

Exploring English Online Research and Comprehension Strategies of Korean College Students

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In order to inform foreign language education practices that can empower students to properly retrieve and utilize information in today's society, research on the nature of reading that takes place on the Internet—referred to as online research and comprehension—is of paramount importance. As an initial step, this study investigated the strategies employed by six Korean tertiary-level learners of English that engaged in a second language online research and comprehension (L2 ORC) task. To this end, screen recordings of L2 ORC sessions and verbal data from stimulated recall interviews were triangulated in order to identify and categorize strategy use behind L2 ORC. The results revealed that a wide variety of strategies for constructing a coherent reading path as well as comprehending single and multiple digital texts contributed to successful L2 ORC. These findings demonstrate that the current conception of L2 reading needs to be expanded to encompass the novel challenges posed by the Internet.

Key words: online research and comprehension, reading strategies, second language reading, new literacies, reading instruction, reading assessment

1. INTRODUCTION

Literacy has always been deictic throughout history, meaning that its conception and function have continuously changed according to the social context and the technologies it entails (Leu, 2000). In today's society, the primary impetus driving the shift in the nature

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of literacy is the rapid emergence of the Internet (Coiro, Knobel, Lankshear, & Leu, 2008; Leu, Kinzer, Coiro, Castek, & Henry, 2013). The Internet has become a vital source of information, as evidenced by various recent statistics. For instance, a nationwide survey conducted in 2017 show that approximately 90.3% of the South Korean population over three years of age have used the Internet at least once in the past month, primarily for the purposes of communication, data/information gathering, and leisure (Ministry of Science and ICT & Korea Internet and Security Agency, 2018).

This phenomenon has profound implications for second language (L2) education as well. Most importantly, it suggests that more attention should be paid to the L2 literacy required to read on the Internet. The fact that the English language remains as the lingua franca of the Internet, accounting for content in about 52.1% of all Internet websites (in stark contrast to the 0.9% of websites written in Korean; W3Techs, 2018, April 20), further emphasizes the need to train Korean students to actively retrieve information in English in order to fully utilize the potential the Internet holds for them. This urges L2 reading theoreticians and practitioners to question whether the current focus on traditional print-based reading is truly enough to empower students to become literate members of society in an age where retrieving information from the Internet according to individual needs is crucial.

These questions can in part be answered by unraveling the strategies readers utilize while they read for information on the Internet. Delving into reading strategies, or “deliberate, goal-directed attempts to control and modify the reader’s efforts to decode text, understand words, and construct meanings of text” (Afflerbach, Pearson, & Paris, 2008, p. 368) provides valuable insight from both theoretical and pedagogical perspectives. Readers’ strategy use, although due to its “deliberate” nature may not portray a complete picture of the implicit and subconscious processes behind reading, sheds light on its multifaceted and latent nature (Grabe, 2009) by revealing the cognitive processes that it entails. Moreover, the strategies that are essential to successful reading can become instructional objectives that are explicitly demonstrated by teachers and practiced by students in the classroom (Afflerbach et al., 2008).

Since the early 2000s, literacy researchers have begun to conceptualize the reading that takes place on the Internet and examine its unique characteristics. This kind of reading has been referred to in the literature as *online reading comprehension* (Coiro, 2003; Coiro & Dobler, 2007; Leu et al., 2008), *Internet reading* (Cho, 2014; Schmar-Dobler, 2003), or more recently, *online research and comprehension* (Leu et al., 2013; Leu, Kiili, & Forzani, 2016). Studies within this line of research typically directed skilled readers to read on the Internet in their native language in an attempt to identify characteristics of skilled online research and comprehension (ORC hereafter). In contrast, ORC in a second language (L2 ORC hereafter) has not been amply researched, partly due to the confusion with the term

online reading by researchers in L2 reading contexts. That is, studies that have purported to investigate “L2 online reading” administered tasks that directed participants to only read a static, designated set of text on the computer (e.g., Huang, Chern, & Lin, 2009; J. Park, Yang, & Hsieh, 2014; Taki, 2016), thereby failing to incorporate the active process of constructing a reading path that characterizes ORC.

In light of the contextual factors discussed thus far, the purpose of the current study is to complement this line of research by exploring strategy use behind L2 ORC. By investigating how English learners approach L2 ORC tasks, this study aims to serve as an initial step towards understanding the distinctive nature of L2 ORC. More specifically, this study was inspired by the following research question:

What strategy use is observed from Korean tertiary-level English learners conducting L2 ORC in English?

2. LITERATURE REVIEW

2.1. The New Literacies of Online Research and Comprehension

The theoretical framework that aims to capture the continuous change in the nature of literacy driven by information and communication technology (ICT) is known as *new literacies* (Coiro et al., 2008; Leu et al., 2013). According to this framework, there are many “new literacies” that are currently emerging due to the advancement in ICT, such as reading linked to e-mails, social media, video games, etc. Among such new literacies, one that has received attention in the literature is the *new literacies of online research and comprehension*, or the new literacies required in order to search for information on the Internet. As claimed by this perspective, five essential practices comprise ORC: first (a) identifying a problem, and then (b) locating, (c) evaluating, (d) synthesizing, and (e) communicating information (Leu et al., 2013, 2016).

