Exploring the Internet Reading Strategies Used by Elementary School Students to Locate Specific Information

Lee, Changhee Korea University

Lim, Taewon Korea University

I. Introduction

The notion of literacy, or the ability to read and write, has been re-conceptualized according to changes in our society (Lee, 2010). The advent of the digital era, which was brought on by developments in science and technology, has promoted modern literacy researchers to invent the concept of new literacies (New London Group, 1996; Noh, 2008; Park, 2008). The Internet became an important tool to explain the characteristics of new literacies, and its use was reinforced both in and out of literacy exercises in school.

Many researchers have conducted studies that are related to reading strategies in the Internet environment; they reached a consensus that people need both the traditional skills associated with reading printed texts and the new skills associated with Internet reading (Cho, 2012; Zhang & Duke, 2008). Among the latter skills, the ability to find desired information quickly and accurately in the flood of material is emphasized by researchers because of its importance as an basic step for Internet reading (Cho, 2008; Hartman, Morsink, & Zheng, 2010; Jang, 2013).

While, in the new environment that Internet became the crucial research topic in new literacies as an aspects of media, elementary school students are critical subject of Internet reading studies. This

is mainly because they are agents of a ceaselessly changing society. Therefore, they are good examples of literacy in the modern era. These children, who are called "digital natives," are living in a different environment than their older peers, who are called "digital immigrants." In this new era, having the skills and strategies to comprehend and respond to information on the Internet is likely to play a central role in our students' success (Coiro & Dobler, 2007).

For these reasons, this study investigated elementary school student's Internet reading strategies for the purpose of locating specific information. We expect that this study will provide a snapshot of present-day children's reading ability and give an educational implication for reading education in the rapidly changing society.

II. Literature Review

1. Internet Reading and Reading Strategies

In recent years, Internet reading has become widely used as opposed to printed text reading. Previous studies were focused on reading strategies for printed text. The growth in the importance of the Internet has implications for Internet reading research. In this chapter, Internet reading strategies will be compared with those for printed text. Table 1 shows the classification of reading strategies.

Pearson, Roehler, Dole, and Duffy (1992) organized seven comprehension strategies that strategic readers used. These strategies of comprehension are considered to be the factors that distinguish between skilled and less able readers.

Yoon (2011) examined the effects of some reading strategies such as story structure strategy, summarization strategy, question generation strategy, and visualization strategy that have been widely used to understand texts. The main purpose of this study was to comprehensively investigate the effectiveness of reading strategies on read-

ers' comprehension; the study was based on meta-analytic research performed to combine the results of experimental studies. This study found that the reading comprehension score of the average individual in the experimental group exceeded the score of the average individual in the control group. For moderator variables, treatment length and treatment type were found to be significant for readers' comprehension of texts.

Table 1. The Classification of Reading Strategies

Researcher	Reading Strategies
	Printed text reading
Pearson, Roehler, Dole, and Duffy(1991)	(1) Activate prior knowledge (2) Monitor comprehension (3) Repair comprehension (4) Determine important ideas (5) Synthesize (6) Draw inferences (7) Ask questions
Yoon(2011)	(1) Summarization (2) Question generation (3) Story structure strategy (4) Visualization strategy
	Internet reading
Cho(2012)	(1) Realizing and constructing potential texts to read (2) Identifying and learning text content (3) Monitoring one`s own reading processes (4) Evaluating texts
Wang(2013)	(1) Activating prior knowledge sources (2) Using inferential reasoning strategies (3) Self-regulated reading strategies (4) Critical reading strategies

Cho (2012) conducted a research synthesis to describe the strategies that adolescent readers use while reading on the Internet. In this study, a body of literature emanating from multiple areas of research contributes to descriptions of central reading strategies in Internet settings. The result indicates that adolescents bring several general tendencies to the task of Internet reading. They are good at collect-

ing and finding information and also at understanding literal meaning from Internet texts.

Wang (2013) studied six Chinese college students reading the Internet. This study used data sources such as questionnaires, interviews, observation, and think-aloud protocols. The findings of data analysis suggested that skilled readers applied the following strategies when reading online: 1) activating prior knowledge sources, 2) using inferential reasoning strategies, 3) self-regulated reading strategies, and 4) critical reading strategies. Also, language-switching strategies appeared frequently during online reading.

