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# Four English Language Learners' Experiences and Strategy Use in Learning Environments of Multiliteracies

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Four English Language Learners' Experiences and Strategy Use  
In Learning Environments of Multiliteracies

by

Ho Ryong Park

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
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## ABSTRACT

English language learners (ELLs) develop their reading by engaging in diverse literacy activities in the learning contexts of multiliteracies. I investigated ELLs' experiences and their use of strategies when they read computer-based texts at home and in school. In addition, I identified a variety of influential factors that affected the ELLs' use of reading strategies when they read computer-based texts in both research contexts.

This research was conducted at homes and at three public elementary schools. Participants were two fourth-grade and two fifth-grade ELLs, four parents, and five classroom teachers. The study included observations, interviews, verbal reports, documents, field notes, and reflective journals. My data analysis processes consisted of five steps and resulted in an understanding of the ELLs' use of strategies and literacy experiences when they read computer-based texts in home and school contexts.

I collected data from April 2010 through December 2010. The findings indicated that the ELLs used 15 strategies when they read diverse computer-based texts. All the ELLs created their multi-dimensional zone of proximal development (ZPD) and dialogued with others, themselves, and texts in both non-linear and dynamic ways. The ELLs' specific patterns of using the strategies contained both similarities and differences in each context. In addition, (1) ELLs' electronic literacy knowledge and experiences, (2) parents' and teachers' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, (4) the language of computer-based texts, and

(5) technology equipment in the contexts all influenced the ELLs' use of reading strategies at homes and schools.

There are two implications for parents and teachers. First, even though limitations exist, parents and teachers need to play more active roles in supporting their children's efficient and productive use of strategies and computer technology for their computer-based text reading. Second, to enhance the ELLs' literacy development in the learning contexts of multiliteracies, a home-school connection is necessary.

## CHAPTER 1: INTRODUCTION

### Introduction

The world has become diverse with respect to aspects of language and technology, and personal computer and electronic devices have influenced students' lives (Becker, 2000). Home is the primary place where young students use computers and access the Internet, and school also provides these students with many opportunities for using computers (Becker, 2000; Lee & Chae, 2007). Therefore, one critical component that the formal and informal education systems in the U.S. need to consider is diverse technologies.

Since technologies permeate students' everyday and academic lives, the ways of how they think and learn also change (Foehr, 2006; Jeong & Fishbein, 2007; Oblinger & Oblinger, 2005; Prensky, 2001b, 2001c). Regardless of whether the students are ELLs or native English speakers, they obtain information through various technologies, such as radio, TV, the Internet, CD-ROMs, and computers, and they use them for both academic and entertainment purposes (Lenhart, Simon, & Graziano, 2001; McPherson, 2005).

The change of the educational contexts has also influenced language education. In addition, some central concepts, which researchers and teachers took for granted, have changed too. Literacy, reading, and texts, which are my focuses in this study, also encounter these challenges in diverse sociocultural and technological contexts. Since ELLs, as parts of both school and society, are also in the middle of this transformative



process, it is important to know who they are and what their literacy experiences are in order to improve literacy education in the learning contexts of multiliteracies in the U.S.

The number of ELLs in U.S. public schools was approximately 3.5 million in the 1998-1999 school year, and it increased to 5.3 million during the 2008-2009 school year. This number represents that they reached almost up to 10.8 percent of the school population in the 2008-2009 school year (National Clearinghouse for English Language Acquisition, 2011). ELLs usually do not belong to the mainstream student group; they are marginalized in school and society. They are the populations that represent diversity clearly, and their ethnic identities are often more complex than people perceive (Lee, 1996; Li, 2000, 2003, 2006; Nieto, 2000; Verdugo & Flores, 2007). In this study, I focused on the ELLs' perceptions and experiences when they read computer-based texts in home and school contexts.

In technology-incorporated societies, ELLs' literacy development, especially reading development, was my focus of this study. Reading is an important language skill to understand texts, and ELLs need to master it to become fluent language users (Anderson, 2003; Ediger, 2001; McPherson, 2005; Urquhart & Weir, 1998). Even though it is clear that literacy is important for ELLs' linguistic and academic competence, the teaching and learning of it in an academic context are very complex processes. The ELLs' developmental processes of literacy involve every difficulty that native English speakers experience while they master reading and writing. But the processes also contain additional factors, such as cultures, languages, and identities (Antunez, 2002). These cultural and linguistic differences alienate the ELLs from mainstream contexts, and

learning environments in home and school settings play important roles as ELLs become successful within these sociocultural contexts (Li, 2000, 2003, 2006).

To effectively help ELLs succeed in the learning contexts of multiliteracies (New London Group, 1996), it is necessary to understand their experiences in diverse technology-incorporated literacy contexts, such as homes and schools, and their reactions when they read different types of computer-based texts. Furthermore, it is necessary to know how the students make meaning (Au, 1993, 1995; Coiro & Dobler, 2007; Gee, 1992b; Goodman, 1984; New London Group, 1996; Pearson & Stephens, 1994; Rosenblatt, 1978, 1982) in their dialogic relationships with others' voices and powers (Bakhtin, 1986; Freire, 2000) within the reading environments of multiliteracies. In these ways, parents, teachers, and administrators can effectively guide and support their students and facilitate a home-school connection. However, not many researchers have paid attention to students' use of reading strategies when they read texts on computers (Elshair, 2002). Furthermore, the research about ELLs' use of reading strategies in diverse learning contexts is still limited (Anderson, 2003; Coiro & Dobler, 2007; Huang, Chern, & Lin, 2009). Therefore, it is necessary to conduct research regarding the ELLs' reading of computer-based texts in the diverse learning contexts of multiliteracies.

### Purposes of the Study

The purposes of this study were to investigate elementary-level ELLs' experiences, their use of strategies, and influential factors when they read computer-based texts in home and school contexts. I adopted a holistic viewpoint to understand their literacy experiences in depth and to view their meaning-making processes and dialogic interactions within the zone of proximal development (ZPD), referring to “the

distance between the actual developmental level . . . and the level of potential development” (p. 86) in reading computer-based texts. In addition, I explored the influences of the environments of homes and schools on the ELLs’ reading of computer-based texts.

Throughout their reading processes, readers actively make meaning and interact with themselves, with others—such as parents, siblings, teachers, and peers—and with authors of texts in the social, cultural, historical, and institutional contexts (Au, 1993, 1995; New London Group, 1996; Park & Kim, 2011; Pearson & Stephens, 1994; Rosenblatt, 1978). Reading, as a meaning-making process, is not an individual phenomenon but a complex and dialogical phase, and readers make meaning through their views of the world in their ZPD (Halliday, 1994; New London Group, 1996; Vygotsky, 1978). The dialogic features, which include inner dialogue as individual speakers’ conversations with themselves, help readers name the world and play important roles when they transact with texts (Bakhtin, 1986; Freire, 2000; Rosenblatt, 1978, 1982). Moreover, in their sociocultural contexts, readers appropriate their struggles and conflicts between authoritative discourses—including their parents’ and teachers’ words—and internally persuasive discourses—as their own words—through dialogic interactions (Bakhtin, 1981).

My goals for this study were to identify ELLs’ use of strategies in their literacy activities and to gain a holistic understanding about their reading experiences in technology-incorporated sociocultural contexts, including homes and schools. In these ways, parents, teachers, and administrators can more effectively facilitate the ELLs’ literacy development in the learning contexts of multiliteracies. Furthermore, we can

approach the ELLs' mindsets and worldviews appropriately and help them become successful members of society.

### Research Questions

To have a better understanding of ELLs' use of strategies and their reading experiences when they read computer-based texts, I addressed the following seven research questions:

1. What strategies do four elementary ELLs use when they read computer-based texts in their home context?
2. In what ways do these elementary ELLs describe their use of these strategies in their home context?
3. What influences these ELLs to use the strategies when they read computer-based texts in their home context?
4. What strategies do these elementary ELLs use when they read computer-based texts in their school context?
5. In what ways do these elementary ELLs describe their use of these strategies in their school context?
6. What influences these ELLs to use the strategies when they read computer-based texts in their school context?
7. In what ways do ELLs' use of strategies differ when they read computer-based texts in their home and school contexts, and what influences these potential differences?

Questions 1 to 7 aimed to investigate the ELLs' use of strategies when they read computer-based texts in both home and school contexts. The ELLs' strategy use showed

how they actually reacted when they read computer-based texts in their new literacy lives. The third and sixth questions sought to understand elementary-level ELLs' experiences in the contexts of multiliteracies in home and school settings. In addition, I focused on their dialogic interactions with other people, the environmental factors in their meaning-making processes, and the influences of factors affecting their literacy development.

### Theoretical Framework

#### *Sociocultural Theory (SCT)*

Vygotsky (1978, 1986) focuses on the role of language, culture, and society in human development and developed SCT to investigate human higher mental consciousness (Johnson, 2004; Lantolf, 2005). Through SCT, Vygotsky provides several key concepts: genetic method, internalization, mediation, and ZPD. It is arguable to add activity theory into SCT depending on researchers; therefore, I do not review the concept in this study. I briefly review the key concepts relevant to SCT.