The theoretical framework of the new literacies of ORC contributes to the current study from two important aspects. First, the classification of the five components of ORC provides a theoretical lens through which the unique nature of L2 ORC could be identified and analyzed in light of print-based L2 reading. That is, by scrutinizing the cognitive processes linked to each phase of L2 ORC, it would be possible to identify where the inherent gap between L2 ORC and traditional, classroom-learned L2 reading lies. Moreover, the tenets of the new literacies framework provide further justification for the current study. Given that today’s literacy is not the same as that of yesterday, and again will be different from that of tomorrow, efforts towards continued research into the shifting

nature of literacy is required; the current study aims to do so for L2 literacy by investigating strategy use behind L2 ORC.

2.2. Constructively Responsive Reading

In the field of reading comprehension, there has been no universal consensus on the exact definition of reading strategies (Afflerbach et al., 2008; Brown, 2017), making it difficult to obtain comparability between findings from different studies. Pressley and Afflerbach's (1995) meta-analysis is especially seminal in this regard. They synthesized a total of 38 studies on reading strategies that implemented verbal protocols. From this synthesis emerged the model of *constructively responsive reading*, the gist of which is that expert reading is characterized by the reader's conscious, intentional, and goal-directed *response* to the text while they actively *construct* meaning from it.

Afflerbach and Cho (2009) extended the model by incorporating 46 more studies on both multiple text reading as well as Internet/hypertext reading. As for the comprehension of multiple texts, the authors note how research findings consistently emphasize the importance of piecing together information contained in different text by comparing, contrasting, relating, and differentiating them. Regarding Internet/hypertext reading, they point out that the flexibility of hypertext structures allows readers to make choices on their path of meaning construction but also demands that readers maintain their focus in the midst of irrelevant or unnecessary information.

More recently, Cho and Afflerbach (2017) applied the model specifically to the reading that takes place on the Internet. According to them, reading in such multilayered digital text environments involves constructing coherent information representation, intertextual relationships, and reading paths. In accordance to such conceptualization of ORC, the authors sorted out and reorganized constructively responsive reading strategies necessary for (a) *comprehending a single digital text*, (b) *comprehending multiple digital texts*, and (c) *the construction of reading paths*. This resulted in a theoretical model of reading strategies that is comprehensive enough to account for reading that takes place in both traditional and newly created contexts.

2.3. Research on Strategy Use in ORC

Initial work that addressed ORC from the perspective of literacy was conceptual in nature, discussing the potential changes to reading posed by the Internet. For example, Coiro (2003) conceptualized ORC by examining how the Internet has influenced key elements of reading comprehension—namely text, reader, activity, and social context. Schmar-Dobler (2003) roughly compared reading strategies for print-based reading to

those for Internet reading and noted that Internet reading requires the use of skimming and scanning as well as guiding questions that keep the reader focused without being sidetracked.

The majority of exploratory studies on ORC in one's native language (L1) that followed have been conducted with proficient readers. Analysis of the readers' verbal protocols and screen recordings of ORC sessions repeatedly indicates that successful ORC requires the use of additional strategies in comparison to print-based reading. Coiro and Dobler (2007), for example, analyzed the think-aloud protocols of 11 skilled readers and found that the readers demonstrated more complex ways of utilizing prior knowledge sources, inferential reading strategies, and self-regulated reading processes during ORC. Zhang and Duke (2008) revealed that proficient adult readers employed divergent patterns of strategy use depending on the different purposes for reading. Cho (2014) investigated the strategies utilized by seven expert readers and noted the centrality of strategies for locating useful texts and determining the order of reading.

Research on L2 ORC utilized similar methods of data collection but generally relied on theoretical frameworks that do not account for hypertext or multiple-text reading strategies. Konishi (2003) examined the strategies of six Japanese college-level English learners according to Carrell's (1998) cognitive and metacognitive strategies and noted the need to account for strategies linked to navigating through various web pages. H.-R. Park and Kim (2011) analyzed the think-aloud protocols of three college-level English learners without being guided by a theoretical framework. They identified seven themes of strategy use, of which *using hypermedia* and *using computer applications and accessories* were unique to ORC. Although these studies shed more light on how ORC differs from print-based reading, they were not able to address the specific "second language" nature of L2 ORC.

This gap was addressed in part by J. Park et al. (2014), who observed how seven graduate-level English learners referred to online dictionaries and websites in their L1 to answer comprehension questions while reading online. However, how they operationalized "L2 online reading" is questionable in that the primary texts to be read were designated for the participants. This largely ignored the active process of constructing a reading path, which has been noted as an essential component of ORC (Afflerbach & Cho, 2009; Cho, 2014; Cho & Afflerbach, 2017; Coiro, 2003; Konishi, 2003). Such misrepresentation of ORC is also observed from studies that investigated the extent to which individual learner variables impact strategy use during "L2 online reading" (Huang et al., 2009; Taki, 2016).

These imminent gaps in the literature necessitate further studies into L2 ORC that operationalize research procedures that better replicate actual L2 ORC. The current study aims to serve as an exploratory study in this regard by administering a task that maintains more authenticity of L2 ORC and grounding the analysis within the framework of constructively responsive reading, which has synthesized decades of reading strategy

research.

3. METHODOLOGY

3.1. Participants

Six Korean tertiary-level learners of English enrolled at a select university in South Korea participated in the current study. These participants were recruited and selected based on responses to a preliminary screening survey that included questions about individual variables that were expected to influence the process and outcome of L2 ORC. These variables are general English language proficiency, Internet usage, and prior knowledge about the topic of the task (see Appendix A for the complete survey). As a goal of the present study was to delve into strategies behind successful L2 ORC, tertiary-level students, who are expected to be more competent in L2 ORC, were opted for in this study.