Ki (2014) explored the types of reading strategies that proficient elementary school students use while reading on the Internet. Students were given the question, "what is most important in society, land development or environmental?" The findings of this study indicated that proficient elementary readers used the four types of strategies. These strategies are realizing of constructing potential texts to read, Identifying and learning text content, Monitoring, and Evaluation(Cho, 2011, 2013). Also, the frequency of using Constructive Internet Reading Strategies used by the elementary school readers participating in the current study was presented.

The exploratory studies (Schmar-Dobler, 2003; Calisir & Gurel, 2003; McDonald & Stevenson, 1998; Hartman, Morsink & Zheng, 2010) concluded that the use of hypertextual links on the Internet to locate information has some corollary with printed text. People use the index or contents table when reading printed text. This strategy appeared to use of links in internet reading. Despite the similarities between Internet reading and printed text reading, earlier studies did differentiate between Internet reading strategies and printed text reading strategies. Internet reading has unique features that require readers to adopt different strategies than those used when reading printed texts. The unique features of Internet reading are that it provide to readers with a larger reading space than printed texts, and, include the larger amount of information available on the Internet.

2. The Effects of the Reading Purpose on Internet Reading

The reading purpose has a great effect on reading strategies. In research on reading strategies for printed text, it appears that reading purpose impacts the reading strategy used. Previous studies have not investigated the impact of different reading purposes on Internet reading. Generally, people engage in many different kinds of reading on the Internet with many different purposes. Therefore, we have attempted to synthesize the reading purposes used in earlier studies.

Coiro and Dobler (2007) investigated skilled sixth-grade students' reading strategies as they searched and located information on the Internet. The purpose of this qualitative study was to explore reading comprehension processes while reading on the Internet. Findings suggested that successful Internet reading experiences appeared to simultaneously require both similar and more complex applications of (1) prior knowledge sources, (2) inferential reasoning strategies, and (3) self-regulated reading processes.

Zhang and Duke (2008) explored the different reading strategies used by 12 competent adult Internet readers while completing three Internet reading tasks, each with a different purpose: seeking specific information, acquiring general knowledge, and being entertained. This study investigated whether readers' strategies differed by reading purpose. They have identified more than 50 strategies. Some strategies were used across multiple purposes.

Choi (2014) studied 2,942 students that were chosen by researchers according to convenience sampling. The purpose of this research was to explore the reading attitudes model of Korean middle school and high school students. This study used four different factors that included reading purposes: (1) academic digital, (2) academic print, (3) recreational digital, (4) recreational print. The findings of this study showed that a high coefficient between academic digital and academic print may indicate that when reading for academic purposes, text type or medium makes little difference to Korean adolescents. How-

ever, a weak relationship was revealed between recreational digital reading and the other three categories.

The different purposes of Internet reading lead to the use of different reading strategies. In this study, the main Internet reading purpose was locating specific information. This is because we think that locating specific information is the most frequent activity in real-life school situations, especially elementary school students assimilating conceptual knowledge. These are the reasons why this study chose elementary school students as participants.

Research by Zhang & Duke (2008) was used as the basis for this study. They emphasized the environmental changes of reading such as new literacy. According to their view, comprehension involves a range of processes, including: (a) processes that are verbal and nonverbal, such as making sense of graphical elements in text; (b) processes that are at least partially verbal but do not have an obvious aural component, such as skimming and scanning text; and (c) processes entailed in navigating the text that is being comprehended. The study that follows allowed us to explore Internet reading strategies used for the reading purpose of locating specific information.

Our research questions were as follows:

1. How do elementary school students read the Internet given the purpose of locating specific information?
2. Do readers use particular strategies for the purpose of locating specific information?

III. Method

1. Participants

Fifteen school children at an elementary school in the Seongbuk-

gu jurisdiction participated in the study. These students joined book discussion classes in Korea University. Participants were upper grade students, and the 15 participants included seven girls and eight boys. We collected basic information about participants through the survey. Table 2 reports information about the participants.

Table 2. Information About Participants

Item	Mean
Number of hours per week spent reading on the Internet (Home)	5.20
Number of hours per week spent reading on the Internet (School)	2.00
Self-perception of Internet reading abilities (1-3)	2.53
Self-perception of printed text reading abilities (1-3)	2.86

Participants were engaged in Internet reading activities at home and school. On average, they spent 5.2 hours at home and 2.0 hours at the school per week completing Internet reading. Students reported self-perceptions of their reading abilities. They were given a mark of 2.53 in Internet reading, and 2.86 in printed text out of a possible 3 points. Although students responded that Internet reading ability was lower than printed text reading ability, overall, their reading ability scores were high.