#### *Genetic Method*

Vygotsky and his disciples captured human development patterns at four different levels: phylogenesis, sociocultural history, ontogenesis, and microgenesis (Wertsch, 1985). Phylogenesis means the evolutionary development of a group of organisms, so this domain is relevant to biological processes. Vygotsky (1986) focuses on a comparison between higher apes and human beings with regard to phylogenesis and argues “[i]n animals, language and thought spring from different roots and develop along different lines” (p. 68). Different from phylogenesis, sociocultural history places a stress on historical processes, which are responsible for cultural development. Therefore, human higher mental development interrelates with social, cultural, historical, and material

circumstances. Ontogenesis is one of the individual levels of human higher mental development, and both phylogenesis and sociocultural history domains are incorporated into it. Consequently, human beings interact with biological and sociocultural components in this developmental level, and both domains influence the development. The last domain of genetic research is microgenesis, and its focus is human higher mental functioning over a short time period. (Johnson, 2004; Lantolf & Thorne, 2006; Mitchell & Myles, 2004; Vygotsky, 1978; Wertsch, 1985).

### *Internalization*

To understand human higher mental development with respect to social and historical components, another complex concept, internalization, is necessary. Vygotsky (1978) defines internalization as “the internal reconstruction of an external operation” and argues that “the process of internalization consists of a series of transformations” (p. 56). According to Vygotsky, the external operation for activities begins to occur internally, so psychological function appears “first between people on the interpsychological plane and then within the individual on the intrapsychological plane” (Lantolf, 2005, p. 153). These transformations occur throughout the gradual and prolonged developmental events, and individuals experience three stages: the object-regulated stage, the other-regulated stage, and the self-regulated stage. In the object-regulated stage, the world of objects and external environments influences individuals’ mental functioning. In the other-regulated stage, their mental functioning relies on adults’ or more-skilled individuals’ assistance, typically mediated through language. Finally, at the self-regulation stage, they take control of their higher mental processes autonomously (Johnson, 2004; Lantolf, 2005; Mitchell & Myles, 2004).

### *Mediation*

Language plays a crucial role as mediation when the transformation processes from the interpersonal to the intrapersonal plane occur, and individual speech development has three stages: external speech, egocentric or private speech, and inner speech (Vygotsky, 1986). External speech refers to the speech form to control others' behaviors. Private speech is the form of speech externalized to regulate a speaker's own mental activity, and it precedes inner speech. Private speech plays a transitional role to move from interpersonal speech to intrapersonal speech. Inner speech, as verbal thought, implies "speech for oneself" and "speech without words" (pp. 225-226). Vygotsky indicates that both private and inner speeches fulfill intellectual functions for human higher mental development. They share similar structures, and one transforms into the other. In SCT, social interactions are requirements for the emergence of higher forms of consciousness because social activities precede language and cognitive processes (Johnson, 2004).

### *Scaffolding*

Another fundamental concept of sociocultural perspectives is scaffolding, which describes tutorial interactions between an adult and child (Hobsbaum, Petes, & Sylva, 1996; Yang & Wilson, 2006). Scaffolding literally refers to a supporting structure erected around a building under construction, and it is no longer necessary when the building is strong enough (Yang & Wilson, 2006). Furthermore, the term *scaffolding* is used to explain how an expert helps a novice perform some task without another person's assistance (Scrimsher & Tudge, 2003; Wood, Bruner, & Ross, 1976). Scaffolding also

refers to the support that other, more-capable individuals, such as parents, teachers, peers, and texts, can offer to novice children when they are in their ZPD (Vygotsky, 1978).

### *ZPD*

Vygotsky (1978) defines ZPD as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). This notion reveals his idea about learning. Vygotsky argues:

[A]n essential feature of learning is that it creates the zone of proximal development; that is, learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. (p. 90)

This suggests that learning occurs within ZPD, and sociocultural contexts and others’ help influence the learner’s development. Vygotsky (1978) uses ZPD in three diverse situations. He uses it to explain the emerging psychological functions of children in developmental contexts; but he also uses it to clarify children’s different performances and achievement when they have or do not have scaffolding from others in applied contexts. Finally, he uses ZPD as a metaphoric space where children’s everyday concepts encounter scientific concepts from teachers or other mediators of learning (Kozulin, Gindis, Ageyev, & Miller, 2003). Therefore, the children with more casual knowledge obtain more academic and formal information in this metaphoric space. I interpret ZPD as a metaphoric space where human development occurs through social interactions



between learners and advanced others, such as parents, siblings, teachers, and peers. In addition, they learn from themselves or diverse texts.

Vygotsky emphasizes that social, cultural, historical, and institutional components play important roles in human development for both first language (L1) and second language (L2). He notes that social interactions for human cognitive development in ZPD are important regardless of whether they are interpersonal and intrapersonal. However, even Vygotsky's SCT does not cover every language aspect because the sociocultural contexts are too complex. Vygotsky delineates the concepts of interaction and speech, but he does not specify the characteristics of the notions in sociocultural contexts. To validate and support Vygotsky's SCT, I adopted Bakhtin's dialogism, which depicts the characteristics of speech in the complex contexts (Johnson, 2004).

### *Dialogism*

Bakhtin (1981) identifies language, both oral and written, as speech rather than as a system of grammatical categories. He considers it is "a world view" and "ideologically saturated" (p. 271). He emphasizes utterance as an important component for speech and adds that language and life can interrelate with each other through concrete utterances. To make his arguments clear, Bakhtin differentiates speech from language, and defines the utterance as the real unit of speech communication, which is different from the sentence as the unit of language.

### *Utterance*

According to Bakhtin (1986), the utterance belongs to a particular speaker, so speech does not exist without the individual speaker's utterance. The utterance has three features. First, the utterance has a speaker or speakers, so there is "a change of speaking

subjects” (p. 71). Each utterance has an absolute beginning, which follows another speaker’s utterance, and an absolute end, which precedes another speaker’s responsive utterances, understanding, and actions. Second, the utterance brings about some kind of response or reaction from other subject(s), and Bakhtin associates this characteristic with “addressivity, the quality of turning to someone” (p. 99). Words and sentences, as signifying units of language, are impersonal, so they do not have an author and an addressee who understands the utterance. However, any utterance, either oral or written, has its author, an addressee, and a superaddressee, whose responsive understanding is absolute and ideally true. The addressivity is a critical feature for utterance to exist. The last characteristic of the utterance is closely related to a speech genre, which refers to relatively typical and stable types of utterances, not a form of language. The speech genre includes certain typical types of expressions and organizes our speech. Bakhtin stresses it because he considers that people learn language while they are exposed to various speech genres during their speech processes. “Genres correspond to typical situations of speech communication, typical themes, and . . . particular contacts between the meanings of the words and actual concrete reality under certain typical circumstances” (p. 87); they are diverse and flexible.

### *Dialogue*

Bakhtin (1986) argues that the utterance is in a dialogic relation with other speaking subjects’ utterances and voices. He manifests the dialogic aspects of the utterance in his argument: “The speaker ends his utterance in order to relinquish the floor to the other or to make room for the other’s active responsive understanding” (p. 71). According to Bakhtin, in dialogic contexts each utterance has a complex relationship with

others' precedent utterances, and language exists between speaking subjects. Words in the language belong to oneself and the other at the same time, and they do not exist in a neutral and impersonal language; language is not a neutral medium (Bakhtin, 1981; Johnson, 2004). Bakhtin asserts that we always adopt the form of dialogue when we speak. His concept of dialogue encompasses both monologue and the traditional meaning of dialogue referring to speech between two or more speaking subjects (Johnson, 2004).

### *Dialogized Heteroglossia*

All utterances and voices are in multiple dialogic relations with other utterances and voices of other speakers, and the relations include the social, cultural, and institutional contexts of the utterances as well as those of the original speaking subjects. Therefore, all speech contains heteroglossic features (Johnson, 2004). Furthermore, the centripetal and centrifugal forces work simultaneously for every concrete utterance. The centripetal force acts upon centralization, unification, and systematization of the utterance, but the centrifugal force works for decentralization, heterogeneity, and diversity of utterances (Bakhtin, 1981). Although the two forces are contradictory, every utterance responds to the process of centralization and decentralization at the same time. Bakhtin lays more emphasis on centrifugal force than centripetal force, and this is where his "dialogized heteroglossia" exists (Bakhtin, 1981, p. 272). In terms of epistemological development, Bakhtin's dialogized heteroglossia is important because he discovers the individual self and brings the dynamic relationships between individual inner and outer worlds into focus. All those complex relationships are mediated through dialogues (Holquish, 1990; Johnson, 2004).

The heteroglossic aspects of dialogue are relevant to the concept of ideology, and ideology comprehensively refers to an “idea-system” (Bakhtin, 1981, p.429) in Russian culture. Medvedev and Bakhtin (1978) argue that an “isolated person does not create ideologies” and “ideological creation [such as works of arts, scientific works, religious symbols and rites, etc.] and its comprehension only take place in the process of social intercourse” (p. 7).

### *Inner Dialogue*

Bakhtin’s inner dialogue refers to individual speakers’ conversations with themselves, and it is similar to Vygotsky’s inner speech. As mentioned in the Mediation section, “[i]nner speech is speech for oneself; external speech is for others” (Vygotsky, 1986, p. 225). This statement clearly reveals that inner speech does not include speech for others. However, inner dialogue includes the dialogue with both individual speakers and others at the same time. This is because Bakhtin’s individual self is based on other speakers’ voices too (Johnson, 2004). Therefore, inner dialogue encompasses utterances in more diverse and dynamic contexts. Bakhtin (1981) does not follow the trend of centralization, which means “unity of diversity” (p. 274), and ignores diverse characteristics of language; instead, he advocates heteroglossic and dialogic aspects of language.