First of all, general English language proficiency was considered as it was thought a minimum level of reading ability was necessary in order to comprehend and report content from English web pages. The subsequent variable examined was Internet usage; it was thought that learners with more exposure to the Internet on a regular basis would be more familiar with the L2 ORC task to be administered in this study. Finally, the level of prior knowledge about the topic of the task had to be controlled in order to minimize its influence on the process of L2 ORC.

The researcher sampled six participants based on one criterion; only participants that responded with either *1* or *2* to the 7-point survey question about their level of prior knowledge were considered. Otherwise, the researcher sought a varied sample that would demonstrate diverse strategy use based on other individual variables. The individual profiles of the six participants of the current study are outlined in Table 1.

3.2. Data Collection

3.2.1. L2 ORC task

While designing the L2 ORC task, a few factors were taken into consideration to effectively elicit strategies from the participants. First, high priority was given to replicate authentic ORC as closely as possible, as conceptualized by Leu et al. (2013, 2016). To achieve this goal, the task was designed to direct the participants to initiate the search and navigate through hyperlinks of their choice. This task was also expected to lead the participants to engage in more higher-order thinking—rather than simply locate factual

information from a designated set of web pages.

TABLE 1
Individual Profiles of the Participants

Participant	Gender	Major	Year of Study	General English Proficiency	Weekly Internet Use in Korean	Weekly Internet Use in English
Jiwoo	Female	Gender studies	Completed master's coursework	TEPS 705	7-14 hours	Less than 3 hours
Seunghoon	Male	Electrical and computer engineering	Senior	TEPS 664	21-28 hours	Less than 3 hours
Minseo	Female	Economics	Junior	TEPS 680	More than 35 hours	Less than 3 hours
Kyungmin	Male	English literature	3 rd semester of master's coursework	TEPS 970	7-14 hours	12-15 hours
Youngmi	Female	French language education/international relations	Senior	TEPS 910	14-21 hours	More than 15 hours
Taeyeon	Female	Linguistics/social welfare	Senior	TEPS 931	7-14 hours	Less than 3 hours

Note. TEPS = Test of English Proficiency Developed by Seoul National University. All names are pseudonyms.

Nonetheless, some constraint was also necessary in order to meet the research objectives of this study. First, as the focus of this study is L2 ORC, the participants were directed to read only web pages in English. They were, however, given the freedom to utilize online resources (e.g., online dictionaries and translators) as necessary. Second, albeit less authentic in nature, a 20-minute time limit was also included to control how long the participants conducted L2 ORC. Finally, a comprehension task asking participants to verbally explain what they have learned as a result of their search was included to keep the participants actively engaged in L2 ORC. Based on these considerations, the following task prompt was designed for this study:

You will now have about 20 minutes to conduct an Internet search on the difference between fiat currency and cryptocurrency.¹ Based on the results, you need to explain to me the difference you found in Korean. While you can read only web pages in English, you are allowed to use online dictionaries or translators if necessary. You can organize the content you found either on this paper hand-out or on a word processor like Microsoft Word and refer to it

¹ Although the entire task prompt was presented to the participants in Korean, the key terms *fiat currency* and *cryptocurrency* were also provided in English.

when you explain to me the difference between fiat currency and cryptocurrency. Please use the 20 minutes to its fullest for a complete answer.

Each participant initiated the L2 ORC task from the desktop screen of the researcher's laptop computer, on which shortcut icons for four major web browsers (i.e., Chrome, Internet Explorer, Microsoft Edge, and Firefox) and Microsoft Word 2013 were located. For each web browser, accommodations were made so that the participant's L2 ORC session would not be influenced by any of its settings (e.g., opening page, browsing history, and extension tools). While the participant conducted L2 ORC, the entire computer display was recorded using OBS Studio version 21.0.1 (<https://obsproject.com/>). After the 20 minutes had passed, the participant was directed to stop their L2 ORC and then verbally explain what they found out about the difference between fiat currency and cryptocurrency, referring to the notes they had taken during the L2 ORC session.

3.2.2. Stimulated recall interview

Each participant subsequently took part in a stimulated recall interview in which they were asked to recall their thought process while watching the screen recording of their L2 ORC session. The stimulated recall, rather than the think-aloud protocol, was opted for in this study out of the concern that the excessive cognitive load imposed by the think-aloud protocol would interfere with the regular flow of L2 ORC.

Although Hilden and Pressley (2011) recommend keeping instructions for verbal protocols general in order not to bias the participants' processing, some specific directions asking to report on why they had entered a certain search term, why they had selected a certain web page, and exactly where on each web page they had read could be incorporated as the reading had already taken place. Moreover, whenever the participant remained silent for a prolonged span of time, the researcher described the action playing on screen and asked for the participant's rationale behind it (e.g., "You just accessed page 2 of the search results and scrolled down to access a HuffPost article on the topic. What made you select that web page?"). The researcher made effort to remain nondirective and neutral, only mentioning actions that were clearly evident in the screen recording. The stimulated recall interview sessions, which lasted for about 20 minutes for each participant, were voice-recorded for analysis.

3.3. Data Analysis

The screen recordings of the participants' L2 ORC sessions were parsed out into actions visible on screen, such as entering a search term and opening a web page. These actions

were grouped together according to the window (i.e., a web browser tab or Word document) the participant was focusing on during their L2 ORC session. In addition, time stamps indicating the time the participant spent on each window were included in the list. This was then combined with verbal data from the stimulated recall interview, which resulted in an action timeline of each participant's L2 ORC session. A short excerpt from that of one participant is provided below in Figure 1.