2. Data Collection Procedures

Data was collected through basic surveys, computer screen records, and stimulated recall. Data collection flow was as follows.

The experiment was conducted over a period of four days. Researchers did an analysis of the computer screen and a stimulated recall was conducted two days later.

To begin the study, participants were asked to fill out a basic survey, in which they reported their Internet use, or time they spent on the Internet each week. After the survey, we gave a preliminary Internet reading task to students in order to measure their reading skill levels. Students were given five minutes to complete the task, but every

student solved this task in well under the provided time. Researchers provided laptops for each participant and distributed the reading task to students. The task was to locate four sets of information on the Internet. The questions of the task were set in consideration of the Korean language and Social Studies curriculum. We discuss goodness of the assignments, and, confirmation by two elementary school teachers.

Table 3. Data Collection Flow Chart

Procedures	Time(min)
1) Survey for Internet usage	15
⇩	
2) Preliminary Internet reading test	10
⇩	
3) Distribute reading task to students	10
⇩	
4) Deal with the task (Recording the computer screen)	45
⇩	
5) Stimulated recall test	30

Table 4. Internet Reading Task

You can go to any web site or use any search engine to finish the following four tasks. Even if you know the answers, please also find the answers on the Internet.
1. Where was the latest oil spill was in Korea and when did it occur? 2. What was the incident that caused the Arizona to sink to the bottom of the Pacific Ocean? 3. What is the name of the person who discovered the 'Island of trash'? 4. What is the name of the public corporation in Korea that was established to prevent marine pollution?

The duration of this task ranged from 25-42 minutes, with a mean of 32 minutes. Computer screen records contain the voice of participants. The default opening page of the explorer was a blank page. Researchers did not give guidance as to how to navigate or read the

text.

While the participants participated in the stimulated recall, they watched computer screen records on a laptop. Participants reported extensive information about strategies they used. When they could not verbalize their thoughts and strategies, researchers paused the video and asked some questions to give them enough time to report what was on their minds. The stimulated recall was audio-recorded and transcribed for later analysis.

3. Data Analysis Procedures

Researchers collected a survey, screen video file of the whole reading process, and stimulated recall records. We used a variety of methods to analyze this data. The survey consisted of 15 multiple choice questions and five essay questions. Multiple choice questions were analyzed using Excel. All stimulated recall questions were voice-recorded, and recorded files were transcribed and coded throughout the data collection process.

Three steps were used to develop the reading strategy inventory for this study. First, each researcher did an open coding of data for strategies used by the participants. Second, analyzed data was shared, and strategies were added if evidence of new strategies could be warranted. Third, researchers synthesized reading strategies by cross-checking. The analysis procedures of the study allowed for inclusion of additional data if it was found that new reading strategies were still being identified by the 15 participants, but they were not. Twenty meetings were held in order to discuss the findings.

IV. Results

Results showed that there were numerous Internet reading strategies that were used by students to locate specific information. We

separated the whole process into three sections according to the phase: 1) initial searching phase, 2) search result reading phase, 3) in-site reading phase. We also set an evaluation phase to embrace the reader's self-monitoring of the reading process and evaluate the information observed throughout the three phases. Figure 1 shows relationships between each phase.

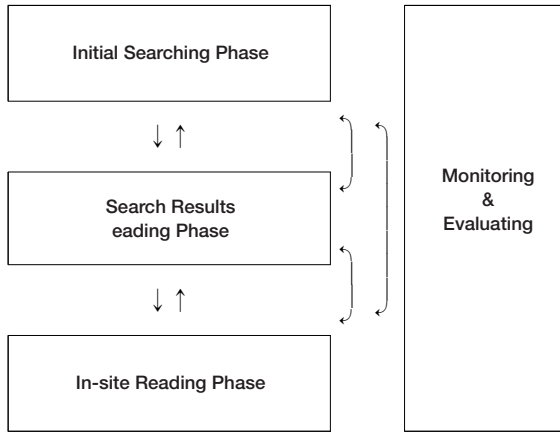

Figure 1. Phases of Internet Reading

During the initial searching phase, participants chose search engines and keywords to obtain search results that were more likely to return a series of websites containing potential sources of information. During the search result reading phase, participants read search results and selected webpages that were more likely to the contain information they desired. During the in-site reading phase, participants read texts and tried to acquire the desired information. Throughout each phase, readers evaluated the information they obtained and monitored their searching and reading activities by themselves. A detailed description of each phase follows.

