrolling up) up at the top they had .. things you can look at! (pointing at
> the text box listing up links to 'Overviews', 'Latest News', etc.) .. but then
> they have articles that they've gotten from other websites (scrolling down;
> highlighting several links under the subheadings 'Overviews' and 'Latest
> News') .. I did not notice that when I first researched it

Katie recognized that the current webpage provided an interactive overview,

the table of contents with hyperlinks, of the information organized on the site.

Initially she read the page from the top to the bottom, but after browsing in the

frame of the page (spatial dimensions of the page) she realized that there was a

device allowing for an easier scanning of the webpage contents.

Sometimes, the design of a webpage or website was not effective or

informative enough to guide readers' information access. While there were many

eye-catching links, images, characters, or advertisements on this site, these were

often irrelevant and caused distraction. Readers perceived this structural

ineffectiveness, and reflected it into their evaluation of the website quality.

> Sam: ([Siemens-Offshore Wind Power Solutions:
> www.energy.siemens.com]) um ... I'm gonna click on products under this
> (clicking on menu: Products; written descriptions on the products on the
> same page) and I'm clicking more again (clicking on LINK: >more; written
> descriptions about Wind Turbines on the same page) .. and it just gave me
> the same thing! I just saw ... that's really aggravating!

In the middle of a series of hyperlink selections on a website, she detected a

problem of accessing relevant information and attributed it to the ineffective

structure of the site. This perception influenced her judgment of the site. After

modifying her search terms applied into the Internet search engine, she encountered

the same entry again. She perceived that the previous experience visiting the ill-structured site was not productive, and rejected the link immediately.

> Sam: ([Google+*the price of windmills*) .. um .. this (pointing at <u>ENTRY: Wind Turbines Cost: www.simens.com</u> in the Sponsored Link) I'm definitely not going there cause I just went there and it just confused me!

Internet contexts presented numerous links and texts to the participants. Participants were aware of this information load and the resultant cognitive overload. In response to this situation, participants used strategies to retain and remember the information that they believed important. Also, some of the participants used a pencil and notepad regularly to take notes on what they read and learned while navigating on the Internet, while others performed copy-and-paste behaviors on their MS Word file.

> Cindy: (Note-taking: *-hydropower*) ... I'm taking just because for me whether I'm reading on the internet or if I'm reading print text um .. because it's so much information if I just get things that are gonna um trigger what I--everything I read . it's easier for me to go back on my notes and form questions or something

Note-taking was not only for retaining important information but also for summarizing and elaborating thinking. Many participants used their written notes when they developed and typed in their critical questions.

Also, participants perceived that Internet search engines, such as Google, were designed to retrieve information in order of relevance to the input search terms, in general. In the following excerpt, Hannah was aware that the relevance of the retrieved entries could be sparse as she went deeper into the search pages by clicking on "next page." She believed that a further examination of website entries listed on the pages after the first few pages would not be an efficient strategy.

Hannah: And I'm going to the next google page (+ page 2; [The second page of Google+*physician –assisted suicide*) . if I can't find anything on that page then I'm going to type in something else

Many participants also noted the "uncertainties" that the Internet might present to them. Concerns with these uncertainties stemmed from characteristics of Internet texts. For example, many websites and web pages presented multiple texts that originated in different places. This required readers' particular attention to source information. Sometimes the source information of the texts was not clearly disclosed. Websites cited often only a part of the original text, and reorganized and synthesized segments. This cause decontextualization and manipulation of information. Participants maintained a critical stance in reading particular parts of the site because the texts might come from outside of the site, even if the site was accessed based on their initial judgment as a credible and reliable source.

Perceiving the reader's own goals while planning and managing the process of realizing and constructing potential texts to read

Participants' Internet reading indicated that their reading strategies were used in a goal-directed manner. That is, effective reading strategies were used toward achieving the goal of reading, as a compass needle must be pointing north. Participants monitored their reading, based on perceptions of their goal. They constantly checked whether their reading processes were contributing to goal achievement. Whenever these readers moved through a transitional stage of reading (e.g., from gathering general information through investigating more specific information, from information seeking through information comprehension, or from overviewing multiple texts through examining particular texts), they reflected on

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their goals and (re)directed their reading and strategy use towards achieving the goal.

Navigating the Internet imposed cognitive overloads to readers. In the middle of information seeking, participants often attempted to refresh their minds to recall what they really wanted to do in the current reading task.

> Rachel: Um hmm ... I gotta focus on my question .. what do I wanna ask? ... hmm what is the MOST ... I don't know I don't know what is the MOST EFFICIENT way to maybe that that could work . okay . alright!

This regularly performed monitoring of a reading goal indicated conscious mental effort. Monitoring was in part a problem-solving act, because it kept readers proactive to possible disorientation problems. It was a metacognitive act that utilized readers' knowledge of what they were doing and thinking, and a self-regulatory act that influenced follow-up acts of reading.

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

In the above excerpt, Rachel encountered several links and texts related to environmental problems caused by currently dominating farming systems. However, the information provided was not sufficient for her to develop her critical questions because she intended her reading to develop understanding related to alternative and sustainable farming systems. Thus, she perceived the needs for the information about "solutions" to the problems, rather than the information about the list of problems in itself. She consciously reflected on her original focus of reading. This reflection helped her determine what information was located and accessed

thus far and whether she gathered sufficient information to develop a critical question.

Monitoring informed the activity of realizing and constructing potential texts to read. Using the results from the monitoring of current acts of reading and the reflection on the reading goal, participants were able to redirect their acts of reading towards locating and accessing a goal-relevant information space.

> Cindy: (Moving the pointer Google search box in the web browser tool bar) um ... let me go back to google ... so now I have my types . now I'm gonna think of a different question to put into google

> Cindy: (Typing in *why is alternative energy* in the Google search box) um .. there was a--I started to type in why is alternative energy .. um more sustainable . BUT um there's different questions here (the pointer moving on the five different auto-complete search terms) that says 'why is alternative energy so important' (selecting the auto-complete search term *why is alternative energy so important*) and I think I'm gonna search that first!

Cindy was accessing and reading the sites that contained information on "types" of alternative energy. She then reflected on what information she gained and planned what information she needed. Based on the reflection, she changed her focus of information search, from gathering general factual information toward accessing arguments, debates, and other opinionated texts. Cindy wanted to learn about the "reasons" supporting the importance and urgency of alternative energy, and to use the information into her critical questioning.

Planning the reading order was informed by monitoring. When readers collected multiple texts and sites, they anticipated their learning processes and planned to read these sources in a suitable order intended to contribute to a better understanding of the sources.

Katie: Um .. this way I have {the way of studying the current website [CDC Centers for Disease Control and Prevention-Overweight and Obesity: www.cdc.gov] first} .. better knowledge .. before looking into regulations {before studying about the legal themes from the website [PubMed Central-Australia & New Zealand Health Policy-Legal themes concerning obesity regulation in the United States-Theory and Practice: www.ncbi.nlm.nih.gov]}

Katie started her second session for reading the three selected websites by planning what to read first and what to read next. Katie planned to read the site of a public research center that contained detailed information about obesity, and then to examine another site that presented an article about public regulations as an alternative approach to solving the problem of obesity prevalent in America. This determination of the reading order was informed by her awareness that reading a difficult text may require more topic-related background knowledge. Katie believed that gaining some general information by reading an easier text first was able to assist in the subsequent reading of a more difficult text in an easier and smoother way. She reflected on the best way to get to an understanding of the topic that and to generate critical questions based on the understanding.

Detecting the problem of searching for and navigating toward useful information

One of the central functions of monitoring was detection of problems that occurred in the course of Internet reading. The problems varied in part due to readers' lack of prior knowledge or pertinent skills and strategies, and in part due to unexpected situations due to technological problems. For example, readers sometimes encountered unintended sites and pages popped up on a screen without any controls. Although these readers were online users relatively familiar to a

variety of technological challenges online, they were still puzzled with unexpected and unnecessary information.

> Katie: Um just wanna get back (clicking <--; [JAMA The Journal of the American Medical Association-advertisement-www.e-healthcaresolutions.com]) .. past advertisement of climbing a rock {the image embedded in the advertisement} .. (clicking <--; [JAMA-Prevalence and Trends in Obesity Among US Adults, 1999-2008]) .. alright and then take me back (clicking <--; [CDC Centers for Disease Control and Prevention-Overweight and Obesity-Data and Statistics: www.cdc.gov]; [CEC Centers for Disease Control and Prevention-Overweight and Obesity-Economic Consequences: www.cdc.gov]) oh no! .. okay

If participants determined disorientation regardless of their intents, they quickly returned to their Google search page by simply clicking the backward button. In this case, the Google page provided a shelter or safe zone in which readers was able to locate themselves and re-launch another information search.

Conscious monitoring was also required in hyperlink selections. When readers encountered multiple links from which participants needed to select one, they slowed their reading rate and spent time to determine which one might be the best.

> Maggie: ([MADD Mother's Against Drunk Driving: www.thepowerofparents.org]; the pointer moving on the menu bar; clicking on the MENU: UNDERAGE DRINKING; [MADD: Underage Drinking: www.thepowerofparents.org]; scrolling down and up; the pointer moving around the entire webpage) ... underage drinking .. um ... I don't really know what to click on here

There were causes for adjustment of reading rate and attention in hyperlink selection. The links presented on a screen did not offer enough information to judge the usefulness so that readers might have struggled with selecting a link. These links might not be useful, overall, so that needed to create another possible pathway (e.g., going back to the Google search page, sampling a couple hyperlink,

examining the links further to gain another information). Or, many of the links seemed promising so that readers struggled to select the best one. Whatever the reason, monitoring difficulty in hyperlink selection enabled readers redistribute their cognitive resources and helped decision-making whether to return back, go further, or take alternative approaches.

Many of the problems perceived by readers were related to their search terms use in a search engine. Searching for information, with the Internet search engine using particular search terms, called a quite large amount of forward inferences about the resultant information space.

> Sam: ([Google]) hm .. comparing blah blah blah um comparing .. energy bills (typing in *comparing energy bills* in the search box on the bottom) .. um ... I feel like compare is a really big key word but I'm not sure how to phrase this cos I keep on coming to dead ends!

The process of seeking information using Internet search engines required readers' conscious monitoring of related information-seeking processes, including generating search terms, retrieving site entries, examining and judging the entries, making and testing hypotheses about links and texts, revisiting the retrieved entries, and modifying or replacing search terms. This cycle of related acts of search engine use was an initial and critical part of realizing and constructing potential texts to read.

The problems encountered in the process of Internet search engine use demanded that readers paid attention to the monitoring of what they were doing and thinking during the information search.

> Hannah: (The second page of [Google+*physician -assisted suicide*]) .. 'today I'm grieving a physician suicide' {the title of the second ENTRY: Today I'm Grieving a Physician Suicide-Middleton 6(3)-www.annfammed.org} nope!

(scrolling down) .. and this {the entries presented in the second page of [Google+*physician -assisted suicide*]) is basically about doctors killing themselves .. I don't want that .. I said assisted! .. not just doctors committing suicide

Hannah typed in the search term "physician –assisted suicide." However,

The Boolean function of Google produced the entirely different results from what

she originally sought because the search engines recognized the typed search term

as "physician suicide (excluding "assisted")." She did not recognize the source of

the problem but she identified the problem that the Google search results were not

related to what she originally was seeking. Based on this monitoring, she conducted

complementary information search by generating an alternative search term.

Hannah: So I'm gonna go back to the search bar .. and I'm gonna type in euthanization cos that's another word for it .. (typing in *euthanization* in the Google search box)

Hannah: ([Google+*euthanazation*]; moving the pointer around the entries; moving the pointer back to the scroll bar) ... ahh this is just euthanization of animals! so I'm gonna make it more specific and make it of humans in the toolbar! (typing *of human* after *euthanization* that has been already typed in; +Search)

Hannah generated the term "euthanasia" as a synonym of physician-assisted

suicide. She thought that Google misconstrued the previous term "physician –

assisted suicide" (because of the combination of multiple terms), and replaced it

with a single word search term. However, once Hannah retrieved website entries,

using Google, she realized that the term euthanization connoted animal

euthanization too. Thus, Hannah planned to return to her previous search, and added

the word "human" to identify a more relevant information space. She performed a

series of monitoring processes in identifying the problem with her information

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search and finding a solution, in order to access and manage a relevant information space.

> Hannah: So I'm gonna put court cases involving euthanization (adding *involving enthanization* after *court cases* in the Google search box) ... it seems like euthanization is more of .. it's a better term for this than physician assisted suicide when you're using a search engine because it just came up physicians committing suicide and I don't really want to care about physicians committing suicide right now

Hannah's information search and monitoring indicated that a strategy use was not always successful. Monitoring was not always effective for readers to solve the problem if it was rooted in the lack of domain-specific knowledge, insufficient or incorrect system knowledge, or unskillful use of pertinent information-seeking processes). For example, if readers did not know about the logistics of information from Google search, they often struggled with the problem of information search due to the lack of such system knowledge until they realized the source of the problem.

Nevertheless, as shown in Hannah's acts, monitoring helped readers in detecting that there was a "problem" and that it should be solved in any ways of using available cognitive resources for them. Although the solution that Hannah generated and applied was not completely effective and successful (because she was not able to find out the exact source of the problem), she was able to amend the impairment of information search and redirect her reading based on the detection of the problem.

4.5.2. Monitoring the Construction of Meaning

Monitoring the construction of meaning while reading Internet texts overlapped a process of comprehension monitoring generally required in reading print texts. Participants, when they learned from Internet texts, monitored their thinking processes involved in meaning construction (see also, 4.4. Identifying and Learning Text Content). They reflected on their goals of reading, perceived comprehension difficulties, and applied fix-it strategies. This comprehension monitoring processes regularly featured in comprehending the information in and across Internet texts.

Monitoring the stimulation of cognitive processing and activating processes to accommodate characteristics of text

Comprehension monitoring helped participants' detection of comprehension problems. These problems were related to both word-level comprehension and text-level comprehension. Many instances of monitoring of word-level comprehension existed because participants often encountered the situations in which they should deal with unfamiliar text contents, vocabularies, acronyms, and terminologies.

> Andy: Let's see .. uh (pointing around the note on the table) and it says "There is no question that the up front cost of the death penalty are significantly higher than for equivalent LWOP cases' I don't exactly know what LWOP means!

> Cindy: Oh .. (pointing at the written text with the subheading 'Biomass') it also tells me . I was wondering what biomass was cos it told me how it was used but it didn't tell me actually what the fuel was (note-taking: *fuel-wood to landfill trash*)

Sometimes, participants skipped unknown words, without initiating an activity to understand the words' meaning, but, in many cases, participants

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performed fix-it strategies. For example, they planned to conduct a search for the meaning of an unknown word.

> Cindy: Um I actually don't know what the word 'interred' means .. so I actually plan to look that up once I'm done here

They also inferred word meaning, using contextual cues by examining the information before and after the word.

> Cindy: ([iLoveMountains.org-End Mountaintop Removal-Pike County Re-energized by Alternative Power Push: www.ilovemountains.org]; scrolling down slowly) ... 'Pike county' I don't--hold on let me find out where pike county is (scrolling up to the top) .. Kentucky!

Comprehension problems also existed at the level of text comprehension. Participants usually focused to identify and learn the main idea of a text after reading written paragraphs or texts.

> Andy: (Stopping around the subheading '8. Income Level') .. income level .. (the pointer still holding the scroll bar) ... don't quite understand what they're trying to argue here (pointing around the written text of the PRO).

Once the comprehension problem was detected, participants tended to slow down their reading rate and paid attention to understanding what they did not understand. They sometimes reread the sentence and paragraph.

> Andy: Um (pointing around the paragraph beginning with the 'We found that an average capital-eligible case') .. it's saying that um 'in which prosecutors unsuccessful' what? a capital eligible case it will cost one point (mumbling words) ... hm ... I'm trying to figure out their wording

Comprehension problems were in part for text characteristics, including language use, information organization, or the amount of information. Participants often reported experiencing difficulty in understanding the language used in texts, such as research reports and news articles. Participants perceived that most of these texts were written for the readers with established domain-specific knowledge. In

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other words, they thought that if they lacked of topic-related, domain-specific concepts and vocabularies, the reading of these texts would be challenging.

> Katie: (The Obesity Society; [The Obesity Society-About the Obesity Society: www.obesity.org]; scrolling and up and down; stopping at the subheading 'Strategic Initiatives') they have initiatives {a list of initiatives in the document} .. the layout of most of these that I research . is hard to follow .. this is more for people who may be more informed of how it goes .. so me not being informed or being a scientist makes it harder for me to understand it

In the above excerpt, Katie was monitoring her understanding and judgment about the information on a site. After browsing the site for a while, she inferred from the science-specific language used in the texts that the intended audience of the site might be a group of people interested in the problem of obesity as a scientific research topic. On the site, several links and texts were related to introducing the association to the professionals involved in the research communities, so she determined that it would be not easy to find understandable information from this site.

Participants applied a strategy to better understand text content, in response to structural characteristics of the text.

> Andy: Uh let's see (scrolling down) ... and then it talks about morality (the pointer moving around the written text with the subheading '1. Morality'; the pointer moving on the written text of the PRO in the '1. Morality') ... okay I'm gonna I just read the pro and I want to read the con, and then ... (the pointer staying on the written text of the CON in the '1, Morality') ... okay that's talking about morals and ... um ... (moving the pointer to the PRO) ... I'm comparing them

Andy was reading on a site that organized both arguments for and against the death penalty in multiple aspects of the topic. Andy quickly perceived that both sides of arguments were present in a parallel structure. Andy immediately chose the

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strategy for comparing and contrasting the arguments to better understand the both

arguments. As reading proceeded, she reflected on her positive experience of

reading this website with a well-organized information structure and found it

comprehensible and useful in the leaning of general information about the topic.

This reflection and evaluation allowed continued use of this site in Andy's reading

of multiple claims and evidence and how these arguments were mutually supportive

or conflicting to one another.

Shifting the focus of reading and allocating reading attention along to reading

progress toward goal achievement

Monitoring enabled readers to shift their reading focus. Participants

retrospectively revisited what they were doing and thinking thus far, what

information they found and learned, what particular aspects of the topic were over-

or under-represented in the located texts, and how beneficial their reading processes

were to their information gathering and constructing meaning. Based on this

reflection, readers were able to determine what kind of information was needed and

how reading could be handled.

Monitoring helped readers think back about the nature of texts that they

gathered and how the texts were related to the nature of the topic they were

investigating.

> Andy: ([Should the death penalty banned as a form of punishment?: www.balancedpolitics.org]; moving the pointer to the left column 'Yes' of the table) ... I: What are you thinking? ... Andy: Um .. I'm thinking that I'm reading a lot of OPINIONS right now but it's a very opinionated subject so it's in everything I find

In the above excerpt, the heading of the page "Should the death penalty banned as a form of punishment?" triggered Andy's concern with a potential bias implied in the texts read. She reflected and found that she read many opinionated texts, but then reasoned that the controversial topic would be surrounded by the texts representing opinions, arguments, and perspectives. As a result, she initiated a process of information seeking more gearing towards some kind of more specific and scientific evidence, including documented statistics and research findings.

Monitoring also helped participants narrow down their focus of reading and manage the range of information space. Katie did not clearly limit her research in terms of the problem of obesity in American or in the World. She initially focused on gathering general background information to better understand causes and consequences of obesity, and then moved her focus toward finding some social and environmental factors making the problem of obesity deteriorate. However, after she accessed and read on the site that described the problem as a pressing worldwide health issue (i.e., World Health Organization, WHO), she perceived to limit her research only in America.

> Katelyn: I think it's ([Google+*obesity*]) I'm gonna focus on that being an American myself .. knowing more about the subject and (scrolling down) also because I can use it down the road um if I find out a lot of information maybe I can do something to uh prevent it myself .. um for other people .. so probably I'm gonna make this more geared towards Americans

Although she recognized the problem of obesity prevalent in the world and one of the most urgent issues to address in terms of public health, she wanted to localize the problem in her country (even if it was still broad). She was aware of her limited prior knowledge and a potential use of what she would learn from this

reading for herself in the future. This monitoring of herself and potential use of the meaning to be constructed from texts seemed to help Katie reduce the range if information to be gathered and learned in the current reading task.

Perceiving the needs for controlling reading processes according to task-related factors

Participants were aware of task-related factors, including time constraints and task demands. They adjusted what they were able to do and what they had to do, by taking these factors into considerations in the process of information gathering and text learning.

> Andy: (Scrolling down) I'm not going I'm not fully reading everything just don't really have time I don't need to

> Katie: Um beyond how I'd probably use this if I was running a time like my project was due the next morning (clicking the Google search icon in the browser tool bar) um . if I had plenty of time I'd probably to a little bit more research in finding more credible resources

In the above excerpts, Andy and Katie managed their attention to the task completion. They controlled the depth of reading they could go into and the amount of reading they could perform.

In addition, participants sometimes reported that thinking out loud while performing reading was a quite challenging task. Cindy, in the following excerpt, reflected on her think-aloud in the first session and planned to focus more on "reading" than "talking" in the second session.

> Cindy: Okay I'm gonna start from left to right on these tabbed sites (opening the first TAB: Sustainable Energy Coalition) um .. first I'm just gonna um .. not talk much and read a little bit more in depth um .. about the sustainable energy coalition

This excerpt implied Cindy's cognitive overload due to think-aloud task in the first session. Based on her cognitive experiences while verbalizing her thinking in the first session, she planned to invest her cognitive efforts in the reading of text content, rather than verbalizing thinking. She might believe that reading texts should require more cognitive attention and focus, compared with locating and selecting useful texts, and thus she wanted proactive to possible cognitive disruptions due to extensive verbalizations.

4.5.3. Monitoring the Self

Monitoring provided for self-assessment during reading. Participants often reflected on themselves as readers, as they interacted with the text(s) they located and learned. Monitoring involved self-appraisal of reader characteristics, including their current understanding on a trajectory of meaning construction, cognitive strengths and weaknesses, and affective and epistemic responses toward texts.