### *Ideological Becoming*

“In Bakhtinian writings, ideological becoming refers to how we develop our way of viewing the world, our system of ideas, what Bakhtin calls an ideological self” (Freedman & Ball, 2004, p. 5). In addition, it means “the process of selectively assimilating the words of others” (Bakhtin, 1981, p. 341) in a dialogic phase. The

ideological becoming implies the development of a whole person, and this includes the person's concepts and ideas in an ideological world (Freedman & Ball, 2004).

Ideological becoming occurs within “the ideological environments,” and the environments mediate the ideological becoming and include words, scientific statement, and beliefs as ideological phenomena (Medvedev & Bakhtin, 1978, p. 13). In these ideological environments, individual speakers have their own voices and need to interact with others who also have their own voices, and this social interaction is important for their growth. The social interaction is full of tensions and conflicts because individuals have their own voices and discourses, and the individuals struggle within this context as they develop their own ideologies. However, the struggle is crucial to individuals' learning (Bakhtin, 1981). To interact with others who have different voices, individuals need to assimilate between two types of discourse: an authoritative discourse and an internally persuasive discourse. The authoritative discourse refers to the words that are “located in a distanced zone, organically connected with a past that is felt to be hierarchically higher” (p. 342). For instance, authoritative words are moral, religious, and political, such as parents' and teachers' words, and the authoritativeness comes from various contents, such as tradition, generally acknowledged truths and beliefs, rules, and doctrine. Individuals already acknowledge the authoritative discourse from past discourses. Internally persuasive discourse, different from the authoritative discourse, is the individuals' own words, which are in general “denied all privilege, backed up by no authority at all, and . . . frequently not even acknowledged in society” (p. 342). In other words, this is “of decisive significance” and “affirmed through assimilation, tightly

interwoven with ‘one’s own word’” (p. 345). However, Bakhtin argues that our internally persuasive words belong to us and someone else at the same time.

Based on Vygotsky’s SCT and Bakhtin’s dialogism, I consider learning occurs in learners’ dynamic sociocultural and technology-incorporated contexts, and readers, especially L2 readers, make meaning in their flexible ZPD as a metaphoric space in which the learner’s development occurs. For the developmental and learning processes, individuals’ dialogic interactions with teachers, peers, themselves, and a variety of texts are crucial. Since learners and teachers teach each other through dialogic interactions (Freire, 2000), teaching and learning do not occur unidirectionally. I think ZPD needs to be considered as multidimensional in complex educational contexts. For example, it is possible that students are more knowledgeable or capable than their teachers in technology-incorporated and culturally and linguistically diverse learning environments. In these cases, teachers can learn from their students through dialogic interactions. Consequently, students and teachers have their own ZPD, and they bring it to their classrooms. I use these perspectives for this L2 literacy development study in the learning contexts of multiliteracies.

#### Definition of Terms

The following terms and concepts are key to this study, and I offer the definitions to clarify the meanings in the study.

ELL: English language learners refer to “non-native English speakers who are learning English in school”; “most educators prefer the terms English learners, English language learners, non-native English speakers, and second language learners to refer to students who are in the process of learning English as a new language”

(Peregoy & Boyle, 2008, pp. 2-3). In this study, I use the term *ELL* to refer to a student who is learning English in an English Language Development (ELD) program at school. ELLs may have been born in their parents' country or in the U.S., and they may have different first languages, but regardless of their birthplaces and first languages, I call them ELLs when the schools or school district assigned them to ELD programs.

L1: This refers to the language that a child learns usually at home and in communities with the same cultural and linguistic backgrounds. L1 is known "as the primary language [and] the mother tongue" (Gass & Selinker, 2001, p. 5). In this study, I use L1 to refer to the languages that ELLs learn or use at home and in communities wherein they share culture, identities, lives, and languages.

L2: "The second language is commonly referred to as the L2. As with the phrase 'second language,' L2 can refer to any language learned *after* learning the L1, regardless of whether it is the second, third, fourth, or fifth language" (Gass & Selinker, 2001, p. 5). I use the term *L2* as the language that ELLs learn in school environments or other institutional contexts.

Verbal Report: This means the verbal productions that participants make during activities; through the activities the participants express the thoughts they have in their minds (Afflerbach, 2000; Kucan & Beck, 1997). In this study, I use three types of verbal reports: (1) concurrent (at certain designated points while reading), (2) introspective (at certain designated points while reading), and (3) retrospective (at the end of reading).

Multiliteracies: This term refers to the new approach to literacy and literacy pedagogy and expands the traditional literacy concept. It highlights diversities of culture, language, and technology (Cope & Kalantzis, 2000; New London Group, 1996, 2000). I use this term to investigate and depict ELLs' lives at home and at school.

Electronic Literacies: This is a term to refer to a new technology-based literacy concept, and it includes computer literacy, computer-mediated communication (CMC) literacy, multimedia literacy, and information literacy (Warschauer, 2002).

### Significance of the Study

In diverse learning environments, one single definition of literacy is not applicable to every context; however, it is manifest that literacy is crucial to students' success in all aspects of their lives including their academic and social lives (Wiley, 2005). Moreover, "when a person is called illiterate, it implies a social failing, often a personal failing" (p. 530). Based on the No Child Left Behind (NCLB) Act of 2001, schools use standardized tests to numerically measure students' academic performance and achievement. However, the tests do not tell us every aspect of the development of students with diverse social, cultural, and linguistic backgrounds and experiences.

This study provides information about (1) what computer-based texts ELLs read at home and school, (2) how they perceive reading computer-based texts and use reading strategies in each context, and (3) what components influence their reading and strategy use when they read a variety of computer-based texts in diverse sociocultural contexts. Eventually, the findings and analyses provide parents, teachers, and administrators opportunities to learn more about the computer-based literacy experiences and development of their students in both home and school contexts. These opportunities will



help parents, teachers, and administrators guide and support their students and facilitate a home-school connection.

This study will stimulate several critical issues of second language acquisition (SLA), such as power and struggles in the learning environments of multiliteracies. This study may also contribute to the research methods because I adopted qualitative case study as the research method. The qualitative case study describes diverse perspectives and phenomena and contains participants' emic voices, which refer to their own voices and utterances, in the sociocultural contexts. The qualitative case study will facilitate further in-depth research studies related to those critical issues of ELLs.

#### An Outline of the Dissertation

This dissertation consists of six chapters. It begins with Chapter 1 as an introduction. Chapter 2 reviews the literature that is relevant to the topics and analyses. Chapter 3 provides a detailed description of the research method of this study. Chapters 4 and 5 show the findings, and Chapter 6 provides discussion and suggests implications.

#### *Chapter 1: Introduction*

This chapter provides an overview of the study. This includes the purpose of the study, the overarching research questions, the theoretical framework, the significance of the study, definitions of key terms, and the outline of the study. I adopt Vygotsky's sociocultural theory and Bakhtin's dialogism as the theoretical framework.

#### *Chapter 2: Literature Review*

This chapter provides a review of relevant research. The main focuses are L2 literacy development, L2 reading process, and strategy use in learners' meaning-making

processes. I also explore electronic literacies, glosses, multiliteracies, critical literacy, family literacy, identity, and electronic games.

### *Chapter 3: Method*

This chapter provides a description of method including the research design, the site, and the participants. I also explore think-aloud protocol and explain how I develop the details of my research design and procedure.

### *Chapter 4: Holistic Understanding of Four Cases*

This chapter provides a holistic view of the four cases. This compilation of the four cases describes each ELL's learning process and experiences in the context of multiliteracies. This includes brief descriptions of the participants, the contextual information at home and school, and participants' use of computers and reading strategies to facilitate their meaning-making processes. Each story shows family background, language use at home, home literacy, schooling history, the reader's reading behavior and habits, his or her perceptions of reading, and a discussion of the case. I provide their parents' profiles as well.

### *Chapter 5: Findings*

This chapter provides a summary of the findings. I list the individual research questions and respond to them in order. In the beginning of each section or subsection, I describe the strategy or sub-strategy. In addition, I include my participants' emic voices and describe what they said and thought about the strategies and how they used those strategies.

## *Chapter 6: Discussion and Implications*

This chapter provides discussion of the findings. I discuss six topics: (1) hybrid reading and learning, (2) agency and identity, (3) roles of parents and teachers in ELLs' computer-based text reading, (4) technology equipment and education, (5) active and non-linear dialogues, and (6) multi-dimensional ZPD. After the discussion, I describe two implications: (1) roles of parents and teachers in the learning contexts of multiliteracies and (2) connections between home and school contexts. The conclusion and recommendations for future research follow.

## CHAPTER 2: LITERATURE REVIEW

### Introduction

This study is about ELLs' reading experiences and use of strategies when they read computer-based texts at home and at school. In addition, I identify the influential components for their reading. Before I review the specific concepts or literature, I review core ideas and concepts: (1) second language acquisition, (2) literacy, and (3) glosses. After the general approach to the topics, I visit more specific concepts regarding ELLs' literacy development: (1) multiliteracies, (2) critical literacy, (3) family literacy, (4) identity, and (5) playing electronic games.