FIGURE 1
Sample Action Timeline of L2 ORC Session

Time	Window	Actions	Stimulated recall
00:14-00:36	Google	Entered search term <i>fiat currency vs. cryptocurrency</i> and opened Cryptocurrency Facts page	R: Like you mentioned, you entered a search term including <i>vs.</i> and chose the second web page. P: I think I clicked this first because its title was the closest to what I had wanted. R: Yes, well... <i>the difference between...</i> P: I felt like it would have the clearest explanation..it had the table..
00:36-02:00	"The Difference Between Fiat Currency and Cryptocurrency" (Cryptocurrency Facts)	- Read the two bullet points	R: Scrolling down, as you saw the two bullet points.. P: Yes, I read these.. R: I think you read this part especially closely. P: Yes, because this was my first web page, I was trying to find out what it was trying to say.
		- 01:01, opened Word document - Copied the two bullet points	R: And then you copied this entire portion.. What difference did you discover through this first page? P: The quoted text, whether this is issued by the government or not, is what I think I focused on..
02:00-02:05	Word document	Pasted what was copied into Word document	
02:05-02:42	"The Difference Between Fiat Currency and Cryptocurrency"	Read the two bullet points	

Note. The excerpt from the stimulated recall interview presented in the figure was translated from Korean to English by the researcher. *R* and *P* in the rightmost column stand for *researcher* and *participant* respectively.

The researcher subsequently tried to identify and categorize strategy use based on the action-recall combinations, referring to the model of constructively responsive reading and its catalogue of strategy use (Afflerbach & Cho, 2009; Cho & Afflerbach, 2017; Pressley & Afflerbach, 1995). Cho and Afflerbach's (2017) catalogue was adopted as the coding scheme for the current study, mainly due to its comprehensiveness and high relevance to ORC. Throughout recursive rounds of analysis, strategies that could be inferred from the action-recall combinations were categorized according to this scheme. In the process, the researcher also remained open to novel strategies that may be specific to the "L2" nature of

ORC investigated in this study.

4. RESULTS AND DISCUSSION

4.1. Strategy Use Behind L2 ORC

The analysis of the six participants' L2 ORC sessions revealed that a wide variety of strategy use contributed to their successful L2 ORC. As Cho and Afflerbach (2017) conceptualized the strategies required for reading on the Internet, all six participants utilized strategies for constructing a coherent reading path as well as comprehending single and multiple digital texts in order to meet the task demands.

4.1.1. Strategies for the construction of reading paths

The first set of strategies identified from the data was categorized as “strategies for the construction of reading paths,” which helped readers make choices about which text to read in the vast and unbounded reading context of the Internet.

The strategy observed at the beginning of each participant's L2 ORC was *accessing and overviewing a goal-relevant information space by searching for relevant websites or information retrieval systems*. In order to start their L2 ORC session, all six participants first chose Google as their primary search engine. As evidenced by the stimulated recall data, most participants mentioned they had selected Google because of its comprehensive database, especially for information written in English. Such underlying knowledge that different search engines lead to different sets of information became more evident through how most participants accessed the Korean search engine Naver to search for Korean definitions of unknown terminology they had encountered. Additionally, two participants Kyungmin and Taeyeon also utilized Google Books and Google News searches respectively during their L2 ORC sessions in order to further narrow down their search according to the source of information.

The next strategy identified was *reducing and managing the range of possible information to be encountered by generating and modifying search terms related to topic and focus of a task*. All six participants also generated a search term that led to information on the difference between fiat currency and cryptocurrency. With the exception of Minseo, who entered only *fiatcurrency cryptocurrency* [sic] as her first search term, the participants also included words denoting contrast (e.g., *difference* or *vs.*) in their search terms. While most participants accessed web pages from only their initial search results—which indicates their general satisfaction with the results—Taeyeon slightly modified her search

term (i.e., from *cryptocurrency vs fiat currency* to *cryptocurrency fiat currency difference*) in an attempt to locate news articles on the difference between the two key concepts.

Another strategy revealed was *scrutinizing hyperlinks to judge the usefulness and significance of information before accessing it based on specific reading goals*. For the participants that had to choose web pages to read from the search results, the relevance of the web page title to the task demands served as an important criterion; the participants mentioned they had opened a web page because its title seemed to fit the task directions or explicitly contained the terms *difference* or *vs*. The participants were also mindful of the credibility of the source of information, selecting web pages from websites they were familiar with or those that were judged to be reliable. For example, Jiwoo mentioned that she had accessed an article “because the title of its platform, *Digital Money Times*, sounded trustworthy.” Nonetheless, the participants’ prediction of the quality of information on each web page was not always accurate; they also came across largely irrelevant or even unexpected information. Such instances were observed in Taeyeon’s L2 ORC session, during which she had made predictions about the content and logical flow of some web pages but discovered that they were in fact inaccurate after having read them. In determining the level of satisfaction with the information found during their L2 ORC, the participants utilized the next strategy.

This strategy is *assessing relevance and usefulness of information in relation to the tentative meaning constructed through the initial and ongoing exploration*. Once the participants opened a web page, they evaluated its relevance and usefulness to the task demands and decided to either continue reading it or exit out of it. Often times, this evaluation took place in light of previously read texts as well; the participants actively sought new information that they had not encountered in previous web pages. If a web page was redundant and did not make unique contributions to the task, the participants were quick to reject it. This was evident in how Seunghoon and Kyungmin quickly exited web pages they came across after having reached the conclusion that they had located most of the information they needed to find. Interestingly, an instance where a web page initially deemed as useless was later re-accessed was observed from Jiwoo’s L2 ORC session. When she first encountered a page on Quora, which she noted was “where people simply post their personal opinions,” she rejected it thinking “it might be better to look for something more trustworthy.” However, after accessing another web page that was “too difficult” for her, she returned to the Quora page with the expectation that user-generated answers “would have explained it [the difference] more easily.” This exemplifies that the usefulness of a web page is not static but can change in relation to that of other web pages.