Participants self-evaluated their current status of reading, in relation to the reading progress toward goals of reading. They reflected on the extent to which they learned and understood from searching and reading. Moreover, they then planned to shift their reading focus, from realizing and constructing potential texts to read to identifying and learning text content and vice versa. Cindy, in the following excerpt, looked back to her reading, and determined she were ready to start an in-depth reading of the selected texts.

> Cindy: (Typing in *sustainable energy* in the Google search box on the web browser tool bar) I think I have a good amount of resources already .. I would use all those resources {the websites she recorded on her notepad}

Participants also perceived the important themes or questions evolving in the mind. This self-reflection helped them determine that they should focus on particular aspects of reading. Cindy shifted her reading focus because she felt the need for different information. This changing focus of reading was guided by her monitoring of the construction of the evolving meaning.

> Cindy: (Staying on the written text with the three subheadings 'Economically:', 'Environmentally:', and 'Socially:') ... um right now in my head I've already kind of got a statement or a thesis in mind .. that's um .. that to prove that alternative energy is important so .. um right now .. um when I'm reading information I'm thinking what's gonna convince other people .. that .. um uh .. alternative energy is also important

Some of the participants reflected on themselves as interpreters. These readers had an awareness of a possible bias in the interpretation of text content. This healthy skepticism indicated readers' consciousness of themselves, and the alternative approaches offered an opportunity to construct legitimate explanations, even if the reflection did not directly change their reading focus.

> Katelyn: I guess I lean more towards government and organizations site .. giving more information . it's probably a bias that I have

In the above excerpts, Katie persistently sought more credible and reliable texts. Thus, she selected and accessed the websites that were related to government organizations and institutions. She was aware that her belief on "credibility" might be biased. This self-reflection indicated at least that she recognized another possible approaches to gathering useful texts, different than what she was taking now, while she did not initiate any complementary searches or hyperlink selections serving for locating and accessing non-governmental or private sites.

In another example, Andy interpreted text content from the author perspective, and then reflected on how much she could agree with the author perspective as a complementary process.

> Andy: Um ... they're saying that 'There's no question that the up front costs of the death penalty are significantly higher' . um .. for those are simply UP FRONT COST . you have to think about how much is going to cost KEEP those people in prison . to feed them . to take care of them when they're sick . to wash the clothes even and just for all that up keep and for all the space . because if they just keep them in prison for the rest of the like a life sentence for killing someone .. and ... that's unfortunately a lot of people kill people so that's a lot of spaces in jail where the death or if they just got the death penalty .. they'd free up a lot of space for people who have lesser offenses .. um … I don't know if my bias is coming on this at all hhm!

In this excerpt, Andy interpreted the argument that the death penalty was more costly than the life imprisonment. She attempted to understand this argument by taking the author's perspective, rather than from her own perspective. This perspective-taking strategy helped her building an accurate understanding of what the author was saying and what claims the author was making. At the conclusion of this excerpt, Andy reflected on herself by replacing the reading perspective with her own one. In a brief moment, she looked back on the extent to which she could agree with the author argument. Although she did not verbalize further about this reflection, this short verbalization indicated that she was consistently monitoring what stance she posed to understand the author argument and how that was agreeable or disagreeable to the author's stance.

As implied in the above excerpts from both Katie and Andy, participants often reflected on their own beliefs and stance toward reading, text, and knowledge. The following excerpts portrayed a series of self-reflections of Rachel on her reading, which reflected her epistemic beliefs in relation to reading.

Rachel: ([Google+*environmental solutions*) okay 'environmental solutions can help re-' (reading the written text with <u>ENTRY: Environmental Solutions: www.environment-solutions.com</u>) I--I need like a science (the pointer moving around the listed entries) .. like a CONCRETE source you know? what I mean? like maybe ... I don't know . a science organization I don't know

While accessing diverse texts, she perceived her information needs. She gathered was general information, but in contrast, she desired information related to "science." To her, this science-informed or -related information was necessarily "concrete." She valued information of this kind, related to science-based knowledge and science research.

Rachel: (Dropping down the pointer along to the submenu of <u>MENU: Thinking Green</u>) ... I: What are you thinking now? ... Rebecca: I am thinking .. of .. I'm trying to think of sources I could go to that cos I mean I KNOW what I wanna say kind of cos I--cos I do have background information but it's all stuff I've learned cos my mom is the environmental teacher so she like .. you know POUNDS it into my brain haha so .. it's not like I have like real sources and I need .. like I need real sources .. to be able to put on your list of sources--credible sources

In this excerpt, Rachel emphasized her beliefs about "real" sources. She regarded that these real sources should contain detailed scientific facts, and that these sources were equal to "credible" sources. Thus, what she meant by useful texts was the texts containing the information based on science. In other words, scientific information gave the texts a level of credibility because she believed that scientifically detailed factual information was credible and believable.

Rachel: (Mumbling words while pointing the written texts) ... okay 'damage to natural systems' {subheading} .. this {the current webpage [Union of Concerned Scientists-Hidden Costs of Industrial Agriculture: www.ucsusa.org]} is pretty good! I like this . what is this website? Union of Concerned Scientists! seems like a credible website! I guess ... because it's I mean it might not be but it just . 'citizens and scientists for environmental solutions' (pointing the subtitle of the website 'Citizens and Scientists for

Environmental Solutions') .. anything with science . I'm a science person so .. I trust trust the scientist .. I'm not much of a politician or anything like that

Rachel's beliefs about "true" and "credible" texts were related to her own epistemological stance toward knowledge and knowing. Her reflection in the above excerpts demonstrated that she valued and pursued science-based or proven information (but not opinionated information) as a central indicator to determine the trustworthiness of particular texts. This belief consistently influenced her information search, link selection, and text evaluation.

In summary, monitoring strategies assisted readers in directing their reading for both information search and learning from texts. Perceptions of disparity and inconsistency between sought information and encountered information fueled readers' complementary search and taking alternative approaches to accessing a goal-relevant information space. Monitoring involved readers' self-assessment of their own reading performances. Self-assessment indicated that readers were conscious about themselves as readers and their cognitive and epistemological stances toward reading, while it did not much contributed to changes in their perspectives and beliefs. Overall, monitoring was constantly used in the course of Internet reading. It played a central role in regulating complex reading processes entailed in both realizing and constructing potential texts to read and identifying and learning text content.

4.6. Strategies for Evaluation

Evaluation strategy was a critical tool that readers used to gather and learn useful texts. Participants in this study made great efforts to identify and learn from

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useful texts throughout the process of Internet reading. These readers brought

criteria of relevance whenever they encountered links and texts. They were engaged

in guessing and examining the quality of information. Evaluative reading strategies

occurred both before selecting particular links and after accessing and reading the

connected texts. These strategies were used in the process of realizing and

constructing potential texts to read, and also in identifying and learning text content.

4.6.1. Examining the Usefulness of Hyperlinks

As described in the previous sections, participants invested vast amount of

efforts to read and examine minimal information attached to hyperlinks (see also

4.3.2. Selecting Hyperlinks and Navigating Toward Useful Texts, 4.4.1. Making

Meaning from Hyperlinks, and 4.5.1. Monitoring the Construction of Reading

Paths). These readers evaluated the goodness of fit of multiple site entries resulting

from a website search engine use or multiple links organized on a website by

characterizing common features among the retrieved site entries, in relation to the

initial and evolving goals of reading. This link examination was a prerequisite

activity to make an informed decision in hyperlink selection.

Participants judged relevance of hyperlinks by activating their prior

knowledge and generating forward inferences about the information connected

through the links.

> Katie: (Pointing around the text box with the heading 'Other Healthy Life
> Style Topics') and at the bottom it has 'other healthy lifestyle topics' .. which
> include 'nutrition' (pointing at LINK: Nutrition) .. 'physical activity'
> (pointing at LINK: Physical Activity) .. 'division of nutrition physical
> activity and obesity' (pointing at LINK: Division of Nutrition Physical
> Activity and Obesity) .. um these things here can also helpful with how

people can prevent cos nutrition of course physical activity are very important in helping to prevent it

These readers used diverse indicators available on hyperlinks to anticipate significance of hyperlinks, including link tittles, captions of image links, and brief written descriptions and previews.

> Rachel: (Scrolling down to the 'References') references ... 'usda' (pointing at LINK: usda.gov) . that would be good . why didn't I think of that? because it's the United State Department of AGRICULTURE and that's a GREAT place to look for .. I mean that just seems pretty concrete right? hopefully since it's (the pointer moving on the list of references; clicking on the reference 1 LINK: usda.gov)

In the above excerpt, Rachel judged the link "usda.gov" as a promising source because she recognized that, using the web address and her prior knowledge, the site was created by a well-known governmental institution administering research studies. Using the URLs to make an initial judgment of hyperlink usefulness was a popular strategy among these participants, as illustrated in the following excerpts.

> Sam: Um .. (moving the pointer on the second and third entries) .. here's a dot org (clicking on the third ENTRY: How much do wind turbines cost?-Windustry: www.windustry.org) so that's probably gonna be pretty reliable

> Hannah: ([American Foundation for Suicide Prevention-Struggling in Silence-Physician Depression and Suicide: www.afsp.org]) and plus it's a dot org! American Foundation for Suicide Prevention .. so I guess that's like a third party group or a special interest group that might be funded by the government so it should be credible! (scrolling down) and plus it's org . which is better than dot com . because dot com is more commercial and anything can be put on a dot com

> Katie: (Scrolling down) um .. here's a government website (pointing at ENTRY: Obesity and Overweight-Topics DNPAO CDC: www.cdc.gov) . which can be very very useful so I'm probably gonna check that one out first (clicking on the same entry) .. it's called obesity and overweight topics

Participants sometimes judged hyperlink usefulness, based on their information needs and their awareness of particular publishing types available on the Internet, as Cindy did in the following excerpt.

> Cindy: ([Google+*alternative energy*; pointing at the second <u>ENTRY: Alternative Energy News: www.alternative-energy.info</u>) .. um the next one down is alternative energy news . but I don't think I want NEWS . I want more research!

These readers anticipated that types of information would vary according to types of texts. For example, they believed that news articles would contain current discourses surrounding particular issues and events, presenting (or sometimes persuading) the author's opinions. These readers viewed that blog posts could invite them to the chance to observe multiple peoples' different (or similar) opinions and thoughts on a certain topic and issue. In contrast, they believed that research reports should contain more factual, scientific, and reliable information with clear claims and supporting details. Thus, based on the information needs, these readers sometimes sought news articles or blog posts, to broadly overview diverse perspectives and opinions on the topic. Or, they pursued research reports written by experts, to gather more specific evidence with a level of reliability.

Evaluation of hyperlinks played a predictive role in Internet reading. As readers sought to find more useful texts, they anticipated how useful information could be connected through a particular link. A high-incidence of forward inferences occurred in this prediction of link usefulness. Readers considered goal-relevance as a primary standard to determine the usefulness of hyperlinks. Also, they used criteria of significance, credibility, and reliability, to make an informed choice.

4.6.2. Judging the Information Value of Internet text

Strategies for evaluating individual Internet texts were similar to that for evaluating single print texts. Participants used various indicators available in the text to determine the value of the content of text. They examined both internal features (e.g., content validity, logical relationships among different parts of the text, plausibility of information, use of language and rhetorical devises) and external characteristics (e.g., author reputation, source credibility and trustworthiness).

Evaluating relevance, information value, and comprehensibility of Internet text by bringing analytical mindsets into the examination

Participants evaluated the relevance, importance, and validity of webpage content by bringing analytical mindsets. These readers assigned the importance of the content of the current text, based on their reflections on the evolving meaning, questions, and focus and the comparison of the current information with the information gained before.

> Sam: (Scrolling down; staying at the post 'A Utility Will Help Homeowners Go Solar') um ... this says something about 'utility will help homeowners go solar' .. 'a Texas utility with two million customers is asking it possible for homeowners in the Dallas area to lease or buy rooftop solar panels' .. THAT's actually REALLY helpful because like I said I think the cost is like a BIG DEAL and that's REALLY really helpful! so I'd definitely say this is one of my helpful websites

Sam considered the text content related to financial support of customers using alternative energy products to be important to her research. She kept thinking about the fact that alternative energy products was an environmental issue but the high costs of purchasing and equipping them discouraged people willing to replace

their conventional fossil energy with more green energy solutions. Sam determined that the current information well matched her thoughts about the alternative energy issue from an economic perspective. Thus, she evaluated the site as a useful source. The criterion of relevance was used in this determination of text's usefulness.

The standard of relevance was central to determine whether particular texts were useful. Whenever and whatever participants read, they first inferred how relevant information the text could offer. When the text's content was not relevant, readers rejected the text and then moved to another texts or perform a complementary information search to find more relevant texts.

> Sam: ([Relief From High Average Electric Bill-Alternative Energy Diy: www.averageelectricbillrelief.com]; scrolling down) um ... they're talking about tax credits again ... yea that's not helpful so I'm going back (<--) ... I: Why? ... Sam: Uh it's just talk like a bunch of these things (a sereis of links to advertise solar energy products) like it's hard to find straight up info with some of these websites {links} cos all they wanna do is like just advertise their product (clicks <--) and that's really frustrating! because I wanna know the comparison . I don't want to just know about how much uh alternative energy costs . like that way I can kinda like maybe when I'm older and I make my own house I can sort of make it like an EDUCATED decision about . you know my alternative energy

In the above excerpt, Sam summarized the content of a webpage and determined that it was not much relevant to her research. Noting the commercial intent of the webpage, she determined that this text was not useful for her to understand the difference in the costs between using conventional energy and alternative energy.

In contrast, in the following excerpt, Andy found the text content useful because it helped her understanding of the death penalty issue. This webpage

offered the evidence that could be used to understand both pros and cons of the death penalty from an economic perspective.

> Andy: ([DPIC Death Penalty Information Center-Financial Facts: www.deathpenaltyinfo.org]; the pointer moving on the written text with the subheading 'Federal Costs') .. 'Defendants with less than' ... (the pointer still staying on the same part of the text) ... (scrolling down to the written text with the subheading 'New Jersey') ... and also this site like it's showing . it's saying a like 'Death Penalty has Cost New Jersey Taxpayers $253 million' (pointing at the bold sentence under the subheading 'New Jersey') .. and there are other things like this study showed that the death penalty was more expensive .. and then here it says uh 'Study Finds Death Penalty Costly, Ineffective' (pointing at the bold sentence under the subheading 'Tennessee') .. so .. I feel like they're {the current webpage is} not to focusing on one thing only including pro or con but they're also including both pros and cons . which is good!

The primary criterion that Andy imposed in text evaluation was relevance. Andy read different parts of the webpage and judged the relevant. She then evaluated the information value of the page by noting a balance between both sides of arguments. combined these two results into her judgment of usefulness of the page. Once Andy came to a determination of text usefulness, she decided to continue to use this page for her learning. Thus, the understanding of the text content informed judgments of relevance and information value of the content, and this positive result from text evaluation provided readers with a basis for further use of the text.

Participants' evaluation of text usefulness was in part influenced by the organization of text information. When they needed to understand background information, they preferred the text like a textbook passage. They believed that this kind of text contained well-organized information, which made the text easy to comprehend.

Cindy: ([DMA Alternative Energy Engineering-What is Alternative Energy?: www.alternative-energy-engineering.com; scrolling down to the bottom of the page; scrolling up) … the question I typed in 'why is alternative energy important?' .. it's right there {the heading 'Why is Alternative Energy important?'} .. and it gives me three answers right in a row (the subheadings 'Economically', 'Environmentally', 'Socially'} . it tells me why the economically environmentally and socially . which is really nice! because it's easy to read cos I can--in my mind can read um separate things

For example, in the above excerpt, Cindy valued the text that itemized the

information under the three subheadings that denoted three aspects of the

importance of alternative energy. She found this type of information organization

comfortable, and believed that it could help her categorize emerging themes in her

mind and guide subsequent information gathering and learning.

Evaluating credibility of Internet text from a critical stance

In addition to evaluating relevance, information value, and

comprehensibility, participants also brought a critical stance toward text to judge

legitimacy and credibility of webpage content. Participants sought to confirm

references that particular information in the text originated from because they

believed that the persuasive power of the text should be established by credibility

and trustworthiness, as well as relevance and informativenss.

Andy: (The pointer staying on the written text of the PRO in the '3. Deterrence'; moving the pointer to the written text of the CON) ... um one thing um whenever like statements are made about this like '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 thought that the sentence she questioned should be verified and

supported by legitimate evidence. Andy's stance toward text was not of a passive

receptacle of information but of a critical reader examining the credibility and plausibility of information.

> Andy: ([Death Penalty Paper-Death Penalty and Sentencing Information: www.prodeathpenalty.com]; pointing around the author information of the article) and this article is by 'Dudley Sharp' . who's the 'death penalty resource director' (pointing at the author information 'By Dudley Sharp, Death Penalty Resources Director') .. so we already know that it's going to be biased towards the death penalty

In this reading of webpage content, Andy sought to identify who created the text. She perceived that text was a craft by a particular person wanting to present a certain perspective and opinions. Thus, the text should be biased toward the author's perspectives, and the reader should be aware of this potential bias. Andy predicted that the text should be biased toward more conservative perspectives, based on her perception of the institution in which the author was affiliated.

In summary, evaluation of individual Internet texts played two important roles. On the one hand, this type of evaluation helped readers test and verify the hypothesis about the text usefulness they made before selecting the corresponding link. By examining the value of text content, these readers were able to self-assess their anticipatory judgment of text usefulness and decide whether to read or reject the page. Examining the information value of individual texts (accessed by selecting the links) was a confirmatory evaluation.

On the other hand, the evaluation of individual texts helped readers plan and determine subsequent reading processes. For example, evaluating credibility of texts feature regularly when participants had to determine the quality of multiple websites to select a useful one. The evaluation of website quality was informed from the evaluation of individual texts posted on the site. Thus, when readers

judged a series of texts on the website were relevant, credible, and thus useful, they initiated to examine the quality of websites by reading more texts on the site.

4.6.3. Assessing the Quality of Websites

Internet reading involved participants' evaluative reading to select useful websites. In this study, the task assigned to participants in the first session was to identify and choose websites deemed useful to their learning about their topic. Thus, participants coordinated an array of strategies to search for, locate, read, and learn multiple links and texts, and their strategy use contributed to their determination of website usefulness. This means that their process of assessing the quality of websites involved a lot of supportive strategies involved in hyperlink selection, learning of important information, and judging the value of information on the site.

Overall, two types of websites were assessed by the readers participating in this study. Primarily, these readers assessed the websites they located for their learning. These topic-related websites (based on the readers' judgments) included both of the sites that they directly located using prior knowledge or that they retrieved and selected using any information searching tools (e.g., Internet search engines). In addition to these sites, the readers in this study assessed the websites that were created for online users to get information on a variety of topics in multiple domains. These websites included general Internet search engines (e.g., Google), online encyclopedia (e.g., Wikipedia), and other social networking sites (e.g., Twitter). These sites were not exactly topic-related but provided the readers

with the chance to overview possible topic-related information spaces available on the Internet.

Judging usefulness of the means to search for, locate, access, and overview possible target information

The adolescent readers participating in this study used and evaluated the websites to complement their information searches with primary Internet search engines. Four types of sites used as complementary information-searching "tools" were involved. First, participants used other Internet search engines to retrieve numerous website entries to meet the input search terms that might not be identified with their primary search engine (e.g., bing.com). Second, participants used the sites that provided direct answers (posted by other online users) to the applied queries (e.g., Ask.com). Third, these readers also accessed and used websites that had been opened to and created by general online users, which provided organized information from multiple sources out of the sites (e.g., Wikipedia). Last, while rarely used, social networking websites were also used by the readers who sought to overview perspectives and thoughts from different people (e.g., Twitter). Participants assessed these sites before accessing them and also after using them. They possessed prior knowledge and experiences related to these websites. They knew that these sites had certain characteristics that determined types and characteristics of the information posted on or retrieved with the sites.

For example, many participants used the open source Wikipedia to gain some information or survey references that might give them access to useful information. They used their prior knowledge before accessing the site.

Hannah: ([Google+*euthanization of human*]) uh ... euthana-sia yeah! (pointing at <u>ENTRY: Euthanasia-Wikipedia the free encyclopedia: en.wikipedia.org</u>) it's Wikipedia (clicking on the same entry) and I've been told that Wikipedia isn't like a good source because anybody can write on it .. but at the bottom of it they have .. they tell you where they get their sources from . so it might actually be a credible website

Katie: (Opening a new tab; clicking the Google search icon in the web browser tool bar; [Google+*obesity*]) now I'm probably going to check out to Wikipedia (clicking on <u>ENTRY: Obesity-Wikipedia-the free encyclopedia: en.wikipedia.org</u>) even though .. sometimes people say it's not a good source but you gotta check their sources cos they're supposed to cite them {references} at the bottom of the page

As Hannah and Katie mentioned, the adolescent readers participating in this

study reported that the information from Wikipedia might not be credible or reliable

but it could provide useful information if the site cited references. Participants were

aware of both the benefits and challenges in using this site. They had a concern with

wikis, because multiple online users crafted these websites so that the reliability and

credibility of the information organized on the site was not guaranteed. However,

they also believed that they might be able to get some good information through

these sites as long as they were able to confirm who created the information and

where it came from.

Based on this awareness and prediction, participants examined the

usefulness of the content of the website once they accessed it.

Katie: ([Wikipedia-Obesity: en.wikipedia.org]); scrolling down to the bottom of the page) the first thing I do .. (scrolling down to the bottom) is scroll down to the bottom .. and check out their sources…

Katie believed that Wikipedia could be useful because it offered information

on the primary sources used to create. Thus, she even did not read the written

information organized on the site but quickly moved her attention to a list of

references to see if there were many useful primary sources.

> Katie: ([Wikipedia-Obesity: en.wikipedia.org]; stopping around the 'References') oh wow! .. there's a lot of resources here . which could be good .. shows that they might have done a lot of research

> Katie: ([Wikipedia-Obesity: en.wikipedia.org]; pointing at <u>LINK: Prevalence of overweight in US children in the reference no. 14</u>) um a lot of it seems pretty relevant .. 'treatment of the obese patient' (pointing at <u>LINK: Treatment of the Obese Patient in the reference no. 4</u>) .. 'obesity in anesthesia and intensive care' (pointing at <u>LINK: Obesity in anesthesia and intensive care in the reference no. 5</u>) interesting! .. um obesity in art (pointing at <u>LINK: Obesity in art: A brief overview in reference no. 9</u>) wow! .. maybe that's related

> Katie then spent time examining the references by a criterion of relevance.