1) The Initial Search Phase

This phase is related to initial search activities ranging from choosing a search engine to choosing a keyword. Table 5 shows the readers' search strategies that were identified by researchers.

Table 5. Reading Strategies: The Initial Search Phase

Strategy	N
Goes to a specific search engine (Naver)	14
Inputs keyword as a form of phrases based on the needed information	13
Uses predictive text input	5
Selects certain category	4
Inputs keyword as a form of sentences based on the needed information	2
Uses related keyword	2

To begin with, almost all the readers (14 of 15) chose Naver as their search engine. Most of the readers (13 of 15) input the keyword in the form of a phrase and two readers used a full sentence as a keyword. Although the exact forms of the keyword differed, everyone tried to make a suitable keyword that overlapped with the task question. According to Inhae,

> Question sentences include important words, so they include much of the related information naturally. It is the best way to find information. (by *Inhae*)

The contents of the keyword were generally similar to one another because the participants believed that the question sentence included the most relevant information. Some readers copied or extracted a given question almost exactly.

Next, some students used functions provided by search engines such as predictive text input, using related keywords, and confining certain categories. Several of the readers (5 of 15) used predictive

text input. Today, almost all search engines have this function. For example, Sungjae used this function to find a more suitable keyword. He said, "When I input 'ocean debris' as a keyword, 'ocean debris TOP 10' (predictive text input) appeared below the search box. So I selected this keyword because I thought it was more suitable." A few of the readers (2 of 15) clicked "related keyword" for a similar reason.

To narrow the search results, some readers (4 of 15) selected a certain categories prior to inputting their keyword. For instance, Yunjung clicked on Knowledge iN operated by Naver, which is a question and answer (Q&A) webpage that includes information about a variety areas.

2) The Search Result Reading Phase

This phase included reading search results. Table 6 shows the participants' search result reading strategies that were identified by researchers.

Table 6. Reading Strategies: The Search Result Reading Phase

Strategy	N
Restricts the results page to the first page only for finding relevant information	13
Consecutive approach to the results page	11
Reads titles of the links, short descriptions, and URLs by using skimming, scanning, and reading closely	11
Highlights the line above the line of reading to keep focused and oriented	6
Inconsecutive approach to the results page	6
Selects certain category	6
Clicks the links of the results page from the top	4

In this phase, most of the readers (13 of 15) tended to look for information or sources of information in only the first page of the search results. Also, many readers (11 of 15) were apt to read the results pages consecutively from the top. Few readers (4 of 15) did not hesitate to click page links from the top. These readers thought that

search results pages were listed in descending order according to the importance of the materials. For example, Yunjung said, "I think the most important information is located in the first page, especially at the top of the page."

Many readers (11 of 15) commonly scanned the title of the link, short descriptions, and URL to judge the relevance and reliability of the link. Also, they mainly scanned the search results following bold words, since the search engine provided users with automatic bold function for input keywords. Minchul said, "When I glance at the title of the link and read the short text below it, I can know whether to click the link if it includes what I want to read as much as possible." While scanning the results, if participants found many bold words in the title of the link or short descriptions, they stopped scanning and read them closely. As a result, almost all readers clicked the links and entered webpages. However, a few readers could acquire the needed information during this phase while scanning search engine results.

In addition, some of the students (6 of 15) relied on the mouse cursor to indicate the location where they read and sometimes they dragged the cursor and highlighted a certain part of the text. Some readers (6 of 15) skimmed the search results and focus on specific categories to find needed information efficiently.

3) The In-site Reading Phase

In this phase, readers used diverse reading strategies that ranged from scanning and skimming the webpage to reading certain parts closely. Table 7 shows the readers' in-site reading strategies that were identified by researchers.