The last strategy that contributed to the participants’ construction of reading paths was *using navigation functions to select, structure, and create environments to assist in constructing text meaning*. The participants also demonstrated selective reading within a

same web page by utilizing navigation functions built into the web browser or web page. For instance, Kyungmin used the *Find (Ctrl + F)* function on Chrome to quickly locate the key concepts on a web page he had accessed. Youngmi also navigated to a different portion of a Wikipedia page by clicking a hyperlink that shifts the screen to a different section of the page.

4.1.2. Strategies for comprehending a single digital text

In contrast to the set of strategies discussed in section 4.1.1, which the participants reported having used in order to locate relevant and useful text for the task at hand, the strategies discussed in this section were those employed by the participants to comprehend a single text.

The first of such strategies was *looking for important information written or visualized in text and paying greater attention to it than other information*. As with most typical web pages today, the text on the pages accessed by the participants varied in format (e.g., font, size, and style). This made it possible for the participants to identify the key information on each page and read it more carefully. For example, the web page “The Difference Between Fiat Currency and Cryptocurrency” (<https://cryptocurrencyfacts.com/the-difference-between-fiat-currency-and-cryptocurrency/>) contained two indented bullet points that directly compared fiat currency and cryptocurrency. All six participants accessed this web page and carefully read this portion in order to meet the task demands. A similar phenomenon was also observed from some news articles the participants read; because these articles had subheadings that stood out from the main text, the participants were able to quickly identify the sections they needed to allocate their attention to.

The next strategy identified was *adjusting reading speed and concentration depending on the perceived importance of text to reading goals*. Due to the immense amount of information on the Internet in stark contrast to the limited time given to complete the task in this study, all six participants had to judiciously adjust their reading speed and level of concentration to gather the required information. This strategy use was observed from nearly every web page the participants had accessed; they quickly skimmed the web page in order to first identify relevant or unique information and then slowed down their reading speed to process it more carefully. In many cases, the participants also skipped portions of web pages they considered as unnecessary for the task. For example, both Seunghoon and Taeyeon did not read introductory paragraphs of news articles they had accessed, noting that “they usually do not contain much noteworthy information.” An interesting case of such selective reading was observed from Seunghoon’s L2 ORC session; as he recalled, he had “just skipped the paragraph” he was reading because he “did not know what it was saying.” This indicates that for the less established reader—for example, learners of

English—the perceived comprehensibility of the text is also likely to influence the decision on whether to continue reading or skip the text.

Another strategy revealed was *evaluating author's purposes, intentions, and goals based upon the analysis of the assumptions, worldviews, and beliefs that are often hidden in text*. This strategy of “reading between the lines” was not widely observed from the participants' L2 ORC sessions, most likely because the topic of fiat currency and cryptocurrency was not a very controversial one. Nonetheless, Youngmi and Taeyeon were able to identify how some web pages implicitly supported the use of cryptocurrencies over fiat currencies. For example, Youngmi mentioned how one article was biased favorably towards cryptocurrencies in that it described them as “tamper-proof” and having “no single point of failure.” Similarly, Taeyeon recalled that she was “a bit dissatisfied during the search because there were few articles that explained how fiat currency was better.” Such bias noted by the two participants influenced their subsequent actions; Youngmi decided to simply skim the biased article without paying much attention to it, and Taeyeon initiated a complementary search for web pages in support of the opposite side using the search term *fiat currency better than cryptocurrency*.

Finally, the strategy of *using online resources to assist comprehension of text* was observed. That is, the majority of the participants referred to online resources such as dictionaries and translators to search for definitions of terms and phrases they did not understand. The most prominently observed instances were searches for explanations of technical terminology such as *legal tender*, *bank credit*, and *balance of ledger*. This seemed to be widely observed largely because the participants' level of prior knowledge about the task topic was minimal. Furthermore, the participants also searched for Korean definitions of English phrases like *backed by government*, *sans the bank*, and *tamper*. This was also expected from the participants, as not all of them had nativelike control of the English language. Notably, Jiwoo started to rely heavily on an online translator after about 10 minutes into her L2 ORC session, translating paragraphs of English text into Korean. She recalled that she had done so because she “felt a bit pressured by the scarcity of information found when there was little time left.” Although this was mostly induced by the timed nature of the reading task administered in this study, it is also conceivable that learners of English would use an online translator to translate the foreign language text into their native language in order to assist quicker comprehension of the text.

4.1.3. Strategies for comprehending multiple digital texts

This last group of strategies identified from the data analysis is related to comprehending multiple texts. Through the use of these strategies, the participants pieced together information found from different texts.

The first strategy identified was *reading sections of different texts recursively as required to solve problems across multiple texts*. Some participants had multiple web pages simultaneously open in separate web browser tabs and toggled between them in order to read them recursively. Such behavior was observed from Kyungmin and Youngmi, who both simultaneously read the “Fiat money” and “Cryptocurrency” Wikipedia pages. They both also focused on comparing the introductory sections of the two web pages, reporting that they had done so in accordance to the task directions to find and report the difference between the two concepts.