Based on her reading of minimal information, she found that the references could

be relevant to her research.

> Katie: ([Wikipedia-Obesity: en.wikipedia.org]; scrolling down quickly) a lot of it looks .. very confusing! that's the only problem with Wikipedia it would take you forever to research all of this and make sure all of it is pretty reliable

> Katie: ([Wikipedia-Obesity: en.wikipedia.org]; stopping at the top of the page) okay .. overall content seemed to be .. pretty good! um .. I don't know if I feel comfortable with using this {the current Wikipedia page} as a reliable resource .. um it does give a lot of information it looks like um I may reference to it if I was doing a research project on it

> Katie also perceived possible challenges in using these references. She

thought that follow-up actions should be required to test her hypothesis about the

text relevance and ensure the reliability of the sources and that performing the

follow-up actions to assess large numbers of relevant sources should bring her

workloads. This process of examining the website informed her decision-making

about whether to continue to use this wiki site or leave the site and take an

alternative approach to information seeking.

Judging relevance, importance, and potential usefulness of topic-related websites

       The criteria used in the evaluation of the quality of websites were, in

general, similar to those for assessing the quality of Internet texts. That is, the

primary standard of usefulness was relevance. Relevance of the website was judged

while participants read and examined available texts on the site.

> Katie: (Opening TAB: Obesity-MedlinePlus) so looking back (opening
> TAB: The Obesity Society; opening TAB: CDC Obesity and Overweight;
> [CDC Centers for Disease Control and Prevention-Overweight and Obesity:
> www.cdc.gov]) .. um 'centers for disease control and prevention' .. this will
> kinda give me a basis to start out with about .. what it is (pointing at LINK:
> Defining Overweight and Obesity) .. 'causes and consequence's (pointing at
> LINK: Causes and Consequences) .. um 'data and statistic's (pointing at
> LINK: Data and Statistics) .. so those right here (the box in which links are
> listed up) will give me a base of what to start out with

       The initial judgment of the website relevance was complemented by follow-

up reading of information on the site. That is, results of evaluation of individual

texts were taken together, and this informed the determination of the website's

relevance.

> Katie: ([MedlinePlus-Trusted Health Information for You-Obesity:
> www.nlm.nih.gov]) um .. I like this website! (scrolling up) ... it looks at it
> {obesity} from a different point of view . um for the obese people .. um .. if
> it {the website} will help me in finding out more about it {obesity} ..
> probably .. (scrolling down) um .. I guess ..

       In this example, Katie overviewed several headings of the articles posted on

the site, and also sampled a few articles to see if those were relevant to her research.

She found that the overall content of the site was relevant and the site might give

her potential opportunities to access various information she might need at some

point of her research. In this evaluation, Katie judged the relevance of the site and also counted potential use of the site for her research.

In addition, participants determined the usefulness of each website by asking whether the organization or structure of information on the site was easy to follow. Although the overall content of the site was relevant, participants preferred the sites that met with this standard of comprehensibility.

> Katie: ([MedilinePlus-Obesity: www.nlm.nih.gov]; pointing at the box heading 'Research') they have their own research .. um 'clinical trial's (pointing at <u>LINK: Clinical Trials</u>) . 'genetics' (pointing at <u>LINK: Genetics</u>) . 'research' (pointing at <u>LINK: Research</u>) . 'journal articles' (pointing at <u>LINK: Journal Articles</u>) .. uh 'reference shelf' (pointing at the box heading 'Reference Shelf') which includes 'dictionaries' {<u>LINK: Dictionaries/Golssaries</u>} . uh 'directories' {<u>LINK: Directories</u>} . 'organizations' {<u>LINK: Organizations</u>} . 'statistics' {<u>LINK: Statistics</u>} and .. it also has a section called for you (pointing at the box heading 'For You') and it has 'children' {<u>LINK: Children</u>} . 'men' {<u>LINK: Men</u>} . and 'women' {<u>LINK: Women</u>} .. which classifies it pretty well so where if you were looking at this site you'd be able to find out information better

In the above excerpt, while overviewing the subheadings (hyperlinks) of the text on the text, Katie found that the site offered or connected a large amount of relevant information through a well-organized information structure. She judged that this information organization would help her quickly and easily locate certain information on this site.

In another example, Andy also valued the comprehensibility of a website.

> Andy: ([Should the death penalty banned as a form of punishment?: www.balancedpolitics.org]; moving the pointer to the left column 'Yes' of the table) .. um those things . and ... this is kind of a . this site gives you things like a brief overview (pointing at the title of the table 'In a Nutshell') and they give you the background of the death penalty . which is good!

In the above excerpt, Andy judged the site as useful because she found that the site organized general background information with a summary and she was able to easily locate important information, overview main ideas, and comprehend details.

> Andy: ([ProCon.org- Death Penalty-Top 10 Pros and Cons-Should the death penalty be allowed?: deathpenalty.procon.org]; scrolling down; stopping around the subheading '2. Constitutionality') um ... (the pointer weaving between the PRO and CON in the '2. Constitutionality') .. this article {the webpage} how they uh combine the pros and cons they're taking um .. sections out of other studies and just putting them here for you to look at SO I . I--I like the way they do that!

Andy evaluated another site that organized arguments for and against the death penalty practice in a consistent and explicit manner. She found the website useful because she was able to get important information from this site and to enhance her background knowledge related to the topic, using the parallel structure of pros and cons of the death penalty.

Judging credibility, reliability, and trustworthiness of topic-related websites.

Readers also assessed features of a website beyond its content. These readers took the source information of the website, including who created, managed, or sponsored the sites, as an important consideration in judging the website quality. When participants accessed a certain site, they initially attempted to locate indicators of website credibility and reliability. The indicators were simply the title and subtitle of a website.

> Katie: ([CDC Home-Centers for Disease Control and Prevention- Overweight and obesity: www.cdc.gov]) um .. the name of the website is 'Centers for Disease Control and Prevention' {the title of the website} .. uh 'Your Online Source for Credible Health Information' {the subtitle of the website} . which seems like a very uh reliable website so far

In addition to titles and headings, the indicators sometimes included more direct information about the site: copyright information, contact information (e.g., phone number, email, address), logos, emblems, and so on.

> Cindy: ([AE Alternative Energy-Green Jobs: www.alternative-energy-news.info]; stopping at the bottom of the page which presents 'Recommended energy products' with images and price information) .. um? ... I don't really know how credible site is (scrolling up quickly) . I think is it has good articles but I don't know if they're all completely {credible} because there's no (scrolling down quickly) .. they don't have an address or anything they don't really have

However, participants made a judgment of the website's credibility while reading and examining the links and texts available on the site. Using superficial indicators was sometimes insufficient to determine the website credibility. Thus, they complemented their initial judgment by inferring the website's credibility from the "contents" of the site. For example, in the following excerpt Cindy examined multiple links displayed on the site and identified that these links were connecting government institutions or public academic institutions.

> Cindy: ([Planet Green-How to Green Alternative Energy: planetgreen.discovery.com]; scrolling down) ... oh and here! {the heading 'Interesting Facts about Alternative Energy' with the seven bullets} so right here is 'interesting facts about alternative energy' .. um they give these sources (pointing around 'Sources: US Department of Energy, American Wind Energy Association, Energy Information Administration') and everything of where they got this and they are all credible 'US Department of Energy' {LINK: US Department of Energy} . 'American Wind Energy Association' {LINK: American Wind Energy Association} .. um so this is a site I'm definitely would use

Maggie also checked to see if written texts explicitly describing the author were available on the website by locating and selecting menus (e.g., About us, About this site).

Maggie: (The pointer staying on the paragraph) hm .. okay um (scrolling up to the top of the page; the pointer moving on the menu bar while opening different menus) .. I think this website .. I'm gonna see .. (clicking on menu: Who We Are) kind of what their PHILOSOPHY is cos the website could be kind of biased like if they're all about lowering the drinking age

In this excerpt, after reading several texts on the website, Maggie perceived that the site provided only the texts that presented arguments for lowering the drinking age and that it might be biased toward one side of the issue. Thus, Maggie located and selected the menu "Who We Are" to investigate the author(s) that created and provided the texts. Maggie sought to gain an understanding of what purpose they were trying to achieve through this site.

In summary, evaluation strategies were prominent in selecting useful information on the Internet. Participants used these strategies in their navigation toward useful information by choosing the links promising to give them opportunities to read and learn useful texts. These readers read links and texts from a critical stance, and examined the content of texts and websites using analytical thinking. Evaluation was informed by results from use of the other types of strategies, because it was based on an understanding of information conveyed through links and texts, reflections on the readers' evolving understanding, and the readers' reading goals. Evaluation helped readers as they were realizing and constructing potential texts to read and contributed to their identifying and learning important information from the texts. Thus, evaluation was involved throughout the course of Internet reading that constantly asked readers to make an informed decision to select more useful links and texts.

4.7. Summary

The adolescent readers participating in this study performed the critical Internet reading task, selecting useful websites in an open-ended information space and learning from the texts. These readers selected many useful and reliable websites, which helped them learn about the topic they selected and construct meaning from the texts. They developed critical questions, based on their Internet reading, which touched important aspects of the issue they investigated. Their Internet reading performance, overall, was judged as successful reading.

I described an array of constructively responsive reading strategies used by these seven proficient adolescent readers participating in this study. The four general types of strategies suggested form the model of Constructively Responsive Reading were further detailed with relevant examples. While not all of the strategies used by these readers were used effectively and successfully, many strategies helped their website selection and meaning construction on the Internet. The identification and description of an array of strategies for Internet reading also contributed to an understanding of constructive strategy use for adolescent readers in the new literacy contexts.

The model of Constructively Responsive Reading and the descriptions grounded in the data in this study informed us of the psychological reality of strategies for Internet reading, compared with those used for print reading. While one group of strategies was noble (e.g., realizing and constructing potential texts to read), others were iterative and situated in Internet contexts (e.g., strategies for monitoring, evaluation, and identifying and learning text content). All of these four

types of strategies, when performed well, were used in a goal-directed manner, and

jointly contributed to successful location of useful texts and productive learning

from the texts.

Chapter 5: Patterns of Constructively Responsive Reading Strategy Use in Internet Contexts

Different constructive strategies work together toward determining the paths of reading and constructing meaning. Combinations and sequences of strategies vary according to reading situations. This chapter is about my second research question: *What insights about patterns of constructively responsive reading strategy use can be derived from seven participants' Internet reading?* I report in this chapter the results from both descriptive and statistical analyses of patterns of strategy use, including dynamic interplay between strategies, strategy-task relationships, and individual differences in strategy use.

5.1. Dynamic Strategy Interplay in Internet Reading

One small and quick action performed by a reader often entailed more than a single strategy. For example, selecting hyperlinks required readers to engage in a process of decision-making informed from the reading of links, reflection on their reading focus, and their evaluation of the usefulness of the links. In other words, hyperlink selection was successful when readers properly used the strategies to make forward or multi-layered inferences about the information connected through the link, to critically judge the quality of the information, and to constantly self-assess what they want, what they need, and what they seek.

Many instances of strategy combination were present in the analysis of individual participants' Internet Reading Strategy Matrices. The four types of strategies identified in the current study were used in a different combination at

each moment of Internet reading. While each of the types of strategies mutually contributed to the effectiveness of strategies use, my analysis indicated that there were two important contributions of the interplay among the four types of strategies: (a) toward accessing and selecting useful texts and (b) toward constructing meaning from the texts.

5.1.1. Strategy Interplay Operating on Path Construction

The four types of strategies contributed jointly to the goal of accessing and selecting useful links and texts. The course of Internet reading involved an information search, link selection, selective reading, and the examination of different aspects of links and texts. While performing these activities to access and select more useful web sources, readers self-regulated their strategy use toward determining the reading order and constructing reading paths to useful information on the Internet.

Among many episodes of strategy interplay, the very beginning of Sam's Internet reading process, approximately for two minutes, demonstrated how the four general types of strategies interacted with one another in the course of open-ended website searching (Table 17). In this episode, Sam was interested in learning about the cost-effectiveness of alternative energy, such as solar panels and windmills, instead of traditional fossil fuels. With this in mind, she accessed Google and typed in a search term that reflected her tentative goal of information search: "The price of solar panels and windmills." She gained numerous entries and selected one among them on the first page, based on her reading of minimal information on the entry. The selected link led her to a commercial website.

Table 17. An episode of strategy use in the beginning of Sam's Internet reading in Session I. Open Website Searching

Time	Verbal reports and reader-computer interactions	Strategy sequence and combination
01:31	Sam: ([Simens-Complete solutions for onshore, offshore and service projects: www.energy.siemens.com]; **maximizing the window) um ... they're talking about how the demand of clean like energy is pretty big right now** [1]	[1] Predicting the content of webpage, based on its headline with a written paragraph (IL)
01:49	Sam: **(slowly scrolling down the page) and ... they're talking about different wind turbines right here (pointing at one of the images of different windmills) um .. there just talking about they have pictures and solutions and references and stuff** [2]	[2] Overviewing the components of webpage content, based on images and captions (IL)
02:05	Sam: **(Scrolling down and up the page) they don't really have the price! which is kind of upsetting!** [3]	[3] Judging the relevant of webpage content (E)
02:07	Sam: **Oh they might uh wait! (pointing at <u>LINK: more></u> below the upper right windmill image with the caption 'Advanced Offshore Wind Solutions') there's a more button!** [4]	[4] Reserving a further judgment about website content, perceiving a possibility of accessing more information (M)
02:09	Sam: (Still pointing at <u>LINK: more></u>) ... (sigh) … I: what are you thinking now? ... Sam: **Um .. I'm thinking which one I want to click on .. cos I'm not quite sure which one I need to click on ..** [5] **so I'm just gonna click the advanced offshore wind solutions (clicking on <u>LINK: more></u>)** [6]	[5] Perceiving a problem of link selection (M) [6] Testing a hyperlink (RC)
02:09	Sam: ([Siemens-Offshore Wind Power Solutions: www.energy.siemens.com]) **um ... I'm gonna click on products under this (clicking on <u>menu: Products</u>; [written descriptions of products on the same page]) … and I'm clicking more again (clicking on <u>LINK: >more</u>** [7]; written descriptions about Wind Turbines on the same page) .. **and it just gave me the same thing! I just saw ...** [8] **that's . really aggravating!** [9]	[7] Testing a series of hyperlinks to access relevant information (RC) [8] Perceiving getting back in loop (M) [9] Judging the structural ineffectiveness of website (E)
02:44	Sam: **(Moving the pointer to <u>menu: Competence</u>; moving the pointer and clicking on <u>menu: Technology</u>; [couples of hyperlinks on the same webpage]) ... um ... there's (scrolling down) .. it's talking about the technology in it** [10] **(moving the pointer quickly around hyperlink subheadings) I'm not sure!** [11]	[10] Further examination of webpage content, sampling links (RC) [11] Perceiving a problem of accessing relevant information (M)
02:55	Sam: (Moving the pointer to <-- and then to the web-address bar; erasing the typed web address) **this website probably isn't the best! ...** I: why? ... Sam: **Because it's really just putting me in loops so it's not giving me good information at all** [12]	[12] Judging the quality of website in terms of structure and relevance (E)

03:05	Sam: **So going back to google (typing *www.google.com* in the web address bar; [Google: www.google.com]; typing in *the price of solar panels*) .. um type in the price of solar panels** [13] **.. maybe if I do them separately it will probably I'll probably get more information** [14] (+Google Search)	[13] Modifying the previously used search term (RC) [14] Predicting the utility of the term (M)
03:17	Sam: ([Google+*the price of solar panels*) ... **um solarhome dot ORG! (pointing at the ENTRY: Solar Panels: www.solarhome.org) that seems good! (clicking on the same entry)** ... I: Why did you, why did you think? ... Sam: **Um it's a dot org and that means it's an organization so there has to be some credibleness to it** [15][16]	[15] Selecting an entry (RC), [16] based on a judgment of its credibility (E)

As demonstrated in Table 17, Sam started her reading of this website by scanning its content. She attended to the boldface headline of the webpage with a written paragraph, and then images and written captions ([1] and [2]). Based on this overview, she made a tentative judgment about whether the current page contained sought information ([3]). She was disappointed with this webpage (or website) because it did not give her any relevant information. Yet, she noted that there might be more information, catching a hyperlink "more" ([4]), and decided to go further into the website by clicking on it.

During a couple of link selections on the website ([6] and [7]), she perceived that it was not easy to access diverse information within this website ([8]) due to its ill-designed hypertext structure (at least to her, [9]). Although she performed a few more actions to browse available menus ([10]), this negative experience of hypertext selection immediately and strongly affected her valuing of the website and decision-making of whether to keep using the site for further information location ([11] and [12]). Thus, she went back to Google, and then applied a modified search term ([13]) to enhance her keyword search ([14]). She gained other

entries resulting from the Google search, and among them selected an entry that could lead her to more useful sources ([15]), compared with her previous 'dot com' website experience.

This episode demonstrated several interactions between different types of strategies (Figure 10). Her initial overview of webpage content informed a judgment of its relevance (IL → E). When she saw a link that might connect more information, monitoring of what information to be sought helped an initiation of sampling hyperlinks (M → RC). She detected a problem of hyperlink selection in the middle of testing a few hyperlinks, and this monitoring informed her judgment of website structure (M → E). The two kinds of judgments (relevance and structure) in a quick cycle of hyperlink selection informed her evaluation of website usefulness, which guided her decision to reject the site and conduct a modified search (E → RC).

Figure 10. A strategy interplay revealed in Sam's beginning stage of locating and selecting information
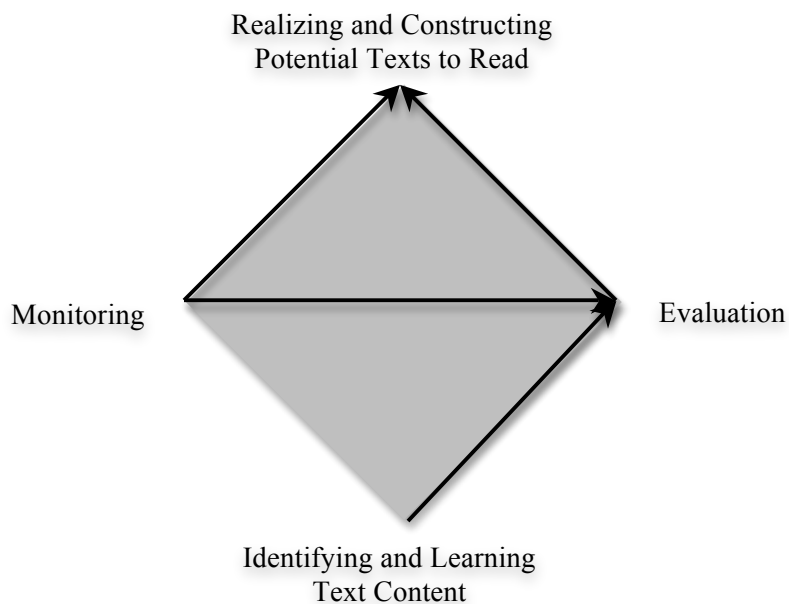
In the above episode, the strategy interplay happened in a very quick cycle of strategy use. Multiple strategies, such as predicting and reading webpage content, monitoring link selection, and evaluating website usefulness, jointly contributed to Sam's next stage of Internet reading. Thus, this dynamic strategy interplay helped her perform a follow-up activity to realize and construct potentially useful texts with modified search terms.

5.1.2. Strategy Interplay Operating on Meaning Construction

Dynamic strategy interplay also contributed to a process of constructing meaning from Internet texts. For example, a sequence and combination of reading strategy use performed by Cindy demonstrated this pattern of strategy interplay toward reading for understanding in Internet contexts (Table 18). This episode of strategy use offered a description of how readers' use of different types of strategies can help them understand text content better.