Some readers (9 of 15) scanned the entire page of the website that they opened, considering various page and text designs such as bold effect, images, and arrangement. And they skimmed whole page according to characteristics of page design they apprehended. When they judged that they had found relevant information, they started to read those lines closely. For example, after scrolling down

the webpage to look at it in one glance, a portion of readers deliberately skipped certain text which included parts of the question when they read a page from Knowledge iN. This is because they knew that Knowledge iN is a Q&A site that lists both question and answer; the requested question (which is located in the upper area of the page) is not necessary to learn important information. As a result, they skipped the question section and moved directly to the answer.

Table 7. Reading Strategies: The In-site Reading Phase

Strategy	N
Reads relevant texts closely	10
Scans whole design of webpage focusing on bold or highlighted words	9
Skims to infer the relevance of information	8
Utilizes a mouse cursor as a indicator	6
Stores possible answer	2
Uses finding function	2

Some readers also skipped pictures because they estimated that trying to find information in the pictures was unnecessary and inefficient considering the reading goal. Furthermore, readers tended to spend more time reviewing the paragraphs that included more highlighted words. Few readers (2 of 15) utilized the finding function (Ctrl+F) to locate the specific words that they intended to find. Some readers read the text using the mouse cursor as an indicator.

4) The Monitoring and Evaluating Phase

In this phase, readers monitored their related behaviors and evaluated the relevance and credibility of information when they moved forward to the next phase or backward to prior phases. Table 8 shows the readers' evaluation strategies that were identified by researchers.

Table 8. Reading Strategies: The Monitoring and Evaluation Phase

Strategy	N
Evaluates / Modifies the relevance of query words	13
Immediately leaves web site	12
Evaluates relevance of found information	10
Re-opens prior visited sites	5
Evaluates reliability of found information	3
Keeps the web sites open	2
Considers tasks solving situation	2
Re-reads the text to check reading comprehension	2

Most of the readers (13 of 15) tended to evaluate the efficiency of the keyword they input in the search box. They judged the relevance of the keyword by referring to the search results of the page. If readers thought the keyword was inadequate, they modified it based on the information they just acquired from the results page. As described by a participant named Heesang,

> When I input "sea pollution," there was a lot of information about an individual essay and it didn't contain the information I wanted. But I found the word "marine pollution" in the results and I thought it was a more professional term. So I changed the keyword from "sea pollution" to "marine pollution."(by *Heesbang*)

Heesang also distinguished professional terms from common terms, which means that she evaluated the reliability of the term and preferred to use more credible term.

Many of the students (10 of 15) evaluated whether the sources of information were relevant and credible or not. Some of them chose a certain source of information such as Wikipedia or Knowledge iN. For example, Jinsu said,

I think Wikipedia has a lot of information and nearly all information from Wiki is credible. So I usually use Wiki when I do homework.(by *Jinsu*)

Participants also had priorities regarding the source of information, which differed from one another depending on individual prior knowledge. For example, Sungjae accessed the source of information from Wikipedia first. Sungjae said, "I prefer to use Wikipedia when I search for something at home and do homework. Many things are not answered yet in Knowledge iN and the contents are too short or weird." However, Eunji was more inclined to use Knowledge iN. Eunji said, "Last time, I knew that Knowledge iN had a lot of topics and related information. It is more convenient to find information, so I like to use Knowledge iN."

Students evaluated the reliability of information by ruminating on their prior knowledge. Minchul said, "If it is similar or the same as what I have heard before, it is likely an accurate answer." Regarding what they do not know yet, participants tried to verify accuracy by comparing different sources of information in the same search results page or inputting a possible answer in the search box.

After evaluating information, students showed certain tendencies for their next actions. First, they stopped reading once they thought they found accurate information. Second, if they thought the information was doubtful, they turned back to the first or second search phase. At this point, some readers chose to keep the website open. Third, if they believed that the information was inappropriate, they immediately left the website. Interestingly, few readers visited the same website again. Minchul said, "When I read the text, I often miss some information. Since my mom tells me I should reread the text, I open websites again to look for missing information."

Readers considered tasks solving situation. They generally tried to solve questions in numerical order. However, readers occasionally passed on to next tasks and tried to solve prior questions again. Hokyun said "I thought I couldn't solve this question. So I passed this

question. I thought I'd try to solve it later." Even though we did not set a time limit, they considered time an important factor.

V. Conclusion

We examined the elementary school students' Internet reading strategies, particularly those used for locating specific information. The two research questions of this study were:

1. How do elementary school students read the Internet given the purpose of locating specific information?
2. Do readers use particular strategies for the purpose of locating specific information?