Another multiple-text comprehension strategy revealed was *rereading and linking text segments that were previously regarded as unrelated to finalize crosstextual meaning structures*. As the task directed the participants to find the difference between fiat currency and cryptocurrency, all six participants identified various criteria that could be used to contrast the two concepts. For example, when Jiwoo read how cryptocurrencies exist solely in digital form, she also “thought about the form of this [fiat currency],” identifying the form of currency as a criterion for contrasting the two types of currencies. This consequently made her realize the gap in the information about the form of fiat currencies and led her to return to a web page she had finished reading. Through her second visit to the page, she was able to find that fiat currencies also exist in physical forms.

In addition, the participants were also *making meanings from different multimodal texts and determining contribution of each modal information to a coherent understanding of the texts*. Although the majority of the web pages the participants accessed contained primarily written text, they also obtained relevant information from videos and illustrations embedded into web pages. For example, Seunghoon watched a YouTube video that contrasted the two types of currencies. What is noteworthy is how he “skimmed the video” by skipping over portions and pausing it to closely read the text that was presented on screen. This exemplifies how the adjustment of reading speed and concentration that is typical of text reading can apply to videos as well. Similarly, Kyungmin located an illustration that compared fiat currencies and cryptocurrencies towards the end of his L2 ORC session. He recalled that while most of its content was redundant, he was able to learn that “the value of this [cryptocurrencies] is solely determined by supply and demand.”

Lastly, the participants demonstrated *organizing related information across texts by using related strategies*. This was largely motivated by the task directions that encouraged note-taking. All of the participants, with the exception of Seunghoon, first created separate sections in their notes (on either paper hand-out or Word document) for fiat currency and cryptocurrency. Then, as they continued their L2 ORC session and read relevant web pages, they filled in each section with newly found information. Kyungmin and Youngmi, who took notes on Microsoft Word, also rearranged the contents of their notes to assist their

comprehension task.

The strategies that were observed from the six participants' L2 ORC sessions are summarized in Table 2. In short, the L2 ORC demonstrated by each of the six participants was characterized by the interplay of strategies for constructing a coherent reading path and those for comprehending single and multiple digital texts. Most notably, the participants predicted the usefulness of web pages from the search results based on the criteria of relevance and credibility before accessing them. On each web page, the participants demonstrated selective reading by quickly scrolling through text deemed as irrelevant or unnecessary. Their evaluation of the usefulness of text was also informed by what they had previously read, indicating that they were in the process of forming a coherent mental representation from text across multiple web pages.

4.2. Individual Variation in L2 ORC

One consideration in the selection of participants for the current study was to seek a varied sample that would demonstrate diversity in strategy use during L2 ORC. While the complex nature of strategy use observed in this study made it difficult to profile each of the six participants, their L2 ORC could be roughly categorized according to Cho's (2011) distinction between *RC-driven reading* and *IL-driven reading*. Cho (2011) distinguished the two modes of reading according to whether strategy use for *Realizing and Constructing Potential Texts to Read (RC)* or that for *Identifying and Learning Text Content (IL)* was more dominant. In other words, a reader's ORC could be categorized according to whether they dedicated more attentional resources towards constructing a reading path or making meaning from the located texts.

In this study, Seunghoon, Kyungmin, and Taeyeon demonstrated L2 ORC that was closer to RC-driven reading, while Jiwoo, Minseo, and Youngmi's L2 ORC was more similar to IL-driven reading. Although the reason behind such individual difference is unclear, the participants' level of L2 reading fluency and different standards of relevance seem to have influenced their L2 ORC styles. The impact of reading fluency was most obvious in the case of Jiwoo; her limited English reading fluency confined her to stay within a same web page for a prolonged amount of time and therefore made it difficult for her to navigate across different web pages within the time limit. In contrast, Taeyeon's fluent reading enabled her to quickly obtain the information she needed from each web page and move on to subsequent web pages.

Another factor that might have affected the participants' reading style was the different standards of relevance that they brought to the L2 ORC task. That is, the participants' understanding of what counts as a "difference between fiat currency and cryptocurrency" influenced their decision on which text(s) to closely read and integrate into their

TABLE 2
Strategies Observed from the Participants' L2 ORC Sessions

Category	Observed Strategy
Strategies for the Construction of Reading Paths	Accessing and overviewing a goal-relevant information space by searching for relevant websites or information retrieval systems Reducing and managing the range of possible information to be encountered by generating and modifying search terms related to topic and focus of a task Scrutinizing hyperlinks to judge the usefulness and significance of information before accessing it based on specific reading goals Assessing relevance and usefulness of information in relation to the tentative meaning constructed through the initial and ongoing exploration Using navigation functions to select, structure, and create environments to assist in constructing text meaning
Strategies for Comprehending a Single Digital Text	Looking for important information written or visualized in text and paying greater attention to it than other information Adjusting reading speed and concentration depending on the perceived importance of text to reading goals Evaluating author's purposes, intentions, and goals based upon the analysis of the assumptions, worldviews, and beliefs that are often hidden in text Using online resources to assist comprehension of text
Strategies for Comprehending Multiple Digital Texts	Reading sections of different texts recursively as required to solve problems across multiple texts Rereading and linking text segments that were previously regarded as unrelated to finalize crosstextual meaning structures Making meanings from different multimodal texts and determining contribution of each modal information to a coherent understanding of the texts Organizing related information across texts by using related strategies

comprehension task. For example, Seunghoon and Kyungmin only looked for the most direct and contrastive information and therefore considered most of the details they had encountered on each web page to be irrelevant. This directed the two readers to quickly exit many web pages in search of new ones, especially towards the end of their L2 ORC sessions. On the contrary, Youngmi also read for more specific details on fiat currency and cryptocurrency to support her response to the comprehension task, which made her remain within a same web page for a longer period of time.