Table 18. An episode of strategy use in Cindy's reading of website content in Session II. Focused Website Learning

Time	Verbal reports and reader-computer interaction protocols	Strategy sequence and combination
04:40	Cindy: (**Clicking <--; moving the pointer to <u>MENU: Library</u>; clicking on <u>menu: Sustainability Studies</u>) .. um I'm gonna click on 'sustainability studies' in the library um to see if that um .. see if this provides any information** [1]	[1] Browsing menus to access information (RC)
04:53	Cindy: ([Sustainable Energy Coalition-Sustainability Studies: www.sustainableenergycoalition.org]) **but I don't think it's going to .. or I don't--I think it's too scientific (pointing at <u>LINK: Sustainable Energy Study #1</u>) .. I don't know too m-any lingo enough to be able to um understand some of them ...** [2]	[2] Making a hypothesis about text and perceiving a difficulty selecting hyperlinks (M)
05:09	Cindy: (**Clicking on the <u>LINK: Sustainable Energy Study #1</u>) I'll click on one and see what it says**... I: Why did you click it? ... Cindy: Um **to see if if it's understandable** [3]	[3] Sampling a link (RC)

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05:15	Cindy: ([Sustainable Energy Coalition-Sustainable Energy Study #1-The Potential for Renewable Energy in Iowa: www.sustainableenergycoalition.org) **oh yeah it is! [4] .. um it's just talking the potential for renewable energy in Iowa! (slowly scrolling down) .. um which is cool to hear . um interesting to hear about another state because you usually hear about renewable energy being used in like um the north east and California . you don't really think of Iowa when you think of renewable energy** [5]	[4] Monitoring hyperlink selection (M) [5] Connecting prior knowledge with text information (IL)
05:39	Cindy: (Moving the pointer to the first paragraph of the article 'The Potential for Renewable Energy in Iowa') **so I'm gonna read this real quick** [6]	[6] Making a decision to continue to read (M)
05:46	Cindy: **(Moving the pointer on the written text of the article The Potential for Renewable Energy in Iowa) .. um here they're talking again about um .. 'generating high-paying jobs' .. um 'clean' .. so I'm seeing a PATTTERN here on all these sites about CLEAN energy . JOBS . and SAVING the planet!** [7] um **so I'll definitely include those three points in my critical question!** [8]	[7] Deriving a theme across current and previous texts (IL) [8] Planning using meaning
06:24	Cindy: (Scrolling down the page; pointing at the second paragraph beginning with 'Over the past 50 years) .. **this kinda makes the government look like the bad guy right here cos it says that 'the federal government has provided more than $500 billion in subsidies to the fossil fuel and nuclear industries, investing {only} a fraction of that in energy efficiency and renewable sources of energy such as wind, solar, and geothermal'** [9]	[9] Interpreting text content (IL)
06:52	Cindy: Um ... **here's another word again 'fossil fuels' (moving the pointer on the highlighted word <u>LNIK: FOSSIL FUELS</u> in the text; the mouse-over text box popped up)** um .. 'This dependence on fossil fuels carries severe public health consequences including' **and here a lot of websites will say they um there's public health consequences but they don't actually say what they are {in the selected websites} .. here they {the current website} actually give examples of** 'asthma, respiratory disease, heart disease, heart attacks, and premature deaths' **.. and they talk about polluting environment ... and give examples that um that can cause** 'global warming, acid rain, oil spills, and runoff pollution' [10]	[10] Comparing current text to previous text and determining new information (IL)
07:25	Cindy: (Scrolling down) ... **I like that they're talking about the government here cos it gives subside to {?} the article** [11]	[11] Judging text content (E)
07:41	Cindy: (Scrolling down) ... um **here is a great statement** [12] says (pointing around the paragraph beginning with 'We can rely on clean energy resources') .. 'We can rely on clean energy sources: in fact, the technical potential of wind, clean biomass, and geothermal resources in the United States is four times greater than our total electricity consumption' .. and **I've heard that fact more than once so I know that's pretty accurate** [13]	[12] Determining important information (IL) [13] Judging the accuracy of text content (E)

Time	Transcript	Codes
08:10	Cindy: (Scrolling down) ... um **it gives some scenarios down here** (stopping around the written text beginning with 'In Iowa, the clean energy policies of Scenario 1 would:') .. um **there's a few other .. um statistics** [14] that says 'In Iowa, the clean energy policies of Scenario one would' **oh! I should read scenario one then (Scrolling up to the written text about 'Scenario 1')** [15]	[14] Skimming and reading the content selectively (IL) [15] Perceiving the information that should be read for better understanding (M)
08:44	Cindy: (**Staying on the written text 'Scenario 1')** ... the **scenario one is 'Enacting a 20 percent clean renewable energy standard, commonly referred to renewable portfolio standard or RPS, which would require Iowa to generate 20 percent of its electricity from CLEAN ENERGY by the year 2020, and funding publicly-run energy efficient programs in Iowa with $50 million each year from 2007 to 2020'** [16]	[16] Comprehending important information (IL)
09:06	Cindy: (**Scrolling down; stopping around the written text beginning with 'In Iowa, the clean energy Scenario 1 would:')** .. um so the **'policies of scenario one would: Create 2,340 net jobs in 2020'** um .. then increasing those jobs uh it would **'Increase wages by $31 million'** . it would **'Save all consumers (...) $1.866 billion on energy bills cumulatively by 2020 and (in 2020) would cut expected electricity demand by 20 percent'** .. also they talk about the **environment . reducing global warming . would reduce carbon dioxide emissions** [17]	[17] Reading selectively and gaining an overall understanding of text content (IL)
11:36	Cindy: Um .. **so this {'the clean energy scenario in Iowa'} is pretty much about Iowa! um but that can be taken into showing that even other states can do this .. Um I don't think... this-this study is about Iowa but I feel like that can be applied to nationwide!** [18]	[18] Generalizing the idea identified in the text to a larger context (IL)

In this episode, Cindy accessed a website deemed useful to understanding the topic of reading. She browsed possibly useful information to learn about the topic on this site. She selected a website menu "Library" that could lead her to useful references. She then subsequently chose a submenu "sustainability studies" because she found that the term was closely related to her topic of reading "alternative energy" ([1]). She was tentative in making a decision to proceed toward accessing a text because it seemed to her that the language displayed on the links was "too scientific" so the texts connected through the links might cause her comprehension problems ([2]). Yet, she decided to test her hypothesis about the

texts because she was willing to read challenging texts for her learning ([3]). She then found that the texts were "understandable" ([4]) and started to read the texts by using background knowledge ([5] and [6]).

With promising texts deemed useful for her learning of alternative energy, she engaged in constructing meaning. She identified important themes across previous and current texts ([7]), and thought about using meaning in her critical questioning task ([8]). She interpreted details ([9]) and determined new and important information ([10] and [12]). While skimming texts, she perceived the information that she missed ([15]) and went back to the previous part of text and read it ([16]). She selectively read the texts, paying more attention to the information necessary for a better understanding of the texts ([14] and [17]). She was not neglected to judge the importance and accuracy of information ([11] and [13]). Finally, she applied what she gained from the reading of a series of text segments into a larger context to generalize the importance of the ideas she learned ([18]).

In this episode of strategy use, two strands of moment-to-moment processes were particularly important to overall reading and learning. First, making and testing a hypothesis about text offered Cindy the opportunity to open up accessing and gaining new and useful information, which might not be explored otherwise. Initially, she hesitated to select the hyperlinks connecting scientific study reports related to sustainable energy because she worried that the potential texts connected through the links might be too scientific and that the reading of the document would require more domain-specific prior knowledge or conceptual vocabularies. While

perceiving this potential problem that might be encountered in the further hyperlink selection, however, she sampled a link to test her hypothesis about text (M → RC). Enactment of hypothesis generation and the subsequent hyperlink selection for hypothesis testing afforded her the chance to access relevant and useful information for her learning (RC → IL).

Second, a process of learning text content helped Cindy read more information and made meaning from the texts that could be useful to her task completion. She selectively read text content by quickly determining the importance of different parts of the text and getting a sense of the overall accuracy of the text content (IL → E). This positive judgment about the text content motivated her to continue to read more details (E → IL). She was sensitive to what part of the text should be necessarily read to make a better understanding of text content. She decided to identify and learn the information, and connected it to other parts of the text she read (M → RC → IL). The meaning constructed here might have been missing if she had not paid attention to details or simply ignored them. This active reading to make a better sense of text content helped her construct meaning to be used in her critical questioning.

This pattern of dynamic strategy interplay was revealed in the above episode of strategy use. As displayed in Figure 11, multiple strategies co-worked toward the construction of meaning. Monitoring helped the reader seek and access useful information, and it directly provided the opportunity to identify and learn important information from the accessed texts. The meaning constructed from the texts provided a knowledge basis for evaluation of the quality of the texts, and the

positive results of text evaluation encouraged readers engaged in reading more

useful texts. Thus, different strategies mutually enhanced the effectiveness of

strategy use to better construct meaning.

Figure 11. A strategy interplay revealed in Cindy's identifying and learning the contents of website

Realizing and Constructing
Potential Texts to Read

Monitoring

Evaluation

Identifying and Learning
Text Content
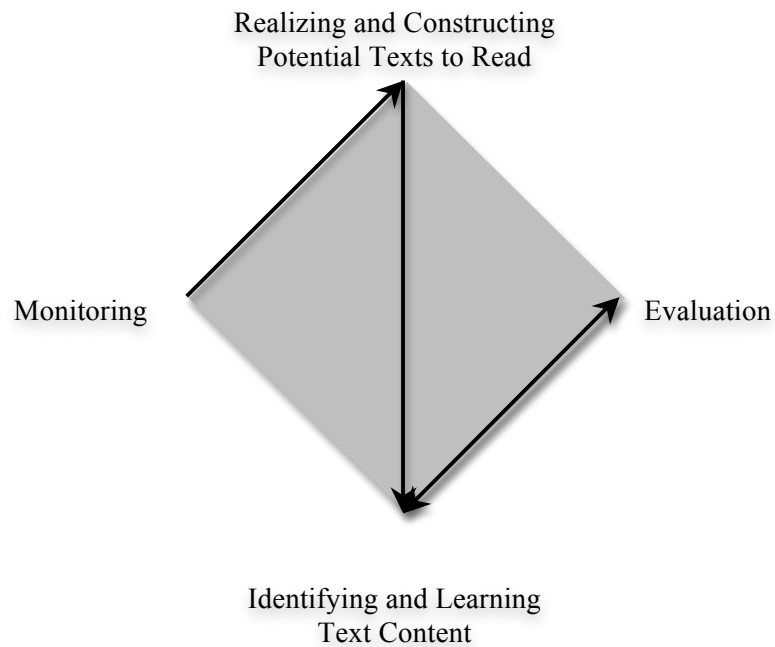
5.1.3. Model-Based Accounts of Strategy Interplay

Descriptions of the above two episodes of strategy use demonstrated that

each of the four types of strategies played a unique role in both path construction

and meaning construction. The activity for Realizing and Constructing Potential

Texts to Read (RC) was supported with the other three types of strategies. An

effective use of RC strategies necessarily required readers' constant reflections on

the meaning evolving thus far (Monitoring) through learning important information in the text or from a list of hyperlinks (Identifying and Learning Text Content). The RC strategy use became more successful when readers filtered irrelevant or seductive information that might mislead them by brining evaluative mindsets into the reading task (Evaluation). The adolescent readers in this study used these evaluative strategies before and after accessing links and texts, and compared the current status of reading with the reading that was originally planned and pursued. As all these four types of necessary strategies played their roles in an ongoing way, they jointly contributed to the determination of suitable reading order and the construction of more reliable reading paths toward achieving the goals of reading.

Dynamic strategy interplay also supported the participants' Identifying and Learning Text Content (IL). The effective use of IL strategies in Internet reading often relied upon the activity of Realizing and Constructing Potential Texts to Read. The understanding built in the readers' minds evolved along the course of searching for, locating, accessing, and selecting links and texts. Location of more useful texts increased the possibility of getting more useful information that could contribute to the construction of meaning. These IL strategies were useful when readers brought their critical-analytical mindsets into the interrogation of the intents, purposes, motives, and assumptions hidden in the text (Evaluation). The combination of strategies for meaning construction and evaluation was regulated and informed through the readers' self-assessment of their own reading and thinking processes, the text environment constructed through Internet reading, and themselves as Internet readers (Monitoring).

Grounded in the strategy data gathered from all seven adolescent readers

participating in this study, reading strategy use can be explained according to the

model of Constructively Responsive Reading in Internet contexts (Figure 12).

Figure 12. Dynamic strategy interplay described in the model of Constructively Responsive Reading in Internet contexts

Realizing and Constructing Potential Texts to Read:
• Exploring goal-relevant information space
• Selecting hyperlinks and navigating toward useful texts

Monitoring:
• Monitoring the determination of reading paths
• Monitoring the construction of meaning
• Monitoring the self

Evaluation:
• Examining the usefulness of hyperlinks
• Judging the information value of webpage
• Assessing the quality of website

Identifying and Learning Text Content:
• Making meaning from hyperlinks
• Comprehending the content of webpage
• Constructing intertextual meaning across texts and links

In addition to the detailed descriptions of the four types of strategies provided in Chapter 5, this chapter describes dynamic strategy interplay between and among the four types of strategies. Identified strategies under the four categories were coordinated in various sequences and combinations in a way of fueling subsequent strategies, suggesting possible directions of strategy use, and enhancing the effectiveness of the strategy use.

5.2. Goal-Directed Strategy Use in Internet Reading

Quantitative analysis of strategy data resulted in another pattern of strategy use that indicated the nature of strategy as a goal-directed activity. The results showed how the strategy use was associated with the task in the two sessions of Internet reading task, respectively. This section presents the results regarding both group characteristics and individual differences among participants. The following sections provide further details related to the results of statistical analysis and possible explanations of the results.

5.2.1. Strategy-Task Relationships: Trends Shared among Participants

Analysis of conditional distributions. When the strategy data of all seven participants were aggregated, a comparison of the percentages of each of the four strategy categories used within each of the two Internet reading sessions showed that strategy use depended on task settings. I observed multiple aspects of the association between strategy use and session, based on an examination of conditional distributions of strategy category within each session (Figure 13).

Figure 13. A portrayal of conditional distributions for the four strategy categories within each of the two sessions of Internet reading task
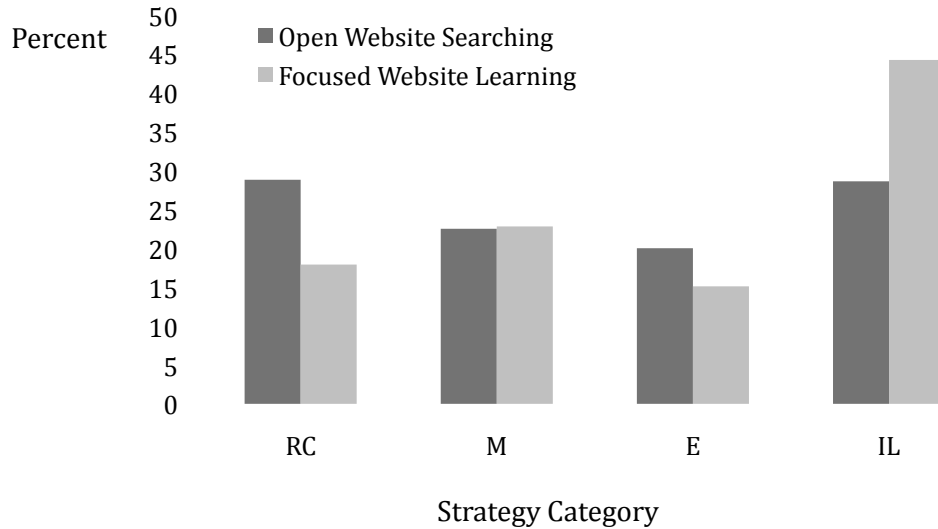
Note. RC = Realizing and Constructing Potential Texts to Read, M = Monitoring, E = Evaluation, IL = Identifying and Learning Text Content.

First, the comparison of RC and IL strategy use indicated that session tasks had an impact on strategy use. The conditional distribution of Realizing and Constructing Potential Texts to Read used in Open Website Searching (28.8% in Session I) was relatively higher than that for Focused Website Learning (17.9% in Session II). In contrast, the conditional distribution of Identifying and Learning Text Content in Focused Website Learning (44.2% in Session II) was relatively higher than that for Open Website Searching (28.6% in Session I). In other words, participants tended to give more attention to using a group of strategies for information search and hyperlink selection when they should have select a limited number of useful websites to learn more in an open-ended information space. In

contrast, they tended to switch their reading attention to the learning with those selected websites when they should have understood the contents of the websites and develop their understanding of the topic to used in critical questioning. This result indicated that the readers participating in this study regulated their cognitive efforts spent using particular strategies in a goal-directed manner, based on their awareness of task goals and demands.

Second, the comparison of strategy use for Monitoring between the two sessions indicated that monitoring was used constantly across both sessions. The conditional proportion of Monitoring used in both sessions was similar (22.5% in Session I and 22.8% in Session II). As demonstrated in the detailed description of monitoring strategies in the previous chapter, monitoring informed participants of the current status of their own reading, in relation to text location, path construction, and meaning construction. These strategies were essential to these readers' self-regulation of thinking and their keeping a balance between Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content. The results indicated that participants' monitoring strategy use at the metacognitive level played a central role in both the determination of reading paths and the construction of meaning in Internet contexts.

Third, strategies for Evaluation were used in the first session, slightly more than in the second session. The percentage of Evaluation used in the Open Website Searching Session was 20.0%, but in Focused Website Learning, the percentage of Evaluation was 15.1%. This result showed that evaluative reading in examining the usefulness of hyperlinks, web pages, and websites was important across the two

sessions of Internet reading tasks. However, it also indicated that the task of reading in the first session that asked participants to locate and select three most useful websites (to learn about the topic in the second session) caused the difference in evaluation strategy use between the two sessions. Participants tended to use these evaluative strategies more frequently as moment-to-moment processes when they judged numerous links and texts they encountered and made a series of informed decisions about what to choose and read in an open-ended Internet setting.

Fourth, overall, Figure 13 shows that strategies in all of the four categories were utilized in both sessions, even if the relative proportion of each of the categories varied according to the session. As suggested in the model of Constructively Responsive Reading, all of the four groups of strategies were important and necessarily required in Internet reading. Also, as described in the previous section (5.1. Dynamic Strategy Interplay), this result indicated that various kinds of dynamic strategy interplay contributed to the completion of the Internet reading task while the needs for and attention to different strategies varied between the two sessions.

Chi-squared test with residual analysis. The results from the examination of conditional distribution of strategies were supported by a subsequent chi-squared analysis with standardized residual analysis. Regarding the overall pattern of strategy use depending on each of the Internet reading sessions, chi-squared analysis with the total 1784 strategies assigned to each of the four strategy categories resulted in a statistically significant association between Strategy Category (response variable) and Session (explanatory variable): χ^2 *(3, N = 1784)*

= *52.86, p<.001*. Overall, the pattern of strategy use performed by the seven

participants was related to different task goals and settings of the two Internet

reading sessions.

The follow-up analysis of standardized residuals detected the directions of

association between Strategy Category and Session in an informal manner, with the

values greater than 3 and smaller than -3 for a given Strategy Category within each

of the session indicating its major contribution to a statistically significant test result

(Table 19).

Table 19. Numbers of occurrence of each of the four strategy categories and
standardized residuals (in parentheses): Detecting the pattern of association between
Strategy Category and Session

	Strategy Category			
Session	RC	M	E	IL
Open Website Searching	340 (2.5)	266 (-.1)	236 (1.3)	338 (-3.1)
Focused Website Learning	108 (-3.5)	138 (.1)	91 (-1.9)	267 (4.3)

Note. RC = Realizing and Constructing Potential Texts to Read, M = Monitoring, E =
Evaluation, IL = Identifying and Learning Text Content.

The analysis resulted in large positive residuals for Realizing and

Constructing Potential Texts to Read in the session of Open Website Searching and

Identifying and Learning Text Content in the session of Focused Website Learning.

Also, it resulted in large negative residuals for Identifying and Learning Text

Content in the session of Open Website Searching and Constructing Potential Texts

to Read in the session of Focused Website Learning. This result indicated that there

were more occurrences of the group of strategies for realizing and constructing

potential texts to read to read in an open-ended Internet search setting but more occurrences of the group of strategies for identifying and learning the contents of Internet texts in a close-ended setting.

Along with the chi-squared test, residual analysis supported the four major observations from conditional distributions of strategy categories within each of the sessions. Overall, the group of seven participants adjusted the amount of cognition and attention according to the tasks to complete and goals to achieve. Also, different reading strategies played different roles in achieving the completion of reading tasks, indicating the goal-directed nature of strategy use.

5.2.2. Individual Differences in the Strategy-Task Relationship

In contrast to the identified association between strategy use and session tasks with the strategy data aggregated from all seven participants, subsequent statistical analyses of possible associations between each of the seven participants' patterns of strategy use indicated that there was a broad range of differences in the performances of individual participants' reading strategy use.

For this analysis, I obtained the number of occurrences and conditional distribution of each strategy category by each of the seven participants within the two sessions, respectively (Table 20). Within the session of Open Website Searching, the chi-squared test resulted in a statistically significant association between Strategy Category and Case: χ^2 *(18, N = 1180) = 126.447, p<.001.* Within the session of Focused Website Learning, another chi-squared test resulted in a statistically significant association between Strategy Category and Case: χ^2 *(18, N = 684) = 44.487, p<.001.*

Table 20. Numbers of occurrence and percentage comparison of Strategy Category for Case (participant) within each Session

| Session | Case | Strategy Category | | | | | | | | | |
| | | RC | | M | | E | | IL | | Total | |
		%	f	%	f	%	f	%	f	%	f
Open Website Searching	Andy	19.3	22	18.4	21	11.4	13	50.9	58	100	114
	Cindy	18.8	36	29.3	56	19.9	38	31.9	61	100	191
	Hannah	35.7	66	25.9	48	18.9	35	19.5	36	100	185
	Katie	16.5	32	21.1	41	31.4	61	30.9	60	100	194
	Maggie	37.9	44	13.8	16	9.5	11	38.8	45	100	116
	Rachel	47.7	73	22.2	34	19	29	11.1	17	100	153
	Sam	29.5	67	22	50	21.6	49	26.9	61	100	227
	Total	28.8	340	22.5	266	20	236	28.6	338	100	1180
Focused Website Learning	Andy	14.0	8	21.1	12	14	8	50.9	29	100	57
	Cindy	16.7	14	28.6	24	10.7	9	44	37	100	84
	Hannah	19.6	20	33.3	34	9.8	10	37.3	38	100	102
	Katie	10.7	19	15.7	28	21.3	38	52.2	93	100	178
	Maggie	26.2	16	18	11	6.6	4	49.2	30	100	61
	Rachel	26.1	23	21.6	19	20.5	18	31.8	28	100	88
	Sam	23.5	8	29.4	10	11.8	4	35.3	12	100	34
	Total	17.9	108	22.8	138	15.1	91	44.2	267	100	604

Note. RC = Realizing and Constructing Potential Texts to Read, M = Monitoring, E = Evaluation, IL = Identifying and Learning Text Content.

Results from these two chi-squared tests demonstrated that patterns of using the four different categories of strategies within each session, to a large degree, relied on who used the strategies. These results converged into the interpretation that, while there was an overall pattern shared among participants that reading strategies were used in a goal-directed way, a considerable range of individual differences should be considered in the descriptions of their strategy use.

Overall, the results from the statistical analysis of encoded strategy data suggested that the pattern of each of the participants' strategy use should be further

examined. The analysis of aggregation of all seven participants' strategy data, on the one hand, demonstrated that their strategy use was associated with the session task goals shared among participants: to find useful websites, to learn about the websites, and to develop critical questions. These results indicated that there were general tendencies shared among all seven participants. These readers regulated strategies for text location and those for meaning construction, constantly used monitoring strategies during the course of Internet reading, and performed both anticipatory and confirmatory evaluative strategies.

On the other hand, the analysis of encoded strategy data of each of the participants demonstrated that there were differences in strategy use among the participants even within the same session. This result indicated that individual participants brought some general tendencies to the Internet reading task but they enacted these tendencies in diverse ways with varying degrees of attention and emphasis. In other words, the result demonstrated idiosyncrasies of reading strategy use among individual readers, signifying a further examination of individual differences through a close-up of each case.