Researchers gave 15 study participants four tasks that were related to locating specific information on the Internet and observed their search process. Data was collected through basic survey, computer screen records, and stimulated recall.

We found that the readers used about 30 strategies in online reading and they went through three dimensional space while they solved the tasks.

First, they chose a search engine and input a chosen keyword in the search box. At this moment, almost all participants chose Naver as a search engine and created a keyword precisely. Furthermore, they utilized some technical functions provided in the search engine such as predictive text input, related keywords, and confining certain categories.

Second, students entered the search results page reading phase. In this phase, they tried to find relevant sources of information. They used various strategies to access adequate sources of information, including focusing on the first results page and upper results, scanning the title of the link, short descriptions, and URLs, and using the mouse cursor to engage with text they reviewed.

Third, during the in-site reading phase, participants used diverse reading strategies ranging from scanning and skimming the webpage to reading certain parts closely. When they scanned and skimmed the webpage, students considered the design of the page. Therefore, they applied different strategies to comprehend the information more efficiently.

Throughout each of the phases, readers actively monitored their own behaviors and evaluated relevance and reliability of the information. They estimated the efficacy of the keyword and modified it based on search results. They also evaluated the relevance and credibility of information in the second and third search phases based on prior knowledge and comparisons with other web pages.

This study has some limitations. First, data might be insufficient to show readers' full natures. Certain strategies might be omitted during recall tests because researchers did not count them as strategies. Second, we judged student's reading abilities on their self-perception. Finally, we did not divide students into groups according to their reading level.

However, some educational implications can be seen on the basis of the study results. In the digital era, having the skills and strategies necessary for effective Internet reading is likely to play a central role in our students' success. Examining Internet reading strategies used by elementary school students to locate specific information is timely and appropriate because of its quality as a basic step. The evaluating the reliability of the information and synthesizing the information of a various sources are more emphasized strategies in the Internet reading comprehension. Therefore, early age readers have to learn about these strategies and how to apply them in actual situations.

Several researchers have already pointed out that while Internet reading has some things in common with traditional reading such as monitoring, making inferences, and evaluating, it also has its own special skill set. Although, similar results were shown in our study, this results are meaningful due to rarity of Korea as technological advanced nation. For example, almost all readers found information

about the first question using the same blog page. Although Minchul read the webpage several times, however, he did not find the requested information. In other words, even if students use appropriate strategies to find the sources of information, they may fail to find information. In this case, Minchul's struggle was caused not only by lack of new reading strategies, but also by lack of traditional reading strategies. Therefore, we suggest that a balanced approach of training for both printed and Internet reading is needed for these students.

This study also showed that Internet reading has a less restricted environment to access and manage information. And a substantial number of search strategies relied on the students' understanding of the Internet environment. For example, some readers who understood the mechanism of the Internet environment used a variety of additional strategies such as using the find function, using predictive text input, using related keywords, and confining certain categories. These strategies will be helpful when readers access the information.

Finally, although we have considered present-day students digital natives, there were some readers who were not familiar with the Internet environment. These reasons were diverse and included technological issues like unfamiliarity with typing as well as a negative perception about the web environment. Therefore, more attention should be given to familiarity or efficiency about technological aspects.

Based on the above discussion, we suggest an increased focus on Internet reading in elementary school as part of reading education. We also hope to conduct future studies about different aspects of Internet reading strategies.

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ABSTRACT

Exploring the Internet Reading Strategies Used by Elementary School Students to Locate Specific Information

Lee, Changhee · Lim, Taewon

The purpose of this study was to explore the Internet reading strategies that are used by elementary school students to locate specific information. Fifteen upper-grade students who registered in a book discussion class at Korea University participated in the study. Data was collected through a survey, navigational records, and participants' stimulated recall. Researchers separated the process into three phases: initial searching phase, the search result reading phase, and in-site reading phase. Additionally, we set an evaluation phase that was observed throughout the three phases. More than 30 strategies were identified and some strategies were used across multiple phases.

Findings suggested that 1) Early age readers have to learn about these strategies and how to apply them in actual situations. 2) A balanced approach of training for both printed and Internet reading is needed for these students. 3) Strategies that are related to the Internet environment will be helpful when readers access the information. 4) There is a need for additional attention to students' familiarity with technological aspects.

KEYWORDS Internet reading, Internet reading strategies, child readers, reading purpose, locating specific information