4.3. The Distinctive Characteristics of L2 ORC

The strategies utilized by the six participants that were discussed in the previous section shed light on the unique nature of L2 ORC by unveiling the cognitive processes it demands from readers. The various strategies that were identified provide further empirical support to the observation that successful ORC requires both strategies for print-based reading and those unique to the Internet context (Afflerbach & Cho, 2009; Cho, 2014; Cho & Afflerbach, 2017; Coiro & Dobler, 2007; Konishi, 2003; H.-R. Park & Kim, 2011; Schmar-Dobler, 2003). While a direct comparison to other research studies on reading

strategy use would be untenable due to differences in the reader-text-task combination (Joh, 2014), strategy use that might be distinctive of L2 ORC is highlighted in this section. This is discussed in light of “print-based” L2 reading—the current instructional focus of secondary classrooms—and “L1” ORC, which Korean learners of English are especially accustomed to.

4.3.1. In comparison to print-based L2 reading: Path construction and multiple-text synthesis

As the Internet is a vast hypertext system, it was crucial that the participants narrow down the scope of information by continuously seeking web pages that were relevant and useful to the task demands. Due to the superfluous amount of information on each web page, they also had to demonstrate selective reading by adjusting their reading speed and level of concentration. This is less likely to be observed from print-based reading, in which the text is usually determined before the actual act of reading and read in its entirety.

The participants initiated their L2 ORC session by choosing a search engine and entering a search term into it. Guiding their choices was their prior knowledge about how different search engines lead to different sets of information. This echoes Coiro and Dobler’s (2007) observation that ORC demands the application of additional prior knowledge, such as that of web-based search engines, in comparison to print-based reading. As evidenced by the participants’ stimulated recall interviews, such prior knowledge seemed to stem largely from their previous experience with searching the Internet for various information.

Another strategy use that contributed to the construction of the participants’ reading paths was the active and critical evaluation of the usefulness of each web page on the search results. The participants grounded their evaluation in two main criteria: relevance of the web page title to the task demands and the credibility of the source of information. In other words, they selected web pages with titles that were highly relevant to the task and those that were hosted on websites that were judged to be trustworthy. Again, the participants’ previous experience with particular websites (e.g., Quora) played a significant role in the selection of specific web pages.

The participants constructed reading paths not only across different web pages but also within individual web pages by adjusting their reading speed and level of concentration. They first quickly scanned and skimmed the page to identify relevant and unique information and then slowed down their reading speed to process it carefully. Such scanning and skimming, which have been noted as essential strategies for ORC in comparison to print-based reading by Schmar-Dobler (2003), were in part assisted by navigation functions such as *Find (Ctrl + F)* and hyperlinks that shift the screen to a

different portion of the web page. Such adept use of navigation functions serves as an example of how ORC can be conceived of as a combination of six elements—reader, text, author, task, context, and technology—with technology gaining more importance in Internet contexts (Hartman, Morsink, & Zheng, 2010).

As the participants followed the reading paths they were constructing, they also made effort to synthesize content across multiple web pages into a coherent mental representation. This mental representation that was in the making influenced the participants' actions—most prominently their choices to either closely read or reject the text that they encountered. For instance, if the contents of a web page were deemed as redundant in light of previously read text, the participants quickly exited it in search of web pages that would make unique contributions to the task demands. In addition, a gap in what they have comprehended from the searched web pages in light of the information necessary to fulfill the given task directed their additional search for corresponding information. Such monitoring of the current state of comprehension and taking deliberate actions in response exemplifies the expert reading proposed in Pressley and Afflerbach's (1995) original model of constructively responsive reading.

4.3.2. In comparison to L1 ORC: Online resource use and avoidance strategies

While the majority of the strategies employed by the participants of the current study could be accounted for by Cho and Afflerbach's (2017) categorization of strategies, the comprehension problems posed by the L2 text directed the participants to refer to online resources such as dictionaries and translators to support their reading. These online resources assisted the participants' comprehension from two perspectives. First and more prominently, these resources provided explanations of technical terminology that the participants with minimal topical prior knowledge encountered for the first time during their L2 ORC sessions. Additionally, a more L2-specific online resource use for finding the Korean definitions of English text was also observed. Such translation, which ranged in scope from single words to entire paragraphs, helped to close the gap between L2 ORC and L1 ORC. These examples demonstrate how learners of English seek linguistic support from online resources while reading on the Internet (H.-R. Park & Kim, 2011; J. Park et al., 2014).

The perceived comprehensibility of L2 text also served as a criterion for evaluating the usefulness of text, which consequently led readers to avoid reading text found to be beyond their comprehension level. This was evident in how some participants skipped reading paragraphs of text or even rejected an entire web page based on their judgement that they would be too difficult for them to understand. Sometimes this criterion of comprehensibility assumed higher priority than the credibility of source in the selection of

a web page, as was depicted in the example where one participant returned to a web page previously deemed as untrustworthy in expectation of more comprehensible text.

4.4. Implications of the Findings

In general, the results of the current study provide more detail on the unique nature of L2 ORC and thereby reveal how the Internet has impacted reading in a second language. These findings provide implications at both theoretical and practical levels. At the theoretical level, the study emphasizes the need to expand the concept of L2 reading to encompass the unique challenges posed by Internet contexts. As demonstrated by the participants of the current study, solely relying on strategies for traditional print-based L2 reading does not guarantee successful L2 ORC; readers also need to construct their individualized reading path and synthesize information from multiple texts as they follow it. This lends empirical support to the framework of new literacies, which posits that ICT has profoundly changed the nature of literacy (Coiro et al., 2008; Leu et al., 2013).