5.3. Individual Differences in Strategy Use in Internet Contexts

5.3.1. Distinctive Modes of Internet Reading Strategy Use

Individual participants approached the completion of their Internet reading task in unique and different ways, and this resulted in dynamic patterns of strategy use among the participants. The model of Constructively Responsive Reading offered one possible explanation of this variation. Flows of the reading strategy use performed by the participants were characterized, according to varying degrees of

the attention allotted between the two important activities of Internet reading: Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content.

One mode of reading, RC-driven Internet reading, was directed toward the activity for Realizing and Constructing Potential Texts to Read (RC). Readers in this mode of reading showed general tendencies to pay more attention to searching for and locating texts and links. These readers invested more cognitive resources in the construction of relevant, informative, and useful text environments. The other mode of reading, IL-driven Internet reading, entailed more extensive use of strategies for Identifying and Learning Text Content (IL). In this reading mode, readers engaged in comprehending and examining the contents of Internet texts and constructing meaning to be used in their critical questioning task.

Metacognitive monitoring and critical evaluations were consistently important in both modes of reading because readers used these metacognitive and critical-analytical strategies to regulate a dual-task of information management and meaning construction in Internet contexts thereby accessing and understanding more useful and credible links and texts. Monitoring was consistently when readers were switching their attention between information search and text comprehension, detecting any problems in the course of reading, and selecting pertinent strategies to solve the problems. Evaluation strategies featured prominently in examining diverse aspects of links and texts, determining their importance and usefulness, and finally making decisions about what to select and where to go. Monitoring and evaluation

were used in an ongoing way, and both contributed to activation and management of modes of RC-driven or IL-driven Internet reading.

These two modes of Internet reading elicited somewhat distinctive patterns of constructive strategy use. I obtained flow charts of the strategy use of the seven participants, which allowed me to juxtapose patterns of strategy use in both RC- and IL-driven mode of Internet reading. Figure 14 represents the four flow charts of two participants. Each of the four graphics visualized a set of constructive strategy use that Rachel and Andy performed for approximately 20 minutes from the beginning of each of the two sessions of Internet reading task. These visual representations, constructed with these two readers' Internet Reading Strategy Matrices, described the strategic acts of reading, through the information on the number and sequence of strategic actions, approximately 5-minute interval of strategy use, and moment-by-moment strategic actions encoded to the model of Constructively Responsive Reading.

Figure 14. A graphical representation juxtaposing the flows of strategy use in RC-driven and IL-driven mode of Internet reading: Strategy use of Rachel and Andy for approximately 20 minutes from the beginning of each of the two sessions, respectively

RC-driven Internet reading

Rachel (Session I)

Time	Cell	RC	M	E	IL
00:01.0	1		M		
	2	RC			IL
	3	RC			IL
	4	RC	M		
	5	RC			
	6	RC			
	7	RC			
	8	RC			
	9		M		
	10			E	
	11				IL
05:30.1	12		M	E	
	13		M		
	14		M		
	15	RC			
	16	RC			
	17	RC		E	
	18		M		
	19			E	
	20	RC		E	
	21	RC			
	22	RC	M		
	23	RC			
	24	RC			
	25			E	IL
09:12.1	26		M		IL
	27	RC			
	28			E	IL
	29		M		
	30	RC			IL
	31	RC	M		
	32		M		
	33		M	E	
	34	RC			
	35	RC			IL
	36			E	
	37	RC	M		
14:56.1	38	RC			
	39	RC			
	40	RC			
	41	RC			
	42	RC		E	
	43	RC			
	44	RC	M		
	45	RC			
	46	RC			
	47	RC			
	48	RC			
	49	RC			
	50	RC			
	51		M	E	IL
	52	RC	M		
20:06.1	53	RC	M	E	

IL-driven Internet reading

Andy (Session I)

Time	Cell	RC	M	E	IL
00:00.0	1	RC			
	2	RC			
	3	RC			
	4	RC			
	5			E	
	6		M		
	7	RC			
	8				IL
	9	RC	M		
	10	RC			
	11	RC			
	12			E	IL
	13			E	IL
	14				IL
	15				IL
	16			E	
	17				IL
04:57.1	18				IL
	19				IL
	20		M		IL
	21		M		
	22				IL
	23				IL
	24				IL
	25				IL
	26				IL
	27	RC			
	28	RC			
	29	RC			
	30				IL
	31				IL
09:50.1	32				IL
	33			E	IL
	34				IL
	35				IL
	36				IL
	37		M		IL
	38				IL
	39				IL
	40				IL
	41				IL
	42		M		
	43				IL
15:00.3	44		M		IL
	45				IL
	46				IL
	47				IL
	48		M		IL
	49		M		IL
	50			E	
	51				IL
	52		M		IL
	53		M		IL
19:56.1	54		M		IL

Rachel (Session II)

Time	Cell	RC	M	E	IL
00:08.1	1		M		
	2	RC			
	3		M		
	4			E	
	5		M		
	6			E	
	7			E	
	8	RC	M		
	9	RC		E	
	10			E	IL
	11			E	IL
05:15.2	12		M		IL
	13		M		IL
	14	RC			IL
	15	RC			IL
	16			E	IL
	17			E	
	18	RC			IL
	19	RC		E	IL
	20	RC	M		
	21	RC	M		
	22	RC			
	23			E	IL
	24			E	
	25	RC	M		
10:00.1	26	RC	M		
	27			E	IL
	28				IL
	29				IL
	30		M		IL
	31				IL
	32		M		IL
	33		M		
15:10.2	34	RC			
	35				IL
	36	RC			
	37			E	IL
	38	RC			
	39	RC			
	40	RC			
	41				IL
	42				IL
	43	RC			
	44			E	IL
19:55.0	45			E	IL

Andy (Session II)

Time	Cell	RC	M	E	IL
00:09.2	1		M		
	2			E	IL
	3				IL
	4			E	
	5	RC	M		
	6	RC			IL
	7		M		IL
	8			E	IL
	9			E	IL
	10				IL
04:58.1	11	RC	M		
	12				IL
	13				IL
	14		M		IL
	15		M		IL
	16		M		
09:19.2	17			E	IL
	18				IL
	19				IL
	20	RC			
	21				IL
	22			E	IL
	23			E	IL
	24		M		IL
15:04.1	25				IL
	26		M		IL
	27				IL
	28			E	IL
	29	RC			
	30	RC	M		
	31	RC			
	32				IL
19:51.1	33				IL

Note. RC = Realizing and Constructing Potential Texts to Read, M = Monitoring, E = Evaluation, IL = Identifying and Learning Text Content, Session I: Open Website Searching, Session II: Focused Website Learning.

Rachel's Internet reading was characterized as being RC-driven, more directed toward Realizing and Construction Potential Texts to Read (RC) than Identifying and Learning Text Content (IL). Rachel's 20-minute strategy use from the beginning of the first session indicated that she used larger numbers of RC strategies, compared with IL strategies. From the beginning of her reading, she used Internet search engines, and spent the most time locating and examining a variety of website entries resulting from her search. She changed her search terms, retrieved website entries, accessed websites familiar to her, and browsed different places within the sites by clicking links and menus. In contrast, Rachel "sporadically" used IL strategies, most of which were intended to read a minimal amount of textual information available on several website entries and hyperlinks. She operated on the usefulness of website entries and hyperlinks, using these IL-strategies, in order to make informed decisions to select or reject.

Rachel's RC-driven mode of Internet reading continued in the second session. While she slightly moved her reading focus to the activity of Identifying and Learning Text Content and used relatively more IL strategies in the second session than in the first session, most of these strategies were focused on making sense of links and menus or pieces of information scattered in the websites being used. Her reading was continuously driven by the RC strategy use, which served her reading focus to find information to support certain perspectives that she brought into the reading task. She extensively browsed available menus and submenus on the sites and sampled several entries and hyperlinks to see if they connected useful

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information that she was seeking, instead of delving into certain meaning from the sites that could give her an understanding of her topic.

In contrast, Andy's Internet reading was marked by active use of IL strategies. She used IL strategies more frequently and extensively, compared with RC strategies. In the beginning of reading, she accessed an Internet search engine, applied search terms, and examined usefulness of the entries resulting from her search. She then used more productive meaning-making strategies when she accessed a particular website containing well-organized textual information related to diverse perspectives on her topic. She used a variety of IL strategies to overview the content of the page, to engage in literal/inferential comprehension of the content, and to navigate the problem space. In the middle of the first session, she went back to the Internet search engine and located another website related to the topic. She did not just overview and skim the website's content but she also attempted to figure out how the website was meaningful to her reading.

Andy's attention to using IL strategies was persistent, but her RC strategy use was parsimonious. In the second session of reading within the three websites, she sometimes opened another pathways to go different places within these websites. She selected available menus and links to find relevant and useful information on the sites. However, her strategic moves for RC were devoted to better understanding the contents of the websites and to developing critical questions allowed by her consistent use of IL strategies. Andy was able to focus on deriving a couple of important issues to be used in her critical questioning, reading several written paragraphs that represented multiple arguments with supporting

evidence. She attempted to verify some of the arguments, using the information gained from the reading of complicated numerical tables. These dynamic meaning construction processes reflected her efforts to integrate related information into an understanding of topic-related issues. Andy constantly looked back on her goals of reading and reasoned how to transform what she had learned from Internet texts into critical questions. It was noteworthy that Andy's 5-minute time intervals of strategy use become shorter as her reading proceeded toward the end of second session. This indicated that she was investing increased time and efforts in learning from Internet texts and engaging in deep thinking, with minimal but active use of necessary IL strategies.

While many alternative explanations were possible, the situated nature of constructively responsive reading strategy use offers an explanation of different patterns of strategy use entailed in two somewhat distinctive modes of Internet reading. As demonstrated in the detailed descriptions of participants' Internet reading, reading strategies were the means to achieve the goals of reading and situated in the process of interactions between "the reader" and "the text(s) or textual environment." In other words, different modes of reading or varying amounts of cognition and attention to particular types of strategies stemmed from differences in what kind of goals readers brought into the task and what sorts of texts were explored, accessed, and selected (or often encountered).

On the one hand, a choice of strategy or mode of reading was guided by readers' goals. For example, when readers set a goal to find any details supporting a certain belief that they imposed in reading, these readers used more strategies to

search for and locate specific information directly related to the beliefs. However, when readers brought interests in learning important issues and delving into the meaning significant, these readers used more strategies to learn the contents of Internet texts and to build an understanding of the topic.

On the other hand, readers' choice of strategies or modes of reading also relied upon what texts were identified and accessed. When readers found the texts that only provided irrelevant and untested information, repeatedly, these readers used more strategies to access and select useful texts and to prevent cognitive distraction and disorientation due to (irrelevant) information overload. However, when readers found the useful texts that contained a good deal of relevant information in the beginning stage of reading, these readers were able to invest cognitive efforts to construct meaning from the texts.

The determination of which strategies to use in Internet reading was situated within a particular moment of reading co-constructed by complex interactions between the reader and the text environment. The mode of Internet reading, in which readers continued to use certain types of strategies more extensively than others, was largely associated with how readers responded to the text(s) encountered on the Internet. Even though readers imposed their goals and interests in leaning from texts, they often experienced difficulty engaging in the process of productive meaning construction when they failed to locate and access useful texts that could contribute to the construction of a relevant text environment. Differences in readers' responses toward texts in a prompt and flexible manner greatly

contributed to individual differences in distinctive patterns of strategy use or modes of reading.

5.3.2. Profiling the Readers

The seven participants were characterized by the their dominant mode of Internet reading strategy use, based on the analysis of flow charts of strategy use. As noted above, the determination of any mode of Internet reading as RC-driven or IL-driven relied on the "degree" of its variance because the two modes (or two activities) interacted with each other and necessary to successful strategy use in Internet reading. The dominant mode of reading was not successful without pertinent and responsive use of the other supportive mode of Internet reading. Thus, I considered the determination of the dominant mode of reading not as a dichotomous categorization but as a location of the readers on the continuum of these two modes of reading, based on identified patterns of their reading strategy use (Figure 15).

I considered two caveats to be important to the determination of reading modes. First, each of the participants was located on the continuum by a comparison only among those readers. Because one's reading was characterized as a "relative location" in comparison with the others' reading, the location of each participant did not necessarily represent the "absolute value" of reading performance of the reader. For example, although Rachel's reading strategy use was depicted as more RC-driven than that for Maggie, the dominant modes of their reading varied according to different interests, goal-setting, topics, and other

situational variables. Thus, to judge a mode of Internet reading strategy use was only applicable to the readers participating in this study and the task settings.

Second, this continuum only represented an overall tendency of reading between the RC-driven mode and the IL-driven mode. Thus, the continuum was not able to describe and explain all possible changes and fluctuations of strategy use as moment-by-moment processes in the course of Internet reading. For example, Hannah used many strategies for identification and selection of links and texts at most of the important moments of her reading, but she also used strategies for understanding text content even if the strategies were sporadically observed. Katie performed the active use of IL strategies to learn from Internet texts throughout her Internet reading, but she also used sophisticated strategies for overviewing numerous site entries and links and selecting useful links toward useful texts.

Figure 15. Characterization of individual participants as Internet readers: Based on their constructive reading strategy use across the two sessions
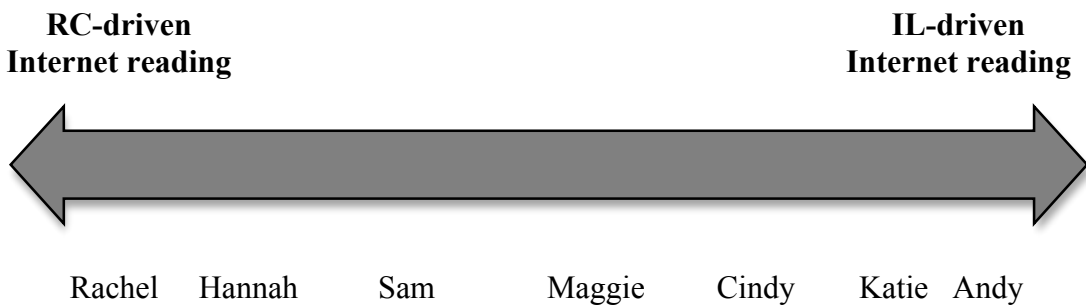
RC = Realizing and Constructing Potential Texts to Read
IL = Identifying and Learning Text Content

Despite these limitations, the continuum of RC-driven and IL-driven modes of Internet reading was able to assist me in understanding the idiosyncratic nature of constructive strategy use in Internet contexts. It also illustrated the importance of two important Internet reading activities: Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content. The regulation of the two activities were largely influenced by knowledge, beliefs, and intentions individual readers brought into the task, and shaped by what sort of text environment individual readers identified, accessed, and constructed in an unknown information space.

In addition to the continuum based on the flow charts of strategy use of individual participants, I conducted the analysis of their search terms in the profiling of the participants as Internet readers. The analysis of search terms showed that search terms reflected what readers were thinking and planning in the course of information search. The analysis of the sequences of typed search terms indicated how readers approached information searches, what aspects of the topic were particularly focused, and what sorts of information were being sought (Table 21). The search terms used by Andy, Katie, and Cindy, who maintained the IL-driven mode of Internet reading fairly consistently, was juxtaposed with that for Rachel, Hannah, and Sam, who are grouped as the readers who relatively consistently maintained the RC-driven mode of Internet reading.

Table 21. Participants' use of search terms and search engines

Participants	Modification of search terms
Andy	Internet search engine (1st): *Information on the death penalty → Pros and cons on the death penalty → Forms of death penalty → ask.com →* Internet search engine (2nd): *Is the death penalty really costly than life in prison?* → Website's built-in search engine: *Does the death penalty deter crime?*
Cindy	Internet search engine: *alternative energy → types of alternative energy → Why is alternative energy so important → ilovemountain.org → facts about alternative energy → sites about alternative energy → sustainable energy →* Website built-in search engine: *solar energy*
Hannah	Internet search engine (1st): *physician –assisted suicide → euthanization → euthanization of human → map of europe → euthanization of humans → legal euthanization in Oregon → court cases involving euthanization → holland euthanization → holland euthanasia → euthanization.com →* Web address bar: *euthanization.org → euthanization.edu →* Internet search engine (1st): *www.penthius.com →* Internet search engine (2nd): *euthanization → euthanization of humans → Jack Kervorkian → punishment of jack kervorkian → jack kervorkian*
Katie	Internet search engine: *obesity → government regulations on obesity in America*
Maggie	Internet search engine: *drinking age lowered → drinking age to stay at 21 → drinking age statistics → drinking age debate statistics → should the drinking age be lowered? → why should the drinking age be lowered? → choose responsibility*
Rachel	Internet search engine (1st): *Environmental Industry → Environmental Industry agriculture → Fresh → envirothon → environmental solutions → agricultural solutions → The University of Maryland →* Website's built-in search engine (1st): *Environmental science →* Internet search engine (1st): *Warren Wilson College → Wikipedia →* Website built-in search engine (1st): *sustainable agriculture →* Website built-in search engine (2nd): *Exports of agricultural products*
Sam	Internet search engine (1st): *The price of solar panels and windmills → the price of solar panels → the price of windmills → how do the costs of having alternative sources differ from have regular electricity → electric bill costs with alternative energy compared with regular electricity → electric bills with alternative energy →* Internet search engine (2nd): *Electric bills without alternative energy compared with alternative energy → comparing energy bills with*

bills with alternative energy → *why people do not purchase alternative energy sources* → <u>Website built-in search engine (1st)</u>: *why do people not purchase alternative energy* → <u>Internet search engine (1st)</u>: *Why people do not purchase alternative energy* → Website built-in search engine (2nd): *why they are unhappy with alternative energy* → *alternative energy* → <u>Internet search engine (1st)</u>: *blogs about alternative energy* → <u>Website built-in search engine (3rd)</u>: *alternative energy*

The IL readers

The readers with the IL-driven reading as the dominant mode of strategy use, performed a parsimonious use of search terms and search engines. They used mostly a primary search engine, with less use of complementary search engines. These search terms reflected a coherent flow of thinking along with changes in reading foci, as the reading proceeded toward task completion. These readers generated the seminal search terms reflecting their current information needs at certain points. The search terms evolved along with changes in readers' understanding, modified and updated in an ongoing way. They scanned and overviewed website entries on the pages resulting from the Internet search engine use, and spent more time and efforts to examine multiple links and to select the links only determined as relevant and useful.

Andy's text learning. Andy initially generated a search term "Information on the death penalty" which reflected her need for general background information about the topic. As she thought of needs for navigating debates and issues surrounding the death penalty, she applied the modified term "pros and cons of the death penalty" into the internet search engine use. After reading a fair amount of information on multiple arguments both for and against the death penalty, she

identified two important aspects of the death penalty: economical efficiency and crime deterrence. She then generated two search questions "Is the death penalty really more costly than life in prison?" and "Does the death penalty deter crime?" to investigate these two aspects, respectively.

The parsimonious but effective information search enabled Andy to engage in learning from the sites that she selected. She noted, in the interview after the second session, how her focused reading of texts helped her critical questioning:

> Andy: Um I definitely was able to go into depth about the question I had made before, and *in my first session I wasn't exactly sure whether it was more expensive or less expensive to practice the death penalty, but um in my second session I was kind of I was reading more things that said that the death penalty was more expensive* [Emphasis added], like I was reading studies things that I view as credible, and the things that were saying that the death penalty cost less, they were really more opinionated, so of course I'm gonna go over more credible than that opinionated. Um I've really got to look at each state and I got to this look at the crime deterrence and how the death penalty effected that as well so. *I just the second session, definitely helped me form my critical question and why is it important* [Emphasis added]. (Andy post-reading interview: Session II)

She mentioned that reading texts more helped her generation of critical questions. In her Internet reading, she continued to read more details and integrated what she learned into critical questions. She continued to focus on the two important aspects of the death penalty, and made efforts to lean more specific evidence supporting pros and cons of the death penalty.

Katie's evaluative reading. Katie's use of strategies and search terms showed another example of IL-driven mode of Internet reading. Katie only used one search engine, Google, applying only two search terms. She first used the term "obesity" identical to her topic word, in order to gather general background information. She then modified the search term by adding qualifiers that reflected

her specified reading focus: "government regulations on obesity in America." This moderate enactment of the strategies for Realizing and Constructing Potential Texts to Read indicated that she was engaged in the learning with multiple sources and identified a great deal of useful information quickly and easily by less use of information-seeking processes.

> Katie: *I was trying to learn as much about it as possible* [Emphasis added]. Um, and after I read through it, I kinda got, you know, I had questions, you know, coming in my head of, okay, well, I mean, learning more about it, you're gonna have questions and, um, I guess my focus was to find what interested me the most about obesity, what caught my eye, and, um, in this case it was at the young age is when it started. And, um, I just, uh, that was pretty much the focus of my reading. Um, *I was just trying to get to one point by reading all of it* [Emphasis added]. (Katie post-reading interview: Session II)

Katie engaged in learning from texts, and this characterized her as an evaluative reader. She consistently examined the quality of links and texts before and after accessing them, and made efforts to understand information as much as possible once she accessed a certain text. Her reading habits required more extensive use of strategies for meaning construction and evaluation, given the fact that links and texts were judged with readers' evolving understanding and goal reflections. She identified and used diverse surface markers for an initial judgment of certain links and texts, delved into the hidden meaning, intents, and purposes of the text(s), and valued and critiqued different aspects of texts. She maintained the IL-mode of reading by actively using these strategies for learning and evaluation.