### Second Language Acquisition (SLA)

L1 refers to the first language, and it means the primary language, the native language, the mother tongue that a child learns. L2, as the second language, is any language that a speaker learns after learning the L1. L2 does not need to be the second in order of precedence; the additional language can be the second, third, fourth, or fifth language. SLA (Second Language Acquisition) denotes the process of learning L2 after the speakers have learned their L1 (Ellis, 1985, 1994, 1997; Gass & Selinker, 2001). The initial studies appeared at the end of the 1960s, so the history of L2 study is shorter than four decades. After the seminal studies intrigued researchers, SLA research has developed rapidly in various fields, such as L2 learning and teaching, L2 process and development, methods, and assessment. Many researchers have published studies

regarding the characteristics of L2 learners and their languages, the development with regard to the acquisition process, and models and theories about SLA (Ellis, 1994).

There are three main traditions of SLA research: behaviorism, cognitive-computational tradition, and dialogical tradition (Johnson, 2004). Behaviorism dominated the SLA field until the late 1960s. Behaviorists viewed learning as the ability to discover rule-governed behavioral patterns in a certain environment and a habit formation process. Ellis (1994) writes:

Behaviourist views of language learning and of language teaching were predominant in the two decades following the Second World War. These views drew on general theories of learning propounded by psychologists. . . . According to the law of exercise, language learning is prompted when the learner makes active and repeated responses to stimuli. The law of effect emphasizes the importance of reinforcing the learners' responses by rewarding target-like responses and correcting non-target-like ones. . . . Underlying these principles was the assumption that language learning, like any other kind of learning, took the form of habit formation, a "habit" consisting of an automatic response elicited by a given stimulus. (p. 299)

Behaviorists placed emphasis on the repeated responses to certain stimuli, imitation, and reinforcement. However, they ignored important factors, such as learners' individual differences, cognitive development, and emotions, which are not observable. Furthermore, they did not include participants whose performance was not in norm range to their studies (Ellis, 1985, 1994; Gass & Selinker, 2001; Johnson, 2004).

To compensate for these shortcomings, cognitivists began to raise their voices. Cognitivists divide the world into two: the material world, which is visible, and the mental world, which is invisible. They connect the human body as the material world with outward behavior and the human mind as the mental world with inward behavior. Ellis (1994) notes:

[A] cognitive theory of language acquisition sees linguistic knowledge as no different in kind from other types of knowledge, and views the strategies responsible for its development as general in nature, related to and involved in other kinds of learning. This perspective contrasts with a linguistic theory of L2 acquisition, which treats linguistic knowledge as unique and separate from other knowledge systems, and acquisition as guided by mechanisms that are (in part at least) specifically linguistic in nature. (p. 347)

The cognitivists are interested in what happens in the learner's head, such as a mental process, when learning occurs, and two groups of linguists represent the trends of the cognitivist approach. The first group of linguists adopts processing approaches; the second group belongs to emergentist or constructionist approaches. Processing approaches focus on how second language learners process their linguistic information in their minds (Mitchell & Myles, 1998). In particular, computational cognitivists of this group identify the human mind with a computer system, and they try to find the universal rules of the information processing (Krashen, 1985; Long, 1983; Swain, 1985; VanPatten, 1996). In emergentist or constructionist approaches, learners actively operate a complex linguistic information processing system as they do for other kinds of information, and the approaches include emergentism, connectionism, constructivism, cognitivism, and

others. From these perspectives, learners acquire language “through usage, by extracting patterns and regularities from the input, and building ever-stronger associations in the brain” (Mitchell & Myles, 1998, p. 98).

However, both behaviorism and cognitive-computational tradition do not consider social interactions and their collaborative aspects, and they are unbalanced regarding theories and methodologies (Firth & Wagner, 1997a, 1997b; Johnson, 2004). The dialogical tradition comes out to restore the balance between material and mental components of human beings and deals with the dualism of behaviorist and cognitivist approaches. The researchers of this new tradition adopt a more naturalistic approach and consider “the dynamic role of social contexts, individuality, intentionality, and the sociocultural, historical, and institutional backgrounds of the individual involved in cognitive growth” (Johnson, 2004, p. 16). This tradition includes Vygotsky’s sociocultural theory and Bakhtin’s dialogism, which I reviewed in the theoretical framework section of Chapter 1. I adopt this tradition to approach ELLs’ experiences and strategy use in the learning contexts of multiliteracies.

### Literacy

The conventional view of literacy is a language skill, and the teachers’ role is to teach the skill to students in class. From this perspective, literacy is context-neutral and value-free. However, the notion of literacy has changed as social, historical, and cultural contexts have become more complex, and different meanings are acceptable in those different contexts (Warschauer, 1999; Wiley, 2005).

Wiley (2005) provides basic distinctions among definitions of literacy and categorizes them into three: traditional definitions, elite and unconventional definitions,

and ethnographically informed definitions. Traditional definitions consist of minimal literacy, conventional literacy, basic literacy, and functional literacy. “Minimal literacy refers to the ability to read and write something, at some level, in some context(s)” (p. 532), so people who can read aloud their names are literate in this perspective.

Conventional literacy means language users’ capacity to utilize familiar prints through reading, writing, and comprehending in their environments. “Basic literacy presumes a foundation level of skills from which continued literacy development is sustained through individual effort” (p. 532). Functional literacy, as the level of proficiency necessary for effective performance, refers to the ability of individuals to use prints to achieve their goals, such as working at a company, participating in a community, and solving problems. (Harman, 1977; Scribner, 1984; Wiley, 2005). Elite and unconventional definitions include elite literacy and analogical literacies. Elite literacy connects literacy concepts with possession of knowledge and skills in academic settings, and this knowledge is the higher level rather than functional and vernacular. “Analogical literacies pertain to knowledge and skills related to particular types of content, knowledge, technologies, and methodologies” (Wiley, 2005, p. 533). Restricted literacy, vernacular literacies, and situated literacy constitute ethnographically informed definitions. Restricted literacy indicates the literacy of particular people, and people informally acquire it for specific purposes within their own community. Vernacular literacies refer to unofficial practices within everyday lives rather than conventional or academic ones in schools. Situated literacy pays attention to the social aspects of literacy, and it also includes the concept of electronic literacies (Warschauer, 1999, 2002) and multiliteracies (Cope & Kalantzis, 2000; New London Group, 1996, 2000).



Wiley's (2005) classification represents the diversity of literacy definitions. However, one definition does not clearly cover all the aspects of literacy in this complex sociocultural context. To show the diversity of the definitions more specifically, I briefly provide Gee's literacy definition. His two discourses are relevant to my understanding of ELLs' dialogues with themselves, other participants, and texts. After Gee's definition, I review technology in literacy, L1 and L2 reading and SCT, L2 reading process, online and electronic text, strategies in computer-based text reading contexts, and electronic literacies in SLA.

#### *Gee's Definition of Literacy*

Gee's (1989b) definition of literacy is "control of secondary uses of language (i.e., uses of language in secondary discourses)" (p. 23), and he connects literacy learning with learning some aspects of discourse. To explain this definition more specifically, he provides two types of discourse: primary and secondary. Discourse is "a socially accepted association among ways of using language, of thinking, and of acting that can be used to identify oneself as a member of a socially meaningful group or 'social network'" (Gee, 1989b, p. 18), and we have multiple discourses (Gee, 1989a).

Based on this definition, primary discourse refers to discourse "developed in the primary process of enculturation" and "our socio-culturally determined way of using our native language in face-to-face communication with intimates" (p. 22) who share a large amount of knowledge based on similar experiences. Children acquire this primary discourse through primary socialization process in a family or extended family. Speakers' different primary discourses are different because they have different languages, beliefs, values, and behaviors; these cause different experiences. The secondary discourses are

beyond primary discourse; they involve social institutions and groups. These social institutions, as secondary institutions, include schools, workplaces, businesses, churches, etc., so the secondary discourses develop through social interactions and association in these contexts. Individuals have their own secondary discourses depending on their experiences and positions, and the discourses include language use, which is beyond primary discourse. In this approach, literacy means to function with the secondary uses of language.

### *Technology in Literacy*

Technology is an important factor for the literacy concept. As technologies become more available and accessible to individuals' everyday and academic lives, they dramatically influence how people understand the concept of literacy. The notion of being literate also changes as socioeconomic and technological contexts become more complex. "The literate person must be able to combine and recombine existing and new literacy knowledge, skills, and purposes for new purposes and new contexts using new technologies" (Anstey & Bull, 2006, p. 1). Especially, technologically literate persons should know how to find, analyze, evaluate, and use contents with diverse media formats in complex information-oriented contexts, and they should be able to learn and update knowledge of changing technologies independently and collaboratively (Chatel, 2002; Leu, 2000). However, technology is not the only factor causing the change of literacy concepts; other factors, such as social, cultural, economic, historical, and political components, have also played important roles in this change (Warschauer, 1999). Furthermore, "[l]iteracy is regularly being redefined within shorter time periods" (Leu,

2000, p. 764). Therefore, it is necessary to understand literacy and its change in diverse sociocultural contexts.