The practical implications drawn from the study can be considered in relation to L2 instruction and assessment as well. With regard to L2 instruction, there is no doubt that L2 students need to learn how to utilize the strategies identified in this study appropriately in order to explore the Internet in English and fully realize the potential it holds for them. Researchers and practitioners have already begun to discuss how traditional instructional models for reading strategies might be applied to ORC (e.g., Leu et al., 2008). With respect to L2 assessment, the expanded construct of L2 reading ability needs to be reflected onto existing reading tests. Otherwise, scores from a reading test that represents only the “print-based” portion of the construct would have lower validity to be interpreted as indicators of such an expanded construct of L2 reading ability. However, significant challenges remain in terms of operationalizing this expanded L2 reading ability, mainly because the scope and amount of text to be read by each reader remains indeterminate on the Internet (Hartman et al., 2010; Leu et al., 2016). In order to overcome this issue and inform the development of assessment tasks that are efficient enough to implement, further research into the construct definition of L2 ORC is necessary.

5. CONCLUSION

The current study delved into strategy use behind L2 ORC by examining the screen recordings and stimulated recall data from L2 ORC conducted by six Korean tertiary-level learners of English. The analysis of the six participants’ L2 ORC sessions revealed that a wide variety of strategy use contributed to their successful L2 ORC. More specifically, all

six participants utilized strategies for constructing a coherent reading path as well as comprehending single and multiple digital texts in order to meet the task demands. The participants' L2 ORC could also be roughly categorized according to whether the reader's primary focus was on constructing a reading path or making meaning from the located texts. Such variation in strategy use seems to have been influenced by the participant's level of L2 reading fluency as well as exactly what they considered to be relevant to the task demands.

These results provide further empirical support to the observation that successful ORC requires both strategies for print-based reading and those unique to the Internet context. They also shed light on how L2 ORC might entail different cognitive demands from either print-based L2 reading or L1 ORC; the "Internet" aspect of L2 ORC demands that readers construct their reading paths and synthesize multiple texts, whereas the "second language" aspect of L2 ORC may require the use of online resources as well as the avoidance of incomprehensible text. Overall, the current study demonstrates that the current conception of L2 reading needs to be expanded to encompass the novel challenges posed by the Internet. Consequently, this urges theoreticians and practitioners to begin discussing methods to incorporate this change into educational practices tied to L2 reading instruction and assessment.

Although this study provides insight into how the Internet has impacted L2 reading, it is not without its research limitations. First, the size of the participant sample of this study was relatively small, largely due to the qualitative nature of the research methodology. Consequently, the results may only generalize to its closest peers such as other tertiary-level learners of English with a similar profile. Second, the identification and categorization of strategies from the collected data was conducted solely by one coder. Although the triangulation of screen recordings and stimulated recall interviews revealed representative strategies such as those discussed in section 4.1, a higher level of reliability would have been achieved if the data had been double-coded.

To mitigate the issue with the limited generalizability of the study, a replication study could be conducted with secondary-level students with a more diverse profile (e.g., in terms of English reading proficiency and Internet experience) for a picture of what L2 ORC in the process of development might look like. Moreover, we expect the results of this study to lay the foundation for further research on strategy use during L2 ORC, such as a more direct and controlled comparison to strategies utilized during print-based L2 reading or L1 ORC by the same group of English learners.

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APPENDIX A

Translated Version of Preliminary Screening Survey

1. Major (also indicate if you have a double-major or minor): _____
2. Gender: (1) Male (2) Female
3. Year of study (e.g., undergraduate senior, 2nd semester of master's): _____
4. Is your native language (i.e., the first language you learned after birth) Korean? This study is only for native speakers of Korean. (1) Yes
5. Authorized English test score (e.g., TEPS, TOEIC, TOEFL): _____
6. Indicate the length of your experience in an English-medium academic environment (e.g., study abroad, international school, exchange student), if applicable: _____
7. About how long do you use the Internet in Korean per week? (including PC and mobile)
(1) Less than 7 hours (2) 7 to 14 hours (3) 14 to 21 hours
(4) 21 to 28 hours (5) 28 to 35 hours (6) More than 35 hours
8. What is your primary purpose of Internet use in Korean? (select more than one if applicable)
(1) Communication (e.g., instant messenger, social media, e-mail)
(2) Obtaining data and information (e.g., information search, reading news articles)
(3) Leisure (e.g., listening to music, watching videos, playing online games)
(4) Operating web pages (5) Education/learning (6) Job/work-related
(7) Other: _____
9. About how long do you use the Internet in English per week? (including PC and mobile)
(1) Less than 3 hours (2) 3 to 6 hours (3) 6 to 9 hours
(4) 9 to 12 hours (5) 12 to 15 hours (6) More than 15 hours
10. What is your primary purpose of Internet use in English? (select more than one if applicable)

- (1) Communication (e.g., instant messenger, social media, e-mail)
(2) Obtaining data and information (e.g., information search, reading news articles)
(3) Leisure (e.g., listening to music, watching videos, playing online games)
(4) Operating web pages (5) Education/learning (6) Job/work-related
(7) Other: _____

11. How well do you know about fiat currency and cryptocurrency?

- (1) know nothing — (2) — (3) — (4) know somewhat — (5) — (6) — (7) know very well

Note. Questions regarding Internet usage were adapted from Ministry of Science and ICT and Korea Internet and Security Agency (2018).

Applicable levels: Secondary, tertiary

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