The RC readers

The participants, grouped into the readers of maintaining the RC-driven mode of reading, used Internet search engines (or website built-in search engines)

more often, and frequently revised and changed search terms to find relevant information. While mostly using a primary search engine, they did not hesitate to replace it with another complementary search engine(s). The results retrieved from multiple search engines sometimes overlapped so that these readers sometimes experienced a failure to gain new information relevant and useful to their information search. These readers showed a tendency to quickly revise search terms, based on the previous information search, but the revised terms were not much semantically different, compared with the previously used search terms. Redundancy and incoherence were often found among the search terms they used. In this light, their search terms reflected not just a flow of their thinking but also challenges they experienced in information searches because

Rachel's hyperlink reading. Rachel's RC-driven mode of Internet reading was in part due to her goals to support her own knowledge and beliefs. Rachel's RC-driven strategy use could be explained in relation to her topic-related background knowledge, self-confidence in knowing and learning about the topic, and goal setting toward supporting her knowledge and beliefs. She reported a great deal of prior knowledge related to her topic of reading, environmentally friendly industry. Also, she reported her experiences related to the topic of reading, including taking an AP environmental science class and her actions to lobby politicians in Washington, D. C. against the coal mining companies that were using the Mountain Top Removal methods and severely destructing local natural and ecological environments. This abundant background knowledge made her self-

confident in reading and questioning about the topic. Overall, her Internet reading was directed toward finding information to support her beliefs.

> Rachel: Well, *I tried, I feel like maybe I came up with my question too quickly at first? but I, basically I just wrote down the questions that were coming up in my head and then picked one that I liked and then tried to find information to back up* [Emphasis added] and to kind of explain, not answer the question but explain why, like you said why the question's being asked, so that was my focus (Rachel post-reading interview: Session II)

Rachel was interested in environmentally friendly industry, especially in agriculture. Thus, she generated search terms, extensively using her prior knowledge. Some of the terms included topic-related words: environmental industry, agriculture, environmental science, and agriculture products. However, some were not very effectively used in relevant information search, such as Fresh, envirothon, The University of Maryland, Warren Wilson College, and Wikipedia. She intended to enhance the effectiveness of her information search by modifying search terms several times, but many of the terms were not semantically distinctive from one another. Her use of search terms was not tightly interrelated, and this reflected that she performed information searches without a through planning for using search terms.

Hannah's disorientation. Hannah was another reader who maintained the RC-driven mode of Internet reading. Hannah's reading was directed toward information seeking, which was intended to answer the questions she already generated in the mind prior to the task. However, her RC-driven mode of Internet reading stemmed from the difficulties that she experienced in information searches. In the beginning stage of reading, she used the topic words as the search term. The problem was that she typed in "Physician –assisted suicide," instead of "Physician-

assisted suicide," which resulted in a completely different information space because of the Boolean search function of Google. That is, the resultant pages with "Physician –assisted suicide," at least the first couples of pages, were actually equal to those for "Physician suicide." This ill-identified information space caused that her examination of the website entries on the Google pages were not productive. This irrelevant text environment was not able to give the opportunity to learn, and this caused Hannah's frustration in both information search and meaning construction.

Hannah struggled to find relevant sites on this information space. To solve this problem, she generated another related term "euthanasia." However, this term also have different meanings so that use of the term made her information search difficult. She could not help but selecting the sites from this constrained information space, and thus it was not easy for her to ensure the quality and usefulness of the sites.

> Hannah: And but it didn't give me like the questions, like the information that I was after, so *the website that I chose if I would have read it more carefully when I first did it then I would've like chose a different website that would have helped me a little bit better, so I learned that to not just look at the title but to actually read it more thoroughly into it and to start clicking on the references* cause [Emphasis added] I clicked on one reference and the link was disabled and that's never good when there's a reference and the link's disabled, then it's like are you sure you got your information correctly? (Hannah post-reading interview: Session II)

As Hannah noted, an ill-constructed text environment (links and texts encountered throughout the reading in addition to a collection of websites deemed useful but actually not) caused an extensive use of RC-driven reading strategy use.

That is, the ineffectiveness of information searches hampered Hannah's

engagement in information processing and meaning construction.

In summary, the analysis of individual participants' dominant mode of

reading strategy use and search terms use implied that the two important activities

of Internet reading—Realizing and Constructing Potential Texts to Read;

Identifying and Learning Text Content—should be balanced in ways that readers

responded to their reading focus and the text environments they located and

constructed. The sophisticated regulation and informed decision between these two

activities were crucial to successful Internet reading. In particular, an extensive use

of RC strategies did not much contribute to reading for understanding. In other

words, the effective use of RC strategies and successful construction of useful text

environment could offer the productive opportunity that readers were able to invest

their cognitive efforts more in reading for understanding and learning from texts. To

ensure the utility of RC strategies, readers should attend to actually reading and

examining the contents of Internet texts.

5.4. Summary

The analysis of participants' strategy data resulted in multiple findings with

regards to patterns of constructively responsive reading strategy use in Internet

contexts. Descriptive analysis of data indicated that a variety of strategies,

subsumed under the four categories suggested from the model of Constructively

Responsive Reading, interacted with one another and jointly helped effective

Internet reading. This dynamic strategy interplay, regularly observed in this study,

contributed to both the determination of reading paths and the construction of meaning.

Quantitative analysis of data demonstrated that the variety of strategies was used in a goal-directed manner. Results indicated that the adolescent readers participating in this study placed varying degrees of attention and cognition between the activities for realizing and constructing potential texts to read and for identifying and learning text content. This adjustment and regulation of strategies were associated with each of the session tasks. Monitoring and evaluation strategies were consistently used in both sessions, which demonstrated the important roles of metacognition in successful Internet reading.

Subsequent analysis of individual participants' reading strategy use indicated that, while there were many shared characteristics among participants, individual differences were also found in each of the participants' strategy use. The analysis of flow charts of strategy use and the used search terms showed that some of the participants attended more to realizing and constructing potential texts to read, but in contrast, their counterparts attended more to identifying and learning text content. These idiosyncratic performances were related to readers' stance toward reading, goals of reading, and the extent of difficulty to which readers experienced in searching relevant texts.

Chapter 6: Discussion and Conclusion

The current study examined and analyzed different types of Internet reading strategies and patterns of the strategy use, with the model of Constructively Responsive Reading. Observations and analyses of seven proficient adolescent readers' Internet reading performances resulted in detailed accounts of constructively responsive reading strategy use in Internet contexts. In this chapter, I identify and present discussion points describing how these findings add to the research literature related both to the construct of reading and reading strategy that contributes to successful Internet reading. I conclude by describing my belief that the current study supports the model of Constructively Responsive Reading in Internet contexts.

6.1. The Roles of Realizing and Constructing Potential Texts to Read in Internet Contexts

Results demonstrate the roles of strategies used in Internet reading that are anticipated by the model of Constructively Responsive Reading (Afflerbach & Cho, 2009; Pressley & Afflerbach, 1995). My study offers descriptions of these "new" strategies subsumed under the category of Realizing and Constructing Potential Texts to Read (Afflerbach & Cho, 2009) and how these strategies operate on readers' enterprise to achieve the goal of reading. This line of strategies serves multiple purposes that contribute to readers' (a) exploration of relevant information

space, (b) determination of suitable reading order, and (c) construction of individualized and unique paths to accessing useful sources.

Strategic readers must initiate and manage the process of accessing an information space on the Internet that is relevant to their goal(s) of reading. This activity offers readers opportunities to locate and select more relevant and useful texts in an uncertain information space. Readers identify and locate useful texts that they believe will contribute to their investigation of a certain problem (Leu, Coiro, Kinzer, & Cammanck, 2004). They take advantage of using Internet search engines, generating and modifying pertinent search terms based on their topic-related prior knowledge and the meaning evolving through the course of Internet reading. In doing so, strategic Internet readers construct and manage their own "text environment" that is made up of a collection of useful texts that they have accessed and selected.

The exploration of goal-relevant information space observed in this study is an important activity that makes a difference between print reading and Internet hypertext reading (Salmeron & Garcia, 2001). In a regular classroom setting, dominated by print literacy, student readers often are given preselected texts. In contrast, readers in an open-ended Internet setting may go to virtually anywhere to seek information they want. This accessibility allows readers to adjust the scope and amount of information to read and learn, and to examine and confirm self-determined text boundary. As much as Internet contexts give readers more freedom of accessing and choosing information, readers must take active roles in exploring useful texts and constructing their own text environment.

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The possibility of accessing multiple texts and different information spaces requires readers to become more conscious and strategic in planning and deciding what to read, and in what order. Readers need to scan first multiple links available in information space. They then must be able to make multi-layered inferences about what links would lead to what sort of texts and whether the connected texts could be useful and relevant to their reading (Coiro & Dobler, 2007). Readers must perform this activity throughout the course of their information search and hyperlink selection (Lawless, Schrader, & Mayall, 2007). Effectively used, these strategies help readers determine the reading order relevant to and suitable for their goals of reading.

The determination of the reading order is especially demanding in Internet reading contexts compared with print reading contexts (Kress, 2003; Salmeron, Canas, Kintsch, & Fajardo, 2005). Although there are instances in which print texts might be read in a nonlinear fashion, readers with print texts are often asked to follow a certain order predetermined by the author. Internet reading, however, requires readers to perform a series of moment-to-moment decision-making processes when they encounter links and texts (Zammitt, 2011). As results demonstrate, strategic Internet readers promptly generate educated guesses to decide whether to reject or accept links and texts in an ongoing way. They are eager to be opportunistic in sequencing their reading during a process of establishing their own text environment (Salmeron & Garcia, 2001).

The need to sequence reading in a more relevant way eventually contributes to the construction of reading paths. Well-constructed reading paths lead readers to

potential texts to be learned from and used to achieve their goals. As the participants in this study demonstrate, strategic Internet readers are willing to make choices at every moment, realizing and constructing potential texts to read by their own criteria of relevance and usefulness. The series of choice-making actions, performed in a certain order on a certain information space, becomes a creative process of constructing unique, individualized routes. These choices, made in a coherent way, offer the opportunity to construct more coherent reading pathways. This may help readers understand Internet texts in a more coherent way (Salmeron, Canas, Kintsch, & Fajardo, 2005).

The establishment of reading paths is a process that takes place almost exclusively during Internet reading, compared with print reading. In print reading contexts, texts generally require a certain order and structure of reading, and limited text boundary constrains readers' dynamic moves to back and forth between different parts of text and their ability to go beyond the text in a timely and convenient way. In contrast, Internet reading allows readers to move around freely in an information space, juggling multiple texts and links, and building their own pathways (Zammitt, 2011). This process demands readers' thoughtful planning prior to accessing links and texts and modifying the original plans by responding to a judgment of an identified and explored information space. It asks often skillful improvisation when readers experienced limited resources for understanding, both cognitive and textual (e.g., lack of prior-knowledge, insufficient amount of information gathered).

Taken together, descriptions of the strategies identified in this study demonstrate that Realizing and Constructing Potential Texts to Read is a necessary and critical activity that is increasingly prominent in Internet reading. This activity serves readers who control the universe of texts. It helps readers in the establishment of their own text environment (collection of texts selected and connected in a relevant way). Strategic readers scan a potentially relevant information space, manage the range of information, or reduce it into a manageable amount of information. Eventually, this activity assists readers in sequencing reading and constructing paths as they select useful hyperlinks and navigate towards information relevant and useful to their task goal(s).

6.2. The Continued Importance of Monitoring, Evaluation, and Identifying and Learning Text Content in Internet Contexts

Realizing and Constructing Potential Texts to Read is a critical part of Internet reading, but it can complete its roles and functions when the other types of strategies are appropriately and timely generated and used. Thus, effective use of these relatively new strategies requires equally effective use of metacognitive strategies, critical-analytical strategies, and strategies for understanding important information in Internet contexts.

My study offers detailed descriptions of many instances of the dynamic interplay that occurs between strategies for Realizing and Constructing Potential Texts to Read and those for the other three categories: Identifying and Learning Text Content, Monitoring, and Evaluation. As demonstrated in the descriptions, highly proficient adolescent readers can enhance the effectiveness of strategies to

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access and select useful links and texts to the extent that they are able to increase the effectiveness of strategies to learn important information, evaluate different aspects of information, and monitor the entire acts of Internet reading.

Strategies for Identifying and Learning Text Content

The group of strategies for Identifying and Learning Text Content are necessary and central to successful meaning construction in Internet reading. As demonstrated in the study, these conscious processes to construct meaning from texts and links are enacted while readers (a) make sense of hyperlinks; (b) comprehend the information on a webpage; and (c) build an intertextual understanding.

In Internet reading, readers overview, access, and examine multiple links, and this entails a process of making meaning from minimal information attached to the links. This activity often takes place on a webpage in which multiple links are conjoined (e.g., the page of entries resulting from Internet search engine use). These strategies for making meaning from hyperlinks contribute to Realizing and Constructing Potential Texts to Read because it helps readers scan an information space and make inferences about texts connected through the links, texts that are not realized right now but could be accessed by link selection (Bolter, 1998).

Hyperlink reading is a hybrid activity, which shares characteristics of both traditional print reading and new forms of reading. On the one hand, hyperlink reading in itself is unique to Internet reading and different from print reading because in most cases multiple hyperlinks are installed into a digital text and make explicit connections between information. These connections, built by digital

hyperlinks, may or may not be coherent or semantically related. This "connective" function of hyperlinks affords readers the chance to relocate themselves to other parts of the text or other texts beyond the text.

On the other hand, hyperlinks necessarily convey certain information that guides (or often influences) readers' link selection, and this "informative" function of hyperlinks requires readers' use of meaning construction strategies. Hyperlink readers literally understand hyperlink information, infer what texts could be connected based on the minimal information of hyperlink, and often synthesize multiple links and identify common themes form the links conjoined on a webpage. Hyperlink reading informs readers of subsequent activities to be performed, including examining and judging the usefulness of links and selecting or rejecting the links.

In addition to link reading, readers used assorted strategies to construct meaning from a webpage. These strategies are similar to those for reading a single text in print contexts. Pressley and Afflerbach (1995) described an array of strategies used in single text reading, many of which are reiterative in a process of reading and learning the contents of Internet texts. Readers perform both literal and inferential comprehension to make sense of webpage content, including relating prior knowledge with the information in the text, paraphrasing the text content and elaborating their understanding of the content, identifying keywords and topic sentences, analyzing and synthesizing different parts of texts, making inferences about implicit meaning, and generating questions about the author's intents and purposes.

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However, strategies for single text reading may not be sufficient for learning on the Internet. Internet contexts call for readers who are able to build a global representation of meaning since numerous texts are posted, updated, and connected on the Internet. As hypertext research suggests, Internet readers must select useful texts and construct meaningful relationships among these texts (Bolter, 1998; Charney, 1987; Landow, 1992). Thus, to read on the Internet and learn from Internet texts necessarily requires strategic choices among multiple texts (and links), and also strategic moves within, between, and across multiple texts.

Internet reading is rife with reading multiple texts connected by links (Afflerbach & Cho, 2009). While managing digital links displayed on a screen (Yang, 1997), readers build intertextual links in their minds, which semantically tie multiple texts together in a relevant way (Hartmann, 1995). A group of linking strategies (e.g., comparing, contrasting, interrelating, corroborating) assists readers in the location of intertextuality in their cognition (Afflerbach & Cho, 2009). They use these strategies to identify interconnections of information and construct a meta-representation of multiple texts that are explored, examined, or often encountered (Stromso, Braten, & Samuelstuen, 2003; Wolfe & Goldman, 2005). Readers perform selective reading and adjust their attention and cognition according to the determined importance of information (Van den Broek, Rapp, & Kendeou, 2005). Readers, through the course of Internet reading, filter irrelevant information based on a goal for reading, refine evolving understanding, and probing information that should be used in their critical questioning task (van Dijk & Kintsch, 1983).

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Both within- and cross-textual reading strategies are central to the completion of a primary goal of reading, that is, reading for understanding (Goldman, 2003; Brate & Stromso, 2011; Rouet, Britt, Mason, & Perfetti, 1996). Readers must manage numerous links and texts on the Internet and build intertextual links in their minds, using a variety of "linking" strategies (Afflerbach & Cho, 2009). Understanding evolves along this process of intertextual reading, which is reiterated in selecting useful texts, constructing text environments, and identifying and learning important information. The evolving understanding opens up another opportunity to fuel additional information seeking and research on unsolved problems.

Monitoring strategies

Monitoring is a metacognitive function (Garner, 1987). It is used to keep a balance between the two activities for Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content. As demonstrated in the descriptions of construction strategy use the participants in this study, monitoring is central to a self-regulated process of reading in the digital hypertext information space. Monitoring strategies are used in (a) the establishment of reading paths, (b) the construction of meaning, and (c) self-reflections as readers.

The multiple roles that monitoring plays in Internet reading can be explained in terms of the nature of Internet reading task. Hypertextuality of Internet reading imposes on readers a dual-task: processing and managing information (Yang, 1997). The activity of accessing and selecting relevant and useful texts and determining the reading order and paths (Realizing and Constructing Potential

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Texts to Read) and that for comprehending multiple links and texts (Identifying and Learning Text Content) often take place together. The goal of meaning construction guides selection of links and texts, and better choices of texts and links build a foundation on which meaning construction can be fostered. Repeated difficulties in information searches and link selections consume cognition that might otherwise be used in more productive comprehension. These readers may be disoriented not just because they get lost in a digital hyperspace (Yang, 1997) but also because their cognitive flexibility becomes significantly limited to one side of Internet reading due to cognitive overload (Niedehauser, Reynolds, Salmen, & Skolmosky, 2000). They in turn may fail to adjust their cognition and attention between these two important activities for Internet reading (Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content).

As numerous studies on expert readers' strategic text processing documented (Pressley & Afflerbach, 1995), results demonstrate that monitoring is habitual for the proficient adolescent readers participating in this study. They automatically use monitoring, and thus it is rarely observed during their smooth reading. However, this automaticity or habituation does not mean that metacognition or consciousness is not there. Proficient readers are more likely to detect problems with searching and comprehension, and this indicates that monitoring is functioning. Once these readers detect problems in selecting useful information and understanding the information, they increase cognitive efforts to identify sources of the difficulty, look up alternative strategies, and apply the fix-up strategies. They also intentionally increase their attention to identify and perform

follow-up actions when they determine the need for a complementary information search or more in-depth examination of text content. Varying rates of reading and adjusted amount of cognitive efforts are possible because strategic readers conduct a continual monitoring of their own reading and thinking processes (van den Broek, Rapp, & Kendeou, 2005), even though it does not always generate actual behaviors.

Monitoring is a key to understanding strategies as goal-directed activities, as consistently revealed in this study. In some sense, the fact that readers use strategies in a particular way at a particular moment means that they are able to monitor and regulate their thinking processes (Paris, Lipson, & Wixson, 1983). Being cognizant of a process of using a variety of strategies means that readers self-reflect on proximal or distal focus of reading and be sensitive to the text environment realized and constructed and the evolving meaning in the mind. Results of this study demonstrate that monitoring is central to flexibly regulating these transactional processes between the reader and the text (environment) and is an important step in achieving the goal of reading.

The monitoring strategies used by the participants in the Internet reading task have both similar and somewhat different aspects, compared with those for print reading. Internet reading adds an important additional task to monitor, that is, Realizing and Constructing Potential Texts to Read, on top of the primary and common task of reading in general, that is, Identifying and Learning Text Content. During the course of searching for and selecting useful links and texts, readers should detect disorientation problems and ineffective information searches. Once a problem is detected, they should identify the sources of the problem and generate

and apply alternative strategies. This task becomes increasingly complicated and demands more sophisticated monitoring strategy use (Afflerbach & Cho, 2009; Yang, 1997). Nevertheless, overall, the monitoring strategies found in this study maintain the psychological (metacognitive) nature enacted and regulated as knowing of knowing, doing, and thinking.

Evaluation strategies

Evaluative strategies contribute to both Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content. They are evoked at nearly every single moment of the decision-making process in the entire act of Internet reading. A variety of evaluation strategies are used when the adolescent readers participating in this study (a) examine the usefulness of links before and after accessing them, (b) judge information value of a certain web page, (c) and assess the overall quality of a website.

Evaluative strategies help readers anticipate the usefulness of links before accessing and using the links in the initial stage of hyperlink selection (Leu et al., 2008). Readers examine characteristics of multiple hyperlinks in light of their credibility, relevance, and usefulness. Examination of hyperlinks gives readers evidence to decide whether to use particular links. Link evaluation takes place in a quick cycle of retrieving and accessing links, making meaning from the minimal information of links, and determination of their usefulness. Readers use mostly surface markers explicitly appearing on a webpage or website (Brem, Russell, & Weems, 2001. These include link titles, a few lines of written texts, URLs, and so

on. Readers make inferences. Based on results of examining this very limited information, readers judge whether a particular link would be good to use.

Once a link is selected, readers perform confirmatory evaluation of the text (webpage) that has been led by the link (Kiili, Laurinen, & Marttunen, 2008). Readers initially scan the content of the text to see if it is relevant and there is anything useful for their learning. Readers look up any information that denotes authorship and sponsorship of the text, clicking relevant menus and links (e.g., About Us, copyright) to see who creates and sponsors it. They also look up information indicating up-to-datedness and maintenance and infer trustworthiness from certain information like contact information.

However, a critical process of reading takes place beyond using only explicit information in web sources (Brem, Russell, & Weems, 2001; Damico & Baildon, 2007; Henry, 2005; Hoffman, Wu, Krajcik, & Soloway. 2003). Readers make initial inferences about the quality of web sources from available superficial markers (e.g., URLs, copyright info). After this quick and shallow process of evaluation, critical readers allot more attention to delving into internal features of texts. They analyze how tightly a claim and evidence are bonded together and judge the validity of the author's argumentation. These readers infer commercial intents underneath the language and what the text really means to the readers themselves. They then finally judge the relevance and usefulness of texts and determine whether to continue to read it or leave from the page.

Internet readers not only evaluate individual web pages, but they also assess the overall quality of text (Dragulanescu, 2002; Rieh, 2002). Readers primarily

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impose relevance criteria in this appraisal of a website, and then examine the credibility and trustworthiness of the website by identifying surface markers and understanding text content. Readers also evaluate how many references a certain website can offer them or how it could potentially lead them to other relevant sources within and beyond the site. This aspect of website quality, the so-called "connectivity" of the website, is considered to be important, especially in determining and selecting useful websites to be used. This is because readers are aware of use of the site. Readers employ "sourcing" strategies (Wineburg, 1991) to value and critique each of the websites they are reading, and assign a unique role to each of the sites for future references and subsequent research.