### *Reading and SCT*

Language learners need to master reading, as one of the major components of literacy, to understand texts, and researchers define it in different ways (Ediger, 2001; McPherson, 2005; Urquhart & Weir, 1998). In the mid-1960s, researchers and practitioners perceived reading as a process of perception rather than a process of language. They also believed that reading was a process of translation from graphic symbols on a printed page to oral codes corresponding to the graphic symbols. In this period, researchers and practitioners viewed reading comprehension as equal to comprehending utterances that readers made when they read. Therefore, teachers' instructional concerns were to teach students how to distinguish written symbols and make the matching sounds; the phonics approach and whole-word instruction were the major teaching methods. From the mid-1960s to the late 1960s, reading attracted researchers from different fields, such as psychologists, sociologists, psycholinguists, and sociolinguists. The researchers began to regard reading as a language process associated with other language processes, such as speaking, listening, and writing (Pearson & Stephens, 1994).

Some researchers adopt a psycholinguistic perspective to approach reading; they regard reading as “the active reconstruction of a message from written language” (Goodman, 1965, p. 639). In his study, Goodman assumes:

Reading must involve some level of comprehension. Nothing short of this comprehension is reading. I have assumed that all reading behavior is caused. It is

cued or miscued during the child's interaction with written language. Research on reading must begin at this point of interaction. Reading is a psycholinguistic process. Linguistic science has identified the cue systems within language. The child learning to read his native language has already internalized these cue systems to the point where he is responding to them without being consciously aware of the process. To understand how children learn to read, we must learn how the individual experiences and abilities of children affect their ability to use language cues. We must also become aware of the differences and similarities between understanding oral language which uses sounds as symbol-units and written language which depends on graphic symbols. (p. 639)

According to Goodman, children's errors, which they make while they read aloud, are not the objects that teachers or parents need to correct or eradicate. Instead, the errors reflect the readers' comprehension process.

Similarly, researchers with the perspective of cognitive psychology consider that reading is a cognitive activity, which mainly takes place in readers' minds. Their investigations largely consist of two areas: reading processes and reading components. The studies of reading processes deal with bottom-up approaches, interactive approaches, and interactive-compensatory approaches. The studies of reading components include topics of word recognition, linguistic comprehension, background knowledge, and so on (Eskey, 2005; Rumelhart, 1980; Urquhart & Weir, 1998).

Sociolinguists, functioning differently from the former trends, are concerned with the relationship between language use and social factors, and they focus more on the social and cultural environments. Sociolinguists interpret social contexts in a broad way.

They include instructional, non-instructional, home, and community settings within the literacy context boundary, and they view language as a social and cultural construction (McKay, 2005; Pearson & Stephens, 1994).

As reading research adopts different perspectives and diverse aspects, scholars expand the concept of reading to include readers, transaction, discourse, society, culture, and identity (Au, 1993, 1995; Bakhtin, 1981, 1986; Gee, 1989a, 1989b, 1992a, 1992b, 2000, 2001a, 2001b; Li, 2000, 2006; Rosenblatt, 1978, 1982; Warschauer, 1999).

Furthermore, reading refers to not only something one can do or teach but also “a complex, orchestrated, constructive process through which individuals make meaning. Reading, so defined, is acknowledged as linguistic, cognitive, social, and political” (Pearson & Stephens, 1994, p. 35). For instance, from her multicultural and sociopolitical point of view, Au (1993) regards reading as a process of constructing meanings as readers interact with other people, such as writers and texts, in a social context. In addition, Rosenblatt (1978) highlights readers’ roles as active meaning-makers rather than passive recipients. She introduces transactional theory and argues that “[t]he relation between reader and text is not linear. It is a situation; an event at a particular time and place in which each element conditions the other” (p. 16). Reading is a two-way process between a reader and a text under those particular circumstances (Rosenblatt, 1982). According to Gee (1989b), “[l]earning to read is always learning some aspect of some discourse” (p. 21). Reading is a socially and culturally situated activity rather than an isolated one, so a perspective of reading needs to become broad in a variety of contexts (Gee, 2000, 2001b).

From the sociocultural perspective, researchers interpret reading in more diverse social, historical, and cultural contexts. Reading is not just a decoding skill to understand

texts, but it is the transactional relation between the reader and the text (Rosenblatt, 1978, 1982), multiple meaning-making processes (Goodman, 1984), heteroglossic dialogue (Bakhtin, 1981), and social interaction (Vygotsky, 1978). Moreover, reading occurs in diverse multicultural, sociocultural, and ideological contexts (Au, 1993, 1995; Bakhtin, 1981, 1986; Gee, 1989b, 1991, 2000, 2001b; Nieto, 2000; Vygotsky, 1978, 1986). As Gee (2000, 2001b) argues, we need more diverse and holistic perspectives to approach reading as a dynamic process in these contexts.

### *L2 Reading and SCT*

L2 reading studies, compared to L1 research, are not sufficient, and many of them rely on L1 research methods and findings. In L2 reading research, reading refers to a skill for learners to employ, and it is a major means through which the learners acquire their target language (TL). For L2 and foreign language (FL) learners, the literacy inputs are more reliable resources than sounds because they access more information through textual materials (Eskey, 2005). When we consider the fact that the number of ELLs in the U.S. has been increasing (Meyer, Madden, & McGrath, 2004; National Clearinghouse for English Language Acquisition, 2011; Verdugo & Flores, 2007) and that they are culturally and linguistically diverse populations, it is clear that we need more research in L2 areas to understand them.

L1 and L2 readers show similar processes when they read. They both look at the texts, predict meanings of words and sentences, use their prior linguistic knowledge (e.g., morphology, phonetics, graphophonics, syntax, and semantics), use schema about the world, and confirm meanings of words and sentences (Eskey, 2005; Grabe, 1991). In addition, L2 readers, like L1 readers, frequently use metacognitive strategies and monitor

their comprehension. They also recognize cognate vocabulary well and recall ideas and propositions. In addition, advanced ELLs focus more on content words than function words (Fitzgerald, 1995). However, L2 readers are different from L1 readers with regard to their second language proficiency and their prior knowledge about topics that they read (Fitzgerald, 1995; Peregoy & Boyle, 2008).

From the perspective of SCT, L2 reading is also a meaning-making process in situated and complex sociocultural contexts (Gee, 1992b; Goodman, 1984). Halliday (1994) argues that “meaning is a social and cultural phenomenon and all construction of meaning is social process,” and the meaning-making process is a distinctive feature of human learning (p. 70). In addition, a variety of individual, social, cultural, and historical conditions are formed when children learn to use language and literacy (Au, 1998). In diverse sociocultural contexts, L2 reading refers to dialogic interactions as well as cognitive processes.

### *Second Language Reading Process*

#### *Schema Theory*

A schema theory is a theory about the representations of knowledge and the ways to facilitate the use of the knowledge in particular contexts in which knowledge is systematically organized. According to the theory, knowledge consists of schemata, and each schema includes both knowledge and the way to use it. A schema, as a data structure, can represent a variety of knowledge concepts, such as situations, events, actions, and sequences of each event and action (Bartlett, 1932; Rumelhart, 1980).

After Bartlett proposed the concept in 1932, schema theory resulted in two basic information-processing modes: bottom-up models and top-down models. According to

these models, the most general schemata are at the top, and the most specific schemata are at the bottom (Carrell & Eisterhold, 1983; Nassaji, 2002, 2007). From the bottom-up models, incoming data or bottom-level schemata converge into high-level schemata and activate the processing of information. However, from top-down models, the information process occurs when the information system makes general predictions based on general schemata and then searches for specific input and information to fit into these higher-level schemata. Rumelhart's (1980) interactive model, Samuel's (2004) automatic processing model, and Kintsch's (2004) construction-integration model followed these bottom-up and top-down models. The three models of schema theory focused on the complex and bidirectional interaction between comprehension processes and memory representations (Kim, 2005).

In literacy, schemata play important roles, and readers use them to anticipate content and structures of texts. A schema also guides readers' understanding of texts and helps them recall after reading (Fitzgerald, 1995). In these perspectives, reading refers to an interactive and dynamic process between texts and readers' prior knowledge, so readers' world knowledge is relevant to their reading comprehension (Carrell & Eisterhold, 1983; Rumelhart, 1980). Readers' prior knowledge also includes their culture, so they understand better when they read texts with culturally relevant content or familiar rhetorical formats. In addition, their schemata influence readers' ways of interpretation (Carrell, 1987; Reynolds, Taylor, Steffensen, Shirey, & Anderson, 1982).

### *Reader Response Theory*

Reader response theory challenges traditional emphases on a text and views reading as a transactional process between readers and texts (Ali, 1993; Hirvela, 1996;



Rosenblatt, 1978, 1982). Rosenblatt (1978) considers that readers are actively involved in reading activities and respond to texts. For example, readers respond to the texts based on their prior knowledge and experiences and choose an appropriate meaning for a particular referent. Furthermore, they pay attention to “the images, feelings, attitudes, associations, and ideas that the words and their referents evoked in them” as well as “the signs pointed to in their external words, to their referents” (p. 10). From Rosenblatt’s (1978, 1982) perspective, reading is a transactional and two-way process, and it involves both readers and texts at a particular time under particular situations. She uses Dewey's term, transaction, and emphasizes the contribution of both readers and texts.

Rosenblatt (1978) thinks that readers find the meanings through the author’s text and what they bring to reading. She argues:

The transactional phrasing of the reading process underlines the essential importance of both elements, reader and text, in any reading event. A person becomes a reader by virtue of his activity in relationship to a text, which he organizes as a set of verbal symbols. A physical text, a set of marks on a page, becomes the text of a poem or of a scientific formula by virtue of its relationship with a reader who can thus interpret it and reach through it to the world of the work. (pp. 18-19)

According to Rosenblatt (1978, 1982), there are two types of reading: efferent reading and aesthetic reading. The term, efferent, is originally from a Latin word, efferre, which means to carry away. In efferent reading, readers pay attention to accumulating the meanings, ideas, and directions after the reading process, and they read informative texts, such as mechanical manuals or academic articles. On the other hand, aesthetic, a Greek

word, means to sense or to perceive. In aesthetic reading, readers' attention moves inward, so they focus on what is being created during the reading process. For this type of reading, readers usually read literary works, such as poems and novels, and their stances are more important than just the texts.

### *Online and Electronic Text*

Reading is also a crucial skill when students navigate Internet web sites, and their autonomous reading abilities and readability of the web sites are core components maximizing the reading (McPherson, 2005). Due to the increasing number of language learners who use online text for academic purposes (Lenhart, Simon, & Graziano, 2001; McPherson, 2005), the differences between reading on a computer screen and reading on paper have become an issue. Researchers claim that reading online is not the same as reading on paper, and they suggest the advantages and disadvantages to online reading to support the argument (De Ridder, 2000; McNabb, Hassel, & Steiner, 2002; McPherson, 2005).

### *Differences between Electronic Text and Paper-Based Text*

Electronic text and paper-based text are different regarding their presentation formats, terms to describe each text, and linearity. Electronic text is digitally presented on a screen, and it is easily modifiable; however, traditional book-based text is printed on paper, so it is hard to modify the text. The presentation of text also differs between two text types, so they use different font size, font color, line spacing, alignment, etc. (Daniel & Reinking, 1987; De Ridder, 2000; Park & Helsel, 2008; Reinking, 1987). These components for web design play important roles in reading online text (De Ridder, 2000; Hughes, McAvinia, & King, 2004). There are five criteria to determine whether a web

site design is good or not. A good web site should (1) be useful and easy to navigate, (2) be accessible, (3) provide opportunities of interaction, (4) contain clear and consistent ways to manage text and subject matter, and (5) reflect teachers' interests and perspectives on how to convey the languages (Hughes, McAvinia, & King, 2004). In addition, people use additional terms to describe electronic text. For example, people use screens, frames, windows, hyperlinks, etc. to talk about electronic text in addition to fonts, indexes, line spacing, alignment, etc. (Park & Helsel, 2008).

The issue of linearity is one of big differences between reading online text and printed text. Some scholars (Berk & Devlin, 1991; Shapiro & Niederhauser, 2004; van Den Berg & Watt, 1991) suggest that readers read book-based text in linear order but electronic or online text in non-linear order. For example, printed text encourages readers to read a regular book from beginning to end in sequential order. Conversely, electronic text allows readers to move from topic to topic and page to page in a nonsequential manner (Berk & Devlin, 1991). However, other scholars do not agree with this argument. They argue that readers do not necessarily read online reading resources in a nonlinear way. In addition, the readers do not need to read paper-based books linearly from the beginning to the end (Bolter, 1998; McKnight, Dillon, & Richardson, 1996).

#### *Features of Electronic Text and Activities*

Multimedia resources, such as audio, video, and text in web sites, may increase the readability of online texts, and online reading activities may motivate readers to read additional materials, which often link to authentic materials dealing with core questions for the reading (McPherson, 2002). In addition, online reading helps readers master traditional reading skills, prepare for the new workplace, and access new tools and

resources. It also works as a tool for collaboration and exploration in online social networking environments (McNabb, Hassel, & Steiner, 2002). However, online readers sometimes waste time navigating web sites that are not relevant to their interest, and advertisements can distract readers' attention. Poor web page design may make it difficult for readers to read online texts, and some text contents and linked web sites can be more difficult for certain levels of readers to comprehend (McPherson, 2002).

Internet-based learning activities make reading enjoyable, encourage students to use critical reading skills, and improve their reading fluency and understanding of content. Moreover, the activities motivate students, and motivated students often feel more responsible for their learning. This responsibility enhances students' self-directed learning habits, and it is critical for the success of the activities (McNabb, Hassel, & Steiner, 2002).

The differences between the two text types influence the roles of learners and teachers, so their roles in online reading environments are also different from their roles in traditional reading environments (Meskill & Mossop, 2000; Patterson, 2000). Meskill and Mossop (2000) argue that electronic texts have been used "as tools through which and around which language use was supported by carefully crafted sociocollaborative contexts. With moment-by-moment teacher support, learners took the bulk of responsibility for initiating and following through on the computer-supported tasks" (p. 589). However, readers still use strategies when they read online text. When skilled readers read online text, they activate prior knowledge, monitor and repair their comprehension, determine important ideas among others, and synthesize the information they get from the text. In addition, they draw inferences and ask questions when they read

(Reinhardt & Isbell, 2002; Schmar-Dobler, 2003). In many studies, participants apply the strategies that they use in reading paper texts to reading online counterparts.

### *Strategies in L2 Text Reading Contexts*

Learning strategies are techniques, behaviors, and actions of learners in diverse learning contexts, and many researchers agree that the use of strategies facilitates learning (O'Malley & Chamot, 1990; Oxford, 1990; Oxford & Crookall, 1989). Language learners, as active participants in the learning process, adopt various strategies regardless of their language proficiency levels (Oxford & Crookall, 1989).

The use of reading strategies has been recognized as an important way to increase L2 reading comprehension (Anderson, 1991; Brantmeier, 2005; Sheorey & Mokhtari, 2001). Some studies investigated the use of strategies by successful and unsuccessful L2 readers (Hosenfeld, 1977; Block, 1986, 1992). Successful readers kept the meanings of texts in mind, made connections between the texts and themselves, read in broad phrases, and skipped less-important words while reading. In addition, they had positive attitudes as readers. However, unsuccessful readers lost the meanings of the texts, focused on their own thoughts and feelings, read in short phrases, paid attention to less important words, and had a negative self-concept as readers (Hosenfeld, 1977; Block, 1986). These strategic patterns of L2 readers were similar to the patterns of L1 readers. In other words, proficient L2 readers performed similarly to proficient L1 readers, and less-proficient L2 readers performed similarly to less-proficient L1 readers (Block, 1992).

Even though the successful and unsuccessful L2 readers show different patterns of reading texts and using strategies, individual differences exist. For example, L2 readers' first languages influence their use of strategies, and the readers' subject

knowledge has a significant correlation with reading comprehension (Abbott, 2006; Brantmeier, 2005; Davis & Bistodeau, 1993). Abbott (2006) claims Arabic- and Mandarin-speaking ELLs' linguistic, cultural, and educational backgrounds influence their reading skills and strategies. According to her findings, Mandarin-speaking ELLs were likely to be more successful at using local and detail-oriented linguistic cues and strategies, but Arabic-speaking ELLs appeared to be more successful at integrating semantic cues by relying on big-picture-oriented strategies and the global structure of texts. However, the use of strategies did not guarantee the success of reading. According to Anderson (1991), not any one single strategy significantly contributes to L2 readers' reading comprehension tests, but high scoring students apply reading strategies more effectively and appropriately.

However, even though many students read texts on their computers, few researchers have investigated students' use of reading strategies in online reading contexts (Coiro, 2003; Elshair, 2002; Foltz, 1993; Hsieh & Dwyer, 2009; Zhang & Duke, 2008). Moreover, fewer researchers have paid attention to L2 readers' online reading strategies (Anderson, 2003; Coiro & Dobler, 2007; Huang, Chern, & Lin, 2009).

#### *Strategies in L2 Computer-Based Text Reading Contexts*

According to Coiro (2003), "Web-based texts are typically nonlinear, interactive, and inclusive of multiple media forms. Each of these characteristics affords new opportunities while also presenting a range of challenges that require new thought processes for making meaning" (p. 459). This idea means that web-based learning environments enable readers to obtain more diverse knowledge and facilitate their personal applications, resulting in higher levels of engagement. However, the learning

contexts can cause the readers to become cognitively overloaded and emotionally frustrated, too.

To overcome these issues and to facilitate their meaning-making processes in the new reading contexts, readers adopt strategies. However, not all of them are newly developed; instead, readers transfer paper-based text reading strategies to computer-based text reading (Elshair, 2002; Hsieh & Dwyer, 2009). For example, readers employed basic reading strategies, such as reading orally, rereading, taking notes, and reader-text interaction strategies when they read computer-based texts (Elshair, 2002). In addition to transferring the existing strategies, readers develop new reading strategies in computer-based text reading environments (Anderson, 2003; Elshair, 2002; Foltz, 1993). In Elshair's research, readers modified text features, navigated web resources, reacted to problems, personalized their behaviors, and evaluated web resources while they read computer-based texts. Moreover, readers used maps, which provided a representation of the text structure, and other signals, such as titles and nodes (Foltz, 1993). In addition, readers adopted different patterns of reading strategies depending on whether they read computer-based texts for fun or for information (Zhang & Duke, 2008).

Among the relatively few studies about ELLs' use of strategies when they read computer-based texts, Anderson (2003) revised the Survey of Reading Strategies (SORS) of Sheorey and Mokhtari (2001). According to Anderson (2003), the majority of the most-frequently used strategies were problem-solving strategies, such as "I adjust my reading speed according to what I am reading on-line" and "When an on-line text becomes difficult, I pay closer attention to what I am reading" (p. 30). Successful readers in the computer-based text reading environment simultaneously employed applications of

prior knowledge sources, inferential reasoning strategies, and self-regulated reading processes (Coiro & Dobler, 2007).

Among the research about ELLs' use of strategies in online learning contexts, sociocultural perspectives have scarcely been adopted. A possible reason is that sociocultural approaches to education are a comparatively recent topic. The current study fills this gap.

### *Electronic Literacies in SLA*

“The development of new communications technologies described earlier, in the context of the broader economic and social changes, set the stage for a major and rapid paradigm shift in notions of literacy” (Warschauer, 1999, p. 11). From the perspectives of multiliteracies, text encompasses a variety of forms of presentations, such as audios, videos, computer games, and online texts, and the ways of meaning making are diverse. The diversity and multiplicity of meaning making are necessary for different groups' various needs (Hamston, 2006; New London Group, 1996, 2000). New technologies change every aspect of our worlds and enhance diversity, so we need to understand and use the technologies to access and transform the worlds (Kellner, 2001). Technology-incorporated literacy is one of the components causing the appearance of multiliteracies, and it boosts the diversity of current literacy worlds.

Electronic literacies, as new screen-based literacies, emerged during the information revolution, and the development of the World Wide Web strongly influenced the appearance. In addition, other web-based technologies, such as hypertext, hypermedia, and computer-mediated communication (CMC), facilitated the emergence of new types of literacies. Electronic literacies do not only mean the change of the materials, but they



require readers and writers to adapt the visions and purposes of literacy activities as well as their eyes to read from paper-based text to screen-based text (Daniel & Reinking, 1987; McNabb, Hassel, & Steiner, 2002; Meskill & Mossop, 2000; Reinhardt & Isbell, 2002; Reinking, 1987; Warschauer, 1999). Electronic literacies consist of computer literacy, CMC literacy, multimedia literacy, and information literacy (Warschauer, 2002).

### *Computer Literacy*

Computer literacy refers to knowledge and competencies in using computers in general, and it includes keyboarding skills and the knowledge of computer operating system environments, such as Windows, Linux, or Mac (Topping, 1997). As Warschauer (1999) argues, “the computer becomes a vehicle for literacy (albeit of a limited scope) but does not itself become a medium of literacy practices” (pp. 15-16). In addition, compared to other components of electronic literacies, the level of computer literacy is low with respect to its complexity and difficulty, and its focus is on the use of computer software and software applications. Although teachers also use these applications, in many cases the computer software and computer applications are not designed to help learners with diverse linguistic and cultural backgrounds, such as ELLs (Meskill, 2005; Wood, 2001). If teachers want to use computer software applications in their classes effectively, they need to know what they are. Furthermore, they need help from possible technology resource persons (Ganesh & Middleton, 2006; Wood, 2001). To facilitate students’ learning, teachers need to monitor students’ activities on the computer and provide appropriate feedback and scaffolding (Proctor, Dalton, & Grisham, 2007). Researchers consider that experience and technological knowledge are important variables of research of ELLs’ technology use (Ariew & Ercetin, 2004).

### *CMC Literacy*

CMC is “a vehicle for the metaphorical construction of community, the crafting of multiple personae and collective identities, and the assumption of social roles in the temporal frame of on-line exchanges” (Lam, 2000, p. 461). It is one of the prevalent technological methods in education, and its major role is communicative interaction (Swan, 2002). Through the interaction, individuals and groups build their communities, and the individuals can recognize their social roles and identities in CMC learning environments (Lam, 2000). There are two types of CMC: synchronous CMC (SCMC) and asynchronous CMC (ACMC). SCMC refers to a real-time communication, such as chatrooms and Internet messengers; ACMC is a delayed-time interaction, such as email, web-based bulletin boards, and listserv (Abrams, 2003; Lam, 2000; Liu, Moore, Graham, & Lee, 2003; Murray, 2000).

SCMC and ACMC are similar in that they enhance negotiations of meaning between learners and teachers, and they encourage learners to talk more than they would in oral classroom contexts. The increased output helps learners’ development of diverse lexical and communication skills. However, they also have differences. For SCMC, people expect relatively prompt responses because other users are present, and it is cumbersome to use outside resources during these interactions. For ACMC, since interlocutors are not immediately present, people have more time to plan responses to others. With plenty of planning time, people can easily use outside resources (Abrams, 2003).

The use of CMC facilitates meaningful interactions between students and teachers, and students participate in the discussion more actively. CMC also results in more

individualized attention during the online discussion session, and consequently supports the language learning processes (Chen, 1999; Liu, Moore, Graham, & Lee, 2002; Sotillo, 2000; Zha, Kelly, Park, & Fitzgerald, 2006). In addition, CMC assists culturally diverse language learners because it diminishes the influence of the cultural differences. Cultural minority students, such as ELLs, feel more comfortable when they express their opinions in online discussions than in face-to-face discussion (Chen, 1999). However, CMC does not work for the learning processes by itself. To use the method effectively, teachers need to consider their specific goals and the needs of the activities and select their CMC programs carefully based on the goals and needs. Furthermore, they need a structured agenda for a successful online instruction (Chen, 1999; Smith, 2003; Warschauer, 1999).

More complex CMC programs, such as blogs, have come out recently, and English as a second language (ESL) teachers use them for their classes. Blogs are websites that users can create and where they can easily update multimedia resources as well as texts as long as they have Internet access. Blogs have a user-friendly and interactive interface, so many teachers use them as the web-based platform of literacy education. Through the analysis of students' audio blogs, Hsu, Wang, and Comac (2008) investigated how the blogs help ELLs and teachers. According to their findings, learners regard audio blogs as an easy and useful tool for their language learning process, and teachers think that the audio blogs meet their needs and help their evaluations of students' oral performances. They are also effective in providing individualized feedback to students.

### *Multimedia Literacy*

There is no clear-cut definition of multimedia. Instead, researchers define it in different ways based on their perspectives (Dillon & Leonard, 1998; Kommers, Grabinger, & Dunlap, 1996; Mayer, 2001; Moore, Burton, & Myers, 2004). According to Dillon and Leonard (1998), multimedia refers to “the umbrella term that has been coined to cover all of the synergistic uses of text, voice, music, video, graphics, and other forms of data to enhance the computer’s role as a communications device” (p. 187). Multimedia also means the combined use of several media devices, so it refers to “computer-driven interactivity with learners’ ability to determine and control the sequence and content selection” (Moore et al., 2004, p. 994). However, Kommers et al. (1996) regard computer-based applications as multimedia, and through the applications users experience different types of audio-visual aids via one screen. Mayer (2001) considers that multimedia means the presentation of materials using both words and pictures.

As a component of electronic literacies, Warschauer (2002) defines multimedia literacy as “the ability to produce and interpret complex documents comprising texts, images, and sounds” (p. 455). Readers can never make meaning solely from textual resources; instead, “there must always be a visual or vocal realization of linguistic signs.” Therefore, “all literacy is multimedia literacy” (Lemke, 1998, p. 284). Even though multimedia literacy has great potential benefits for students, research in this field, especially with ELLs, is not abundant, although a large amount of the research demonstrates the possibilities for ELLs. For example, animated pedagogical agents and electronic arrows with sound significantly help ESL learners with lower levels of prior knowledge. The animated agents are beneficial due to entertaining and engaging features

(Choi & Clark, 2006). In addition, L2 learners work collaboratively when they use technology such as digital cameras, computers, and printers to complete their projects (Bernhard, Cummins, Campoy, Ada, Winsler, & Bleiker, 2006).

### *Information Literacy*

Information literacy is relevant to the processes of drawing information from many different online resources and evaluating them for their suitability. In other words, the focus of information literacy is how content users access proper information from huge online resources and how they critically determine whether the information works for their goals or not. Therefore, research for information literacy has a strong relationship between the users and the contents from the online environments (Rosell-Aguilar, 2004; Warschaer, 2002). The informational aspects of the technology come into the picture when the users get older and use higher thinking skills, such as analyzing and evaluating, more frequently (Brown & Dotson, 2007; Fitzgerald & Galloway, 2001; Hölscher & Strube, 2000; O'Sullivan & Scott, 2005; Schmar-Dobler, 2003; Warschauer, 2002). However, many students still struggle when critically evaluating and selecting the information they need (Hölscher & Strube, 2000; Brown & Dotson, 2007).

### Glosses

Many research studies of information literacy, especially online and electronic resources, are relevant to electronic glosses, such as hypertext and hypermedia (Bell & LeBlanc, 2000; De Ridder, 2000; Moore, Burton, & Myers, 2004; Shapiro & Niederhauser, 2004). Glosses are “many kinds of attempts to supply what is perceived to be deficient in a reader’s procedural or declarative knowledge” (Roby, 1999, p. 96), and authors offer “a short definition or note in order to facilitate reading and comprehension

processes for L2 learners” (Lomicka, 1998, p. 41). For traditional paper-based readings, glosses typically lie in the side or bottom margins of the content, and they mostly supply definitions for unfamiliar or difficult words that may cause problems for L2 learners when they read text (Lomicka, 1998). However, glosses are not limited to traditional printed text and verbal form. They are used in electronic or online reading resources as hypertext and hypermedia, and they take on a multimedia format, such as pictures, sounds, and videos, as well as text (Yoshii, 2006). With the development of technology, more multimedia technology has been used to support education, and hypertext and hypermedia are remarkable tools for supporting online reading.

#### *Definitions of Hypertext and Hypermedia*

Kommers, Grabinger, and Dunlap (1996) define hypertext as a method to create links between words or groups of words in nonlinear ways. The links also contain texts or text pages, so users can move to other online or electronic documents based on their choice. These ways to link different resources through hyperlink are important because they create different ways to store, present, and access a large amount of information compared to earlier forms of traditional writing (Berk & Devlin, 1991; Bolter, 1998; Warschauer, 1999). A further developed version of hypertext is hypermedia (McKnight, Dillon, & Richardson, 1996). Hypermedia also refers to a computer-based method that provides information in a nonlinear way, which is the same as hypertext. However, hypermedia adopts a multimedia format for the online resources, and this is the core difference between hypertext and hypermedia (Kommers et al., 1996).

### *Hypertext and Hypermedia in Online L2 Reading*

Electronic and online reading resources have become prevalent in academic lives, so both L1 and L2 learners and teachers use them for academic purposes. However, a large amount of previous research about hypertext and hypermedia learning contexts has focused on L1 learning environments (Lawless & Brown, 1997; Mayer, 1997; Patterson, 2000; Su & Klein, 2006; Yang, 2000), while there are not many L2 or FL reading studies in those environments (Ariew & Ercetin, 2004; Chun & Plass, 1997; Lomicka, 1998; Mayer, 1997; Sakar & Ercetin, 2005).

On most Internet web sites, hypertext is a useful and important application to link multiple web pages or text resources, increasing some researchers' interest. When students consult hypertext resources while reading electronic texts, they feel a greater sense of agency<sup>1</sup> and control because they can see immediate results from the choices they make as readers, and this facilitates learners' autonomy (New London Group, 1996, 2000; Patterson, 2000). However, at the same time, language learners feel conditioned to click on the web links or glosses of word meanings, so they consult almost every definition provided (De Ridder, 2000). In this electronic reading process, ELLs show the preference of L1 hypertext to its L2 counterpart and have positive attitudes toward the reading activities. However, although hypertext resources do not facilitate ELLs' reading comprehension, they influence ELLs' vocabulary acquisition (Bell & LeBlanc, 2000; De Ridder, 2000; Jacobs, Dufon, & Fong, 1994).

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<sup>1</sup> The ability to take meaningful actions and to see the results of those actions (Murray, 1997).

Researchers also use multimedia and hypermedia for second or foreign language learning environments, and they investigate the effectiveness of a certain mode of presentation or hypermedia. Multimedia is more effective and helpful for problem-solving tasks when students use coordinated multimedia representations together than when they use separated multimedia representations. Furthermore, language learners' prior knowledge and spatial ability temper the multimedia and contiguity effects (Mayer, 1997). They prefer hypermedia annotations in general and think the multimedia resources are effective in L2 reading comprehension. Language learners especially like visual annotations significantly more than textual and audio annotations (Sakar & Ercetin, 2005). However, hypertext and hypermedia learning environments are more complex, so additional components, such as navigation tools, program and computer confidence, also influence the effectiveness and outcomes (Su & Klein, 2006).

Although many research findings show that hypertext, multimedia, and hypermedia are effective and helpful resources for language learning processes, their conclusions are problematic. There are four issues: disorientation phenomena, cognitive overload, flagging commitment, and unmotivated rambling (Heller, 1990). Within the disorientation phenomena, readers have problems with recognizing the extent or size of the system. Therefore, it may be difficult for the readers to know where they are in the huge online learning environments. The second issue of hypermedia resources is relevant to the fact that the system is full of rich information and opinions, and readers experience a state of cognitive overload. The third and fourth problems lessen readers' commitment and motivation while they read online. Novice hypermedia users usually do not set up their search plan, so they are not motivated while they navigate the online resources.



Furthermore, when users do not know what the multimedia resource is and what information the system will offer, they may not feel the commitment to keep searching for more information in the hypermedia learning environments (Conklin, 1987; Hammond, 1989; Heller, 1990).

Hypertext and hypermedia studies have a comparatively short history, so there are also some issues that need to be considered. Shapiro and Niederhauser (2004) and Moore, Burton, and Myers (2004) suggest two problems of studies on hypertext, multimedia, and hypermedia: theoretical issues and methodological issues. Shapiro and Niederhauser argue, “Conducting profitable hypertext research from a holistic perspective will be difficult until [a coherent theoretical framework] is accomplished” (p. 617) and emphasize the need for a theoretical framework. They also raise methodological issues: the lack of experimental research in these areas, lexical disagreement on common definitions for the most basic terms, and methodological flaws in studies in these fields. Therefore, further research needs to focus on those issues to develop hypertext and hypermedia studies.

### Multiliteracies

In 1994 in New London, New Hampshire, 10 researchers from diverse specialties, such as cultural diversity and education, discussed the issue of new literacy pedagogy and suggested a new notion, multiliteracies. The New London Group (1996) released their report of the discussions and presented the relationship between the changing social environments and a new approach to literacy pedagogy that students and teachers encountered. The original 10 researchers are Courtney Cazden (classroom discourse, language learning in multilingual contexts; literacy pedagogy), Bill Cope (cultural

diversity in schools; literacy pedagogy; the changing cultures and discourses of workplaces), Norman Fairclough (language and social meaning), James Gee (language and mind; language and learning demands of the latest "fast capitalist" workplaces), Mary Kalantzis (experimental social education and literacy curriculum projects; citizenship education), Gunther Kress (language and learning; semiotics; visual literacy; the multimodal literacies), Allan Luke (critical literacy), Carmen Luke (feminist pedagogy), Sarah Michaels (developing and researching programs of classroom learning in urban settings), and Martin Nakata (literacy in indigenous communities). They are from the U.S., Australia, and England. The purpose of the meeting, according to Cope and Kalantzis (2000), was the following:

Our purpose for meeting was to engage in the issue of what to do in literacy pedagogy on the basis of our different national and cultural experiences and on the basis of our different areas of expertise. The focus was the big picture; the changing world and the new demands being placed upon people as makers of meaning in changing workplaces, as citizens in changing public spaces and in the changing dimensions of our community lives—our lifeworlds. (p. 4)

With the new terminology, *multiliteracies*, the New London Group expands the concept of literacy and includes negotiating multiple aspects of discourses into the literacy boundaries. The group members highlight that culture and language are becoming diverse in global societies and emphasize various multimedia technologies and text formats associated with information. In addition, the New London Group keeps advocating multiliteracies to epitomize the diversities of language, culture,

communication channels, and media (Cope & Kalantzis, 2000; New London Group, 1996, 2000).

As the New London Group (2000) argues, “literacy pedagogy now must account for the burgeoning variety of text forms associated with information and multimedia technologies” (p. 9). Furthermore, the concept of text changes to encompass audio, visual, and spatial components as well as traditional prints (Hamston, 2006; New London Group, 1996, 2000). I include multimedia, integrating computer games, into the concept of extended text in this study.

According to the New London Group (1996, 2000), dynamic interactions among a variety of cultures need multiple language uses and diverse ways of communication. Furthermore, new technology and mass media expand the concepts of text and the ways to construct meaning correspondingly. In the perception of the group, text encompasses audio, visual, and spatial components as well as traditional prints. In addition, there are multiple discourses of identity and recognition that people need to negotiate in their lives, and the identities are not isolated but socially situated (Gee, 2004; Hamston, 2006; New London Group, 1996, 2000).

### *Language Changes in Three Lives*

In the concept of multiliteracies, negotiation in linguistically and culturally diverse societies is critical in students’ working, public, and private lives, but at the same time, negotiation of differences is difficult. The change of society is relevant to “changes in our working lives; our public lives as citizens; and our private lives as members of different community lifeworlds” (Cope & Kalantzis, 2000, p. 7). Moreover, language changes according to these lives (New London Group, 1996, 2000).

## *Working Lives*

The economy is not an exception to social change, so the change of economy strongly interrelates with the diversity of society. Therefore, the economic transition from old capitalism to new capitalism has a considerable effect on the diversity (Gee, 2004; New London Group, 1996, 2000). Gee (2004) argues that old capitalism emerged from the conflict between workers and bosses over how and how fast work should be completed, and he explains the context of the old capitalism as the following:

In the end, the workers lost the battle. Thanks to “Taylorism,” work came to be carried out at a pace and in terms of procedures determined by a “science” of efficiency, not by workers themselves. The craft knowledge of the workers was removed from the workers’ heads and bodies and placed into the science of work, the rules of the workplace, and the dictates of managers and bosses. A top-down system was created in terms of which knowledge and control existed at the top (the bosses) and not at the bottom (the workers). Middle managers conveyed and mediated knowledge, information, and control between the top and the bottom. This became, too, pretty much how knowledge was viewed in schools: knowledge was a system of expertise, owned by specialists, and imposed top-down on students. (p. 279)

In the old capitalism, which refers to the hierarchical and top