In summary, results of this study demonstrate that the group of strategies for evaluation of different aspects of reading is central to a process of text analysis and informed decision-making in new literacy contexts (Bruce, 2000; Fabos, 2008; Luke & Freebody, 1997). Among them, anticipatory evaluation strategies come to the forefront (Coiro & Dobler, 2007). In an open-ended hypertext space, readers must examine and determine usefulness of links and texts presented on a screen and use the results when they select (or reject) links and texts. Anticipatory evaluation of links and texts, often using minimal information, is an initial and critical step toward constructing relevant and useful text environment. Anticipatory evaluation before accessing particular links and texts is then tested through the activity of confirmatory evaluation based on an understanding of both internal and external features of text.

6.3. The Complexity of Use of the Four General Types of Constructively Responsive Reading Strategies

Dynamic interplay of constructive reading strategies in Internet Reading

Dynamic strategy interplay features regularly in Internet reading. As demonstrated in the study, an individual strategy does not work alone. In many cases, multiple strategies are used in a specific combination and sequence. Pressley and Afflerbach (1995) noted that while each of the general strategies is conceptually differentiated, these strategies often, almost simultaneously, work together and jointly contribute to successful reading. Dynamic interactions between and among multiple strategies contribute to both readers' accessing and selection of useful texts and their meaning construction from the texts.

The variation of the strategy interactions increase, in comparison with print reading, because Internet reading requires an additional type of strategic activity (i.e., Realizing and Constructing Potential Texts to Read) on top of the three types of strategies that must be enacted in reading print texts (i.e., Identifying and Learning Text Content, Monitoring, Evaluation). In print reading, readers perform monitoring and evaluation to get a better understanding of text content. In Internet reading, however, readers should additionally monitor and evaluate to access and select useful information. Internet readers navigate an uncertain information space while exploring possibilities to gain more relevant and useful information. Internet readers construct meaning from links and texts while managing them. As a consequence, although cognitive loads and demands may vary, Internet reading breeds another layer of complexity (Coiro & Dobler, 2007).

Constructive reading strategy as the goal-directed means in Internet contexts

My quantitative analysis indicates an association between strategy use and session task when the strategy data from all seven participants are aggregated. This result is anticipated, given the nature of strategy use as a goal-directed activity (Alexander, Graham, & Harris, 1998). Readers coordinate four different types of strategies, according to tasks and goals in the digital information space (Kim & Allen, 2002; Protopsaltis & Bouki, 2006). For example, readers use more strategies for Realizing and Constructing Potential Texts to Read as they need to seek and select useful texts, but they shift their attention to use of strategies for Identifying and Learning Text Content as they need to learn with Internet texts, construct meaning from the texts, and develop critical questions based on the evolving understanding.

Managing and balancing between these two activities are informed by readers' goal-reflections and monitoring strategy use (Zhang & Duke, 2008). Readers use monitoring strategies in a consistent way, regardless of their tasks in Internet contexts. Even text boundary is limited to a certain numbers of texts, Internet readers must decide when to go to search and when to start to read found texts. Metacognitive monitoring is central to regulation of a process of reading between Realizing and Constructing Potential Texts to Read and Identifying and Learning Text Content. Again, this reflects the nature of Internet reading task that demands readers to perform both information management and information comprehension, simultaneously. Internet readers consciously juggle their cognition

and attention, balancing between the construction of text environments and the construction of meaning.

Differences in the performances of Internet reading strategy use among individuals

Although there are general tendencies that proficient adolescent readers bring to the Internet reading tasks, as indicated in the analysis of individual participants' strategy use, varying degrees of differences in use of the four types of strategies among individual readers exist. Some of the readers in this study use relatively more strategies for Realizing and Constructing Potential Texts to Read, continuing to perform this mode of reading across the sessions. In contrast, others use relatively more strategies for Identifying and Learning Text Content even when they need to find and select links and texts. These two modes of reading, RC-driven and IL-driven, are helpful to characterize the participants as Internet readers.

Distinctive modes of Internet reading strategy use reflect differences in what readers are pursuing. The RC-driven mode of strategy use in Internet reading happens for a few reasons. This mode of Internet reading is observed if the reader has strong background knowledge and beliefs related to the topic of reading. The reader constantly seeks information that supports the reader's own claims and beliefs, rather than gathering relevant information from an open-minded stance toward new ideas and arguments. That is, this reading is more toward seeking the answer, rather than opening up multiple directions. It is similar to reading from an "efferent" stance to find the information and answer from the text, rather than reading from an "aesthetic" stance by appreciating texts, actively responding to

contents, and justifying the responses with evidence from "aesthetic" stance (Rosenblatt, 1994).

Sometimes this continued RC-driven mode of Internet reading is caused by a "bottleneck phenomenon" (Leu et al., 2008): The ineffectiveness of information searches and repeated failures hamper readers' engagement in information processing and meaning construction. The ill-constructed (or unconstructed) text environment is unlikely to give readers opportunities to learn from the texts. As this situation re-generated information needs, readers go back to search again for unsought information (Bilal, 2000). Thus, the information search becomes "reactive" behaviors without rigorous planning and prediction (Fidel et al., 1999), instead of "responsive" acts to the text environment (Afflerbach & Cho, 2009).

The IL-driven mode of constructive strategy use in Internet reading happens for other reasons. This mode of reading is observed in the step-by-step procedures of Internet reading. The readers in this mode starts to read by gathering and learning general information that can complement the lack of prior knowledge or help them overview the problem space. They then go into deeper meaning processes by spending more time and efforts to identify and learn important information in the text(s). Even in the process of information search, these readers often engage in analyzing details, connecting information segments, and integrating them into a meaning. They focus more on the ultimate goal of reading (critical questioning in this task), rather than proximal task demands.

The IL-driven mode of constructive strategy use is observed from critical readers' Internet reading. The more critical the reader is, the more strategies the

readers use in evaluating links and texts (Luke & Freebody, 1997). This reader uses surface markers for an initial, quick judgment of certain links and texts (Brem, Ressell, & Weems, 2001) but shifts reading attention to delving into relevance of contents of texts and validity and plausibility of ideas and perspectives presented in texts (Damico & Baildon, 2007a, 2007b). The reader also examines hidden meaning, intents, and purposes of the texts. This critical reading is a process in which readers use the meaning constructed from texts in valuing and critiquing texts they read.

6.4. Concluding Remarks

Strategy is invisible. It is often instant and ephemeral. Thus, to chart and document strategy use is a challenging task. The difficulty of conducting research on strategy use increases as new literacy contexts bring another layer of complexity to reading that has not yet been fully investigated. This challenge, however, signifies an ongoing investigation of the nature of constructive strategy use in changing contexts of reading. Explication of reading strategy contributes to our evolving understanding of the construct of reading, and it provides a foundational knowledge base to be used for our student readers.

In this study, I examined seven proficient adolescent readers' Internet reading and their strategy use. From a theoretical standpoint, I took advantage of using our previous scholarship that explored the nature of reading and strategy use, in order to understand complexity of new forms of reading. This enabled me to approach research questions from a broader understanding of reading. From a methodological standpoint, I used verbal protocol methods complemented with

newer methods to collect real-time process data. This afforded me the observation and description of invisible workings of human mind involved in Internet reading.

Grounded in relevant research literatures—reading comprehension, intertextuality, and new litercies—this study used the model of *Constructively Responsive Reading* to construct detailed descriptions of constructive reading strategy use in Internet contexts. Using this model that has evolved from print reading to Internet reading, based on comprehensive research syntheses, allowed the integration of new literacy strategies with "more" traditional literacy strategies in this examination of new literacy activities.

Results of this study supported the model of Constructively Responsive Reading, with empirical data that describe cognitive acts of reading in new literacy contexts. Both qualitative and quantitative analyses offered detailed descriptions of the diverse roles and functions of the four general types of constructively responsive reading strategies in Internet contexts: *Realizing and Constructing Potential Texts to Read*, *Identifying and Learning Text Content*, *Monitoring*, and *Evaluation*. Results revealed the complexity of how these strategies jointly contributed to Internet reading. Identification of diverse patterns of strategy use informed us about the nature of constructive reading strategy as the goal-directed and situated activity, and the strategy use varying by individual readers.

Reading on the Internet is often portrayed an entirely "new" literacy practice. Although the study design does not allow direct explanations of how "new" are new reading strategies, results of my study describe shared or distinctive aspects of strategy use between print reading and Internet reading. Internet reading

requires newly demanding strategies but also shares large numbers of strategies

necessarily used in print reading. It is my belief that this insight will fuel subsequent

research efforts to gain a situated understanding of Internet reading as part of new

literacies, which are situated and shaped in new media environments.

Chapter 7: Possible Considerations for Educational Practice

The informed pedagogy of reading begins with a precise and detailed understanding of the construct of reading. Despite being developed for the purpose of theory building, I believe that my study indirectly informs reading instruction intended to help students become more strategic and critical readers. It offers detailed accounts of students' reading strategy use that can help us better understand student reading in these new literacy contexts. This foundational knowledge base may be used eventually in designing and implementing effective instruction and assessment.

Reading instruction that supports student readers' strategy development in new literacy contexts

Reading instruction should take similarities and differences between traditional and new forms of reading into consideration. Reading educators who develop instructional programs for teaching reading strategies should ask what should we retain from current instruction and what we newly consider from newly emerging research. Current reading instruction is mostly focused on skills and strategies in reading print texts, but that does not mean that it should be replaced with the instruction only focused on new literacy skills and strategies. New forms of reading and print forms of reading have both commonalities and distinctiveness. Reading strategy instruction for new forms of reading could build upon the instruction informed by theories of print-based reading as long as it considers newly

demanding skills and strategies to be important to reading development in today's new literacy contexts.

As findings from this study imply, metacognition is important to successful reading and thus reading instruction should foster student self-regulatory skills and strategies at a higher-order level of thinking. Managing the acts of reading is challenging for student readers. Metacognition is constantly required throughout the course of reading. It operates at every moment of reading, even though it is not explicitly generated and activated. These self-regulatory skills and strategies are even more important in Internet reading, given the complexity of strategy use. Student reading achievement could increase to the extent that instruction increases student metacognitive processes. Thus, reading strategy instruction should provide many opportunities for students to have metacognitive experiences and think of their own reading and thinking.

An understanding of the situated nature of reading strategy use should factor into the development and implementation of reading instruction. Instruction should encourage student growth in a variety of Internet reading situations. Multiple relationships may be imagined in Internet reading as we contemplate interactions between multiple authors, multiple readers, and of course multiple texts. As the Internet is a primary and popular learning resource, reading instruction should consider the situations in which Internet reading is performed for inquiry-based learning and other academic projects in content areas, including social studies and science. By having exposures to various reading situations, student readers may

have the opportunity to build meta-knowledge about reading so that they could

learn to use optimal strategies for particular tasks and contexts.

Reading assessment that honors the complexity and new demands of reading

As the construct of reading changes, assessment must reflect the changes.

Designing valid reading assessments begins with an understanding of the construct

of reading and the determination of what important knowledge, skills and strategies,

and dispositions contribute to reading. In the current test regime, it is problematic

that assessment defines the construct to be assessed as it narrowly conceptualizes

the construct of reading. The result is that we gain evidence of students' reading

that at most explains basic skills and strategies elicited in reading short written

paragraphs. Assessment should represent our evolving understanding of reading and

important competences contributing to successful reading. This type of assessment

develops tasks and situations that elicit higher-order thinking skills and strategies

required in successful Internet reading. We could make interpretations of what

students know and can do in reading from assessment evidence, and gain insights

what they need to know more and what they should learn for their reading success.

As this study especially accounts for new types of strategies for Internet

reading, Realizing and Constructing Potential Texts to Read, we should take it into

important consideration to factor into the design of reading assessments. This

activity is an initial and critical part of Internet reading. Reading on the Internet is a

process of inquiry in which readers research certain problems and issues by

surveying a relevant information space, identifying and selecting useful texts, and

constructing their own paths to addressing the problems and issues. Since these

skills and strategies are in increasing demand in new literacy contexts, reading

assessment should measure these dynamic and complex acts of reading, and provide

detailed and accurate descriptions of such reading.

Assessments of reading intended to capture these complexities should count

traditional reading strategies as well as newly demanding strategies. New contexts

of reading shape the use of a same strategy in a different way as noted and

investigated in research on situated cognition and learning. General strategies,

including meaning construction, monitoring, and evaluation, used in print reading

contexts still take central roles in Internet reading. When both new and traditional

reading strategies are fully represented in tasks and situation of reading assessment,

we may build more comprehensive explanations of student reading.

Appendices

Appendix A. The Pre-research Questionnaire to Gather the Information on Participants' Reading Experiences: This questionnaire is built upon Coiro and Dobler's (2007) work.

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STUDENT QUESTIONNAIRE ABOUT READING EXPERIENCES

Name: _____   Age: _____

Gender: ___ Male   ___ Female   School Grade: _____

Primary Language: _____

On your print reading experiences:

I would like you to tell me about your reading experiences, especially when you read print texts. There are many types of print texts, which include school textbooks, commercial books, newspapers, magazines, novels and poetry, and any kinds of informational and literate texts, literally, printed on the papers. Responding to these questions, please focus on your reading of such print texts, rather than reading on the Internet. Circle the best response and fill in information as needed.

1. Do you like to read print texts? a. Yes   b. Sort of   c. No

2. Where do the print texts you read mostly come from?
   a. School   b. Home   c. Library

d. Any other places:

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3. How much time in one week do you spend reading print texts in your school?

_____hour(s).

4. In out-of-school settings (at home, library, and any other places), how much time do you spend reading print texts in one week?

   a. Less than 1   b. Between 1 and 3 hours

   c. Between 3 and 5 hour   d. More than 5 hours: _____

5. Look at the following six reading activities, and estimate the amount of time you spend doing each activity. Then, please rank the following six reading activities in order of use from 1-6, with "1" being most frequent and "6" being least frequent.

    ____ Reading books and articles given by teachers for school work

    ____ Finding books and articles from libraries and reading them for school

        works

    ____ Reading self-selected books and articles for information, but not for

        school work

    ____ Reading novels and poetries for school work

    ____ Reading novels and poetries for pleasure

    ____ Reading cartoons and any other materials for pleasure

6. How important is being a good reader with print texts to your school success?

   a. Very important   b. Important   c. Not so much important   d. Not at all

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7. How good are you at understanding the texts that you read?

   a. Quite good   b. Adequate   c. Not so good   d. Not at all

8. How good are you at evaluating the texts that you read?

   a. Quite good   b. Adequate   c. Not so good   d. Not at all

9. What do you think of the importance of print reading abilities in successful Internet reading?

   a. Very important   b. Important   c. Not so much important   d. Not at all

10. What do you think good readers do in reading print texts? Please list at least five strategies they use while reading print texts.

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On your Internet reading experiences:

Next, I would like you to tell me about your experiences in Internet reading. Internet reading means searching for, locating, understanding, and learning any kinds of texts that you can find on the Internet in online contexts (e.g., visiting websites, reading blogs, using search engines). Responding to these questions, please focus on your reading of such Internet texts, rather than reading print texts. Circle the best response and fill in information as needed.

1. Do you like to read on the Internet?   a. Yes   b. Sort of   c. No

2. Where mostly do you read on the Internet?
   a. School   b. Home   c. Library
   d. Any other places:

3. How much time in one week do you spend reading on the Internet in your school?
   _____ hour(s)

4. In out-of-school settings, how much time do you spend reading on the Internet in one week?
   a. Less than 1 hour   b. Between 1 and 3 hours
   c. Between 3 and 5 hours   d. More than 5 hours: _____

(Page 4/5)

5. Look at the following six activities, and guess the amount of time you spend doing each activity. Then, please rank the following six reading activities in order of use from 1-6, with "1" being most frequent and "6" being least frequent.

_____ Using web search engines and visiting different websites for school work

_____ Searching and learning websites for information, but not for school work

_____ Playing interactive games on the Internet

_____ Visiting social networking websites (e.g., *facebook*)

_____ Using e-mail, Instant Messenger, or *twitters* for communication

_____ Downloading music or software games.

6. How important is being a good reader in Internet reading to your school success?

   a. Very important   b. Important   c. Not so much important   d. Not at all

7. How good are you at understanding the texts that you read on the Internet?

   a. Quite good   b. Adequate   c. Not so good   d. Not at all

8. How good are you at evaluating the texts that you read on the Internet?

   a. Quite good   b. Adequate   c. Not so good   d. Not at all

(Page 5/5)

9. What do you think good readers do in reading on the Internet? Please list at least five strategies they use while reading on the Internet.

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Thank you very much!

Appendix B. Sample critical questions used in the session for modeling critical questioning prior to Internet reading.

The following is an example of critical question. Please carefully read the example. You may refer to this example when you develop your critical question.

Topic: **Fast Food**

Superficial Response

Critical Question: How seriously are fast foods bad for health?

Why is it important to ask? Fast foods contain high fat and calories, and this causes many chronic diseases. We need to know how fast foods are bad for health. This understanding will remind us of the harmfulness of consuming of fast foods.

Critical Response

Critical Question. How could we critically read the fast food advertisements on TV, Internet, and other media? What lifestyles, values, and points of view are represented in the message? What types of people are included or not included in the commercials? What is the message being sent? How could we critically respond to them?

Why is it important to ask? Children are extensively exposed to a lot of fast food commercials from TV, Internet, magazines, and other media. However, while most advertisements represent stereotypic healthy people who are enjoying fast foods frequently, the images may not be true and rather provide untested information. For example, physical activity and sports are often used in ads marketing foods and drinks to children. This may mislead them to think that the foods and drinks are healthful. In fact, the foods and drinks that are marketed to kids are often high in calories, added sugar, and fat and low in nutrients. We should help our children read these fast food ads by providing formal/informal programs encouraging a critical process of examining who created the ads, what are their purposes, what biases are represented, and so forth.

Appendix C. The Assignment Sheet Given to Participants in the Open Website Searching (Session I)

SESSION I. OPEN WEBSITE SEARCHING

In this session, you will search for and read useful information from the Internet. Among a lot of web sources, you should select THREE MOST USEFUL WEBSITES to learn about the topic. You can use UP TO 45 MINUTES for this session.

I would like you to pay special attention to EVALUATING EACH OF THE WEBSITES by examining the following three aspects while you search the Internet:

- How it is *comprehensible* (e.g., How was it easy to comprehend or hard to comprehend?)
- How it is *informative* (e.g., How did it contain and provide useful information or not?)
- How it is *credible* (e.g., How did you trust the information and believe it is accurate?)

While reading on the Internet, you will THINK ALOUD what is going on in your mind. Your think-alouds will become invaluable research data, from which I can infer what you read on the Internet. I encourage you to spontaneously verbalize your thinking as much as you can. You may be sometimes asked to think-aloud further at the particular points that I am interested in your thinking.

You can access any search engines and visit any websites. Think of the computer you are using is your own computer so that you can use any functions available on the computer (e.g., book-marking a webpage). Please make sure to BOOKMARK the three websites you selected into the favorites center.

Appendix D. The Assignment Sheet Given to Participants in the Focused Website Learning (Session II)

SESSION II. FOCUSED WEBSITE LEARNING

You have selected the three websites you judged as useful sources for this assignment. In this session, you will conduct focused, in-depth READING OF THE THREE WEBSITES to construct a critical question that guides classroom discussion related to the topic. You can use UP TO 45 MINUTES for this focused Internet reading.

I would like you to pay special attention to EVALUATING EACH OF THE WEBSITES by examining the following three aspects while you learn with the websites:

- How it is *comprehensible* (e.g., How was it easy to comprehend or hard to comprehend?)
- How it is *informative* (e.g., How did it contain and provide useful information or not?)
- How it is *credible* (e.g., How did you trust the information and believe it is accurate?)

As same as you did in the previous session, I would like you to THINK ALOUD what is going on in your mind while reading on the Internet.

Upon the completion of this session, you will type in your answers to the following questions.

- What is your critical question?
- Why is it important to ask and discuss?

Appendix E. Website Evaluation Questionnaire: After Session I

WEBSITE EVALUATION I: AFTER SESSION I

By marking in each table below, evaluate the website you selected in terms of comprehensibility (e.g., How was it easy to comprehend or hard to comprehend?), informativeness (e.g., How did it contain and provide useful information or not?), and credibility (e.g., How did you trust the information or believe it is accurate?). If you need, you may look back the bookmarked websites.

Marking "0 "through "5" on this sheet entirely depends on how strongly you agree with the question.

For example,

- If you *do not agree with the question at all*, then you can circle on *the number "0."*
- If you *highly agree with the question*, then you can circle on *the number "5."*

For website:

Is the website *comprehensible*? ------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? ----------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? --------------------------------- 0 – 1 – 2 – 3 – 4 – 5

For website:

Is the website *comprehensible*? ------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? ----------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? --------------------------------- 0 – 1 – 2 – 3 – 4 – 5

For website:

Is the website *comprehensible*? ------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? ----------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? --------------------------------- 0 – 1 – 2 – 3 – 4 – 5

Appendix F. Website Evaluation Questionnaire: After Session II

(Page 1/2)
WEBSITE EVALUATION II: AFTER SESSION II

By marking in each table below, evaluate each Website you selected in terms of comprehensibility (e.g., How was it easy to comprehend or hard to comprehend?), informativeness (e.g., How did it contain and provide useful information or not?), and credibility (e.g., How did you trust the information or believe it is accurate?). If you need, you can look back the bookmarked websites.

As same as what you did in the previous session, marking "0 "through "5" on this sheet entirely depends on how strongly you agree with the question.

For example,

- If you *do not agree with the question at all*, then you can circle on *the number "0."*
- If you *highly agree with the question*, then you can circle on *the number "5."*

For website:

Is the website *comprehensible*? --------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? -------------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? ------------------------------------ 0 – 1 – 2 – 3 – 4 – 5

For website:

Is the website *comprehensible*? --------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? -------------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? ------------------------------------ 0 – 1 – 2 – 3 – 4 – 5

For website:

Is the website *comprehensible*? --------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *informative*? -------------------------------- 0 – 1 – 2 – 3 – 4 – 5

Is the website *credible*? ------------------------------------ 0 – 1 – 2 – 3 – 4 – 5

(Page 2/2)
I am curious about what kind of evidence you used for the website evaluation and how it helped your decisions. Please write down any evidence you used for this website evaluation task.

TYPE

Appendix G. The Full Catalog of the Constructive Internet Reading Strategies Used by the Seven Proficient High School Readers Participating in the Current Study.

Realizing and Constructing Potential Texts to Read

Exploring Goal-Relevant Information Space

1. Accessing an information space relevant to the goal(s) of reading by generating key words related to the topic and focus of a particular task, with a web search engine in the beginning stage of Internet reading:

   A. Accessing a goal- and topic-relevant information space by locating a general web search engine (e.g., Google) and by generating and applying topic-related key words, based on the reader's prior knowledge and the initially constructed goal of reading: (a) to overview the range of possible target information and (b) to overview ideas, debates, and issues related to the topic of reading.

   B. Accessing possible target information by changing web search engines: (a) to solve the problem of repeated difficulty and failure in the previous web search engine use; (b) to navigate an unexplored information space that might have not been identified in the previous web search engine use; and (c) to enhance the effectiveness of the current information search with different forms of search terms (e.g., multiple discrete terms or question-type search terms).

2. Managing the range of possible information by modifying previously used search terms to better clarify suitability of links and potential reading path:

   A. Revising topic-related search terms by reflecting on evolving goals and questions: (a) to find unsought information by comparing what information has been located and read so far with what information should be sought; (b) to redirect the process of information seeking and path construction by narrowing down the currently identified information space to access more specific sources.

   B. Revising search terms by using (a) genre-related words in the structure of search term to find a specific genre of Internet publishing or web sources (e.g., blogs, websites, news articles, research reports) and (b) the words that reflect the reader's epistemological stance toward knowledge and truth (e.g., factual,

scientific, credible) to limit the range of information and to locate different types of factual or opinionated information; and (c) the words that indicate authorship or source of knowledge (e.g., government, interest group)

    C. Revising search terms by determining more suitable search terms (a) between two or more competing options generated in the mind by anticipating effectiveness and result of those available options and (b) between multiple auto-complete search terms suggested by a web search engine by examining their goodness-of-fit during or after generating and applying tentative key words in the search box.

    D. Revising search terms by reforming linguistic structure from discrete search terms into question-type search terms (and vise versa) to seek answers relevant to the evolving question or web sources focused on the question.

3. Locating and accessing topic-related websites to overview and learn possible target information by activating the reader's own prior knowledge (a) related to usefulness of the websites and (b) related to recognition of the websites' authorship and reputation (e.g., a group of people who create, maintain, and sponsor the sties).

4. Locating and accessing open web sources (e.g., wikis, blogs, social networking sites) (a) to overview background information that may help directing information searching; (b) to overview hyperlinks and references that may lead to goal-relevant sources; and (c) to survey different people's perspectives on the reading topic and its related issues.

5. Using built-in information searching tools within a particular website to seek and overview relevant information further in addition to the reading of the currently accessed webpage when the website appears to be promising to provide relevant information based on the reader's productive experiences of reading information on the websites.

Selecting Hyperlinks and Navigating toward Useful Information

1. Scrutinizing hypertext entries and links (e.g., resultant entries on a *Google* page) and choosing (or rejecting) and sequencing the reading order by judging the usefulness and significance of the information before accessing it, based on specific reading goals and the evolving meaning:

    A. Activating prior knowledge and experiences (a) to determine the usefulness of hyperlinks and websites connected through the links and (b) to determine the credibility of a group of people, organizations, and/or companies that create, manage, and sponsor

the sites.

    B. Generating inferences about the relevance of information to be encountered as a result of using hyperlinks, often with minimal textual information (e.g., entry titles, a couple of lines of written texts under the link titles)

    C. Generating inferences about the credibility and reliability of information connected through hyperlinks, based on the judgment of URLs (e.g., .com, .gov, .org, .edu)

    D. Generating inferences about the possibility that hyperlinks may lead to a variety of sources presenting different perspectives and ideas or more specific information as focus of reading is narrowing down more and more

2. Selecting relevant and useful menus and links and sequencing the reading order within a website to access further information relevant to specific focus of reading and the evolving meaning:

    A. Browsing menus available on a website to overview if the site provides goal-relevant information, prior to determining the website as a potentially useful source to learn about the topic.

    B. Accessing different parts in the architecture of website and finding stored relevant information different from what are present in a current webpage.

    C. Sampling a couple of hyperlinks, when a series of similar hyperlinks are listed up on a webpage, to test a hypothesis about the nature of the information that hyperlinks may lead to.

    D. Examining and selecting highlighted, underlined, and/or colored words, citations, subheadings, and references (i.e., text-embedded hyperlinks) that may lead to useful information and sources to learn further about the topic of reading while comprehending textual information.

    E. Accessing source information of a current website by locating and selecting menus and links that may indicate who develops, sponsors, and manages the websites (e.g., activated copyright information at the bottom of the webpage, a menu labeled 'About Us') to check authorship, credibility, reliability, and trustworthiness.

3. Deciding whether to read or reject a website, based on the judgment of potential usefulness of the site:

A. Keeping useful websites in tabs, favorites center, or bookmark folders (or note-taking URLs on a notepad) (a) as tentative references that may be used in the course of (re)researching the topic of reading and (b) major sources to read further in the later stage of Internet reading to develop understanding of the topic of reading.

B. Rejecting (leaving) websites informed by the result of website evaluations in terms of relevance, commercial intent, information value, trustworthiness, credibility, comprehensibility, and overall usefulness.

Identifying and Learning Text Content

Making Meaning from Hyperlinks

1. Overviewing and scanning a list of entries resulting from a web search engine use or a group of links listed up on a webpage, prior to determining whether to use those hyperlinks:

    A. Examining a group of entries and links to make an overall sense of common topics, themes, and characteristics across those hyperlinks and information connected through the links.

    B. Interrelating meaning inferred and constructed from the reading of a series of hyperlinks with the evolving goals, questions, and foci of reading, and judging relevance and usefulness of the links.

2. Comprehending minimal textual information (e.g., link titles, captions of image links, short written descriptions, previews, author and source information, descriptions in a mouse-over text) and constructing meaning not only while overviewing and examining entries and links listed on the webpage(s) resulting from web searching but also during the reading of textual information with hyperlinks (e.g., highlighted words and phrases in the text, a series of subheadings connecting sources, references listed at the bottom of the page) on a webpage:

    A. Identifying important ideas from minimal textual information in the hyperlinks.

    B. Generating multiple-layered inferences about what information may be connected through hyperlinks and how relevant the information would be.

    C. Inferring the hidden (commercial and/or political) intent and authorities of hyperlinks and information connected through the links.

Comprehending Information within a Webpage

1. Overviewing (skimming) a web source to make an overall sense of its relevance and usefulness:

    A. Noting characteristics of web sources in relation to length, amount of information, advertisements and banners embedded, menus and links available, authorships and maintenance, and design and layout.

    B. Noting important parts, especially important covered in the web source by scanning content-related features with a special focus on headings, subheadings, and highlighted/bold words, table of contents, and interactive overview.

    C. Determining what to read in what order, what to read in detail, and what to ignore by rating importance of content and conducting selective reading.

    D. Summarizing what was gained from previewing, and based on this summary, generating an initial hypothesis about what the text is about, one that can be revised or refined in light of information gained during subsequent and more careful reading.

2. Identifying and reserving important information in a web source that can contribute to understanding of current text and eventually understanding the reading topic

    A. Using prior knowledge of the text topic, text structure, author, and so on to decide what is important to attend during processing the text

    B. Repeating, restating, and paraphrasing text just read

    C. Looking for key words (e.g., concepts that are repeated in a text, domain-specific vocabularies, topic sentences, and topic paragraphs, and topic text boxes.

    D. Note-taking to store and remember important information, summarize and clarify current understanding, form questions to be further investigated, annotate text characteristics, and manage information

3. Generating inferences consciously to enhance the construction of meaning from a web source

    A. Inferring necessary but missing information to understand text

content and filling deleted information

    B. Generalizing text contexts by applying specific cases and examples described in the text into a broader context and situation

    C. Inferring plausibility of information in a text by checking and questioning (in)consistency between the reader's prior knowledge and text information currently being read

    D. Inferring intended or expected readers who may access, read, and benefit from a text and valuing importance of text content

    E. Generating inferences about author arguments and claim-and-evidence relationships based on information provided in a text

4. Analyzing and synthesizing different parts of text

    A. Comparing the degree of agreement between perspectives, arguments, and questions presented in the text and the reader's own stance, perspectives, and questions toward the same issue

    B. Comparing and contrasting different and/or conflicting perspectives on the same issue presented within the webpage

    C. Comparing and connecting pictures, images, and graphics with the written text for better understanding

    D. Synthesizing pieces of information from different parts of the text to make a sense of what the text says about

    E. Analyzing author claims, supporting details and evidence, and logical relationships between the claim and evidence

    F. Using complementary textual information attached to tables, charts, and maps to better understand the information from those non-continuous sources (e.g., titles, descriptions, map legend, notes on the table)

5. Interpreting text content by using prior knowledge and updated understanding

    A. Identifying 'symbols' (e.g.,   ) or 'symbolic language' (e.g.,   ) and translating of the symbolic language to understand what the author wants to emphasize and say to the reader and potential biases or intents hidden in the use of particular words and expressions

    B. Interpreting meaning of an event in a text by applying it into a real

world context in which the reader deeply participated and engaged and thus experienced situated understanding of the event.

    C. Questioning about possible alternative interpretations of events or facts, validity and reliability of author arguments, reasons and causes, results and consequences, and intentionally/unintentionally omitted information in a text

    D. Examining and interpreting detailed information presented through non-continuous sources, including tables, charts, and maps

Constructing Intertextual Meaning across Different Web Sources

1. Interrelating information from difference Web sources and conducting an ongoing construction of coherent and intertextual understanding:

    A. Connecting and comparing different information gathered and learned from different web sources

    B. Interrelating information gained from different tables, charts, and maps, and making a coherent meaning across these sources

    C. Categorizing, grouping, and classifying the information gathered and learned thus far to build a mental structure of meaning

    D. Identifying thematic patterns or major issues common across the multiple web sources and building a coherent mental model of intertextual meaning

    E. Self-questioning about current constructed meaning from reading multiple sources and reasoning about possible answers to the generated question and/or alternative explanations

2. Using the meaning constructed across navigating and reading multiple Web sources into the critical questioning task (e.g., forming, developing, modifying, and confirming critical questions)

Monitoring

Monitoring the Determination of Reading Order and Paths

1. Perceiving and determining that an Internet hypertext reading needs attention while locating relevant information, sequencing the reading order, and constructing the reading paths:

    A. Noting multilayered relationships among web sources horizontally (e.g., numerous web sources are interconnected by hyperlinks) and hierarchically (e.g., needs to search for and locate relevant

information among different articles posted within a webpage within a website using web search engines).

    B. Noting possible information overload and disorientation and resultant cognitive challenges.

    C. Noting the uncertainty of scope and amount of information on the Internet.

    D. Noting the possibility of decontextualization and manipulation of information from original sources.

2. Perceiving the reader's own goals in planning, directing, and redirecting the process of information searching, the determination of reading order, and the resultant path construction.

    A. Planning information seeking and the order of reading by perceiving information being sought, categories of information relevant to goal, awareness of what is required to complete the reading task at hand.

    B. Directing and redirecting information seeking and the reading order by juxtaposing what information has been sought and located thus far with what information should be further/additionally sought, in relation to different aspects of information characteristics (e.g., relevance and coherence, generality and specificity, breadth and depth, single and multiple perspectives, facts and opinions, credibility and trustworthiness, creativity and plausibility, claims and supporting details, complementary and conflicting relationships, expertise and common sense, global and localized views)

    C. Redirecting information seeking and the order of reading by mentally revisiting currently constructed reading paths and determining problems to be addressed and/or additional information needs.

3. Perceiving repeated presences of the same information while seeking information:

    A. Individual or a group of hyperlinks repeatedly presented in the multiple searches with similar search terms while examining those links.

    B. Previously selected hyperlinks and web sources while examining the links and accessing the sources.

4. Detecting problems in searching for and navigating toward relevant and

useful information (e.g., possible problems including ineffective generation and modification of topic-related key words, incoherent selection of hyperlinks and Web sources):

    A. Perceiving difficulties due to lacking, ill-associated, and inaccurate topic-related prior knowledge.

    B. Perceiving difficulties due to ill-structured websites and ill-organized information on a webpage.

    C. Perceiving difficulties due to unclear and superficial goals of reading.

5. Perceiving disparity and inconsistency between what the reader has in mind and actual information encountered:

    A. Comparing currently located hyperlinks and Web sources with those that were originally sought need to be sought further.

    B. Comparing personal epistemic beliefs and found information form information seeking.

6. Retrospective reasoning about consistent ineffectiveness and impairments throughout the entire course of information seeking and determining the reading order caused by difficulties in generating diverse goal-relevant, topic-related search terms; misuses of inaccurate understanding of topic-related concepts; and disorientation problems in locating relevant Web sources.

Monitoring the Construction of Meaning

1. Planning reading and adjusting cognitive efforts by reflecting on and balancing short- and long-term foci of reading (e.g., to overview, to identify important ideas, to take a look at more detail)

2. Monitoring the stimulation of cognitive processing and activating processes to accommodate characteristics of text:

    A. Perceiving unknown and unfamiliar words, terminologies, concepts, and acronyms and activating processes to find or not to find their meaning, including (a) rereading current and previous parts to use contextual cues in the text; (b) inferring word meaning by using (prior) knowledge updated through reading; and (c) checking mouse-over texts or using Web searching tools to seek definitions and descriptions.

    B. Judging the degree of importance of text information (e.g., key words, main idea sentences, quotations, subheadings, highlighted

references, repeated concepts) and adjusting cognitive efforts according to the result of importance rating, including (a) reading-aloud; (b) rereading; (3) slowing down reading speed; (d) pausing, and (e) skipping.

    C. Detecting comprehension problems due to (a) a lack of prior knowledge related to text information; (b) inappropriate association of prior knowledge with text information; (c) inaccurate predictions, inferences, understanding of text information; (d) cognitive conflicts due to conflicting sources on the same issue; and (e) superficial understanding of text content due to over-focusing on searching rather than reading the content.

3. Shifting the focus of reading and allocating reading attention along to reading progress toward goal achievement and task completion (e.g., from locating sources to learning with sources; from understanding background information to examining more specific details; from developing questions to seeking answers to the evolving questions)

4. Perceiving needs for controlling reading processes according task-related factors, including task demands, time constraints, and cognitive overload due to verbal reporting, while reading on the Internet.

Monitoring the Self

1. Monitoring the reader's progress toward goals of reading by reflecting on the extent to which the reader learned and understood from searching and reading.

2. Monitoring the reader's cognitive strengths and weaknesses in seeking goal-relevant and useful information and choosing the order of reading.

3. Monitoring the reader's self-confidence in choosing and using hyperlinks and web sources and affective responses to different aspects of Web sources.

4. Monitoring the reader's epistemological stance toward knowledge, truth, and source of knowledge and potential biasness in choosing and interpreting choosing and reading Web sources.

Evaluation

Examining the Usefulness of Hyperlinks

1. Evaluating the goodness of fit of the result of search by characterizing common features of resulting entries, in relation to the initial and evolving goals of reading.

2. Evaluating the usefulness of Internet hypertext links and entries that the reader accesses in relation to an imagined or proposed solution path to achieve goals, using an anticipatory "goodness of fit"

   A. Judging the relevance of hyperlinks by activating the reader' prior knowledge related to the information presented on the websites that are connected to through hyperlinks.

   B. Judging the significance of hyperlinks by making meaning from minimal textual information with the links (e.g., link titles, captions of image links, short written descriptions, previews)

   C. Judging the credibility, reliability, and trustworthiness of hyperlinks by inferring authorities from author information (e.g., Who created this information?), source information (When and where is this information appeared?), and URLs (e.g., .com, .org, .gov, .edu, .net).

   D. Judging the usefulness of hyperlinks by reflecting on previous experiences of same hyperlink selections performed in the current reading task.

   E. Judging the usefulness of links and entries based on particular publishing types (e.g., blogs, news articles, books, research reports)

Judging the Value of Information within a Webpage

1. Evaluating the relevance, importance, and validity of webpage content bringing analytical mindsets into reading web sources:

   A. Judging the importance of text information currently read, with the evolving goals, questions, and foci of reading in mind, by comparing information that has been located and read so far.

   B. Judging the validity of text content (e.g., author argument) by interrogating relationships between claims and supporting evidence.

   C. Determining whether the webpage maintains and presents balanced approaches to and multiple perspectives on the same issue (e.g., Does the text contain both pros and cons?).

2. Evaluating the credibility, reliability, and trustworthiness of webpage content from a critical stance toward reading web sources:

   A. Identifying author/source information and inferring the author's stance, purpose, and intent with a critical mindset (e.g., Who is the

author of the information? What is the motive for writing?).

B. Distinguishing fact-oriented or opinionated sources and determining their information values, in part based on the genres of the text posted on the webpage (e.g., news articles, research reports, government documents, commercial advertisements).

C. Judging the legitimacy of webpage content by checking citations and references that the information originates from.

Assessing the Quality of Website

1. Judging the usefulness of web search engines, open web sources, and portal sites as the means to search for, locate, access, overview possible target information:

    A. Anticipating the utility of these sites for information seeking, based on prior learning related to using the sites in searching at school and/or prior experiences related to personal uses of the sites for school work, prior to accessing them.

    B. Determining the efficiency and utility of these sites for information seeking and deciding to use them further, based on current searching experiences (e.g., successes, difficulties, failures).

2. Judging the relevance and importance of websites by examining the extent to which the sites' contents are related to what is being sought and helpful to answer the evolving questions or to contribute to the completion of reading goals.

3. Judging the credibility, reliability, and trustworthiness of websites:

    A. Checking credibility and reliability by identifying and examining reputation, authority, and reliability of the sources of information cited within the website.

    B. Checking credibility and reliability by identifying and examining the current website's authorship and sponsorship (e.g., institutions, sponsors, copyrights, contact information).

    C. Examining maintenance and up-to-datedness by identifying and examining any indicators of when the website has been created and updated, as well as when articles and advertisements has been created somewhere and then posted up on the current website.

4. Judging the potential usefulness of websites:

A. Determining whether there is more a variety of and large amount of goal-relevant information within the website (e.g., website menus, a list of hyperlinks in the middle of texts, references at the bottom of the sites).

B. Judging the connectivity of the website as a potentially useful information source by testing and checking hyperlinks and references that may lead to goal-relevant information out of the current website.

5. Judging the comprehensibility of an accessed website:

A. Checking the availability of hyperlinks and the ease of accessing information stored in other major parts of the website (e.g., hyperlinks in the table of contents, interactive overviews)

B. Judging the effectiveness of information organization (e.g., listed items, categorized subheadings, organized text boxes, block-partitioned contents).

C. Judging the layout and design of the website (e.g., block partitions, menu organizations).

Glossary

Constructively responsive reading strategies. The idea of constructively responsive reading was proposed in the meta-analytic work done by Pressley and Afflerbach (1995). Reviewing multiple studies of reading employing verbal reporting methodologies, Pressley and Afflerbach concluded that accomplished readers come to the task with general tendencies and accomplished reading is marked by their goal-directed, volitional responses to text(s) they read toward a particular goal attainment. In Internet contexts, constructively responsive reading strategies are the acts of reading that readers use to realize and construct potential texts to read on the Internet, identify and learn important information from texts, evaluate different aspects of reading, monitor the entire process of reading (Afflerbach & Cho, 2009).

Print text and Internet text. Text is "organized networks [of meaning] that people generate or use to make meaning either for themselves or for others" (Wade & Moje, 2000, p. 610). Text (both print text and Internet text) includes any sorts of designed meaning represented through (mostly) writing, images, or other modes, which serve its own unique genre characteristics, functions, and purposes (Kress, 2003, New London Group, 1996). Text is to be read, understood, learned, questioned, and challenged. Based on this inclusive conceptualization of text, operational differentiation of print text and Internet text in this study relies upon the media through which a variety of texts are materialized. Print texts refer to the texts mediated through printing materials by conventional typographic technologies (e.g.,

textbooks, newspapers, printed articles and magazines, advertisements on a wall);

Internet texts refer to the texts mediated through the Internet as currently the most

popular and influential digital hypertext information network (e.g., websites, blogs,

online newspaper articles, webzines). Internet texts are characterized intertextually

connected multiple texts by links (regardless of its relationships or coherence), and

the presence of the particular texts or the order of access to the texts is malleable.

The scope and boundary of text is determined by the readers pursuing a particular

goal and their tool use affording (or constraining) their realization and construction

of relevant texts.

Print reading and Internet reading. In a similar way that the terms print text and

Internet text were defined, operational definitions of print reading and Internet

reading depend on the media with which reading take places. Print reading refers to

the reading of the texts printed, whereas Internet reading refers to the reading of the

texts connected through the Internet and represented digitally and electronically. In

real contexts of reading, indeed, these two forms of reading take place often

together and interactively because today's text environments are in transition from

fixed and printed text toward fluid and digital texts (Fox & Alexander, 2009). In

this study, however, these two forms of reading are operationally distinguished as

"traditional" forms of reading and "new" forms of reading, to observe the process

of Internet reading, building upon the relationships between the two forms of

reading.

Critical questioning about controversial topics. Critical questioning is an important

"heuristic" of reading in Internet contexts. It asks readers to be more skeptical,

critical, and tentative about the numerous texts related to a particular controversial

topic—the topic involving prolonged public debates in which multiple opinions,

arguments, and perspectives are competing—which are connected in this unknown,

untested, and ever-changing information space (Ikuenobe, 2001; 2003). The

questions evolving in the reader's mind acts as a prompt to think more critically in

search of the texts relevant and significant to navigation of the problem space,

verification of claim-evidence relationships, and formulation of the reader's own

arguments and perspectives in relation to a particular topic. The exploration and

generation of critical questions involves a process of critical strategy use to explore

implicit meanings, hidden intents and motives, and underlying assumptions and

perspectives in the texts they located, accessed, and read (Pressley & Afflerbach,

1995; Luke & Freebody, 1997; VanSledright, 2002; Wineburg, 1991a, 1991b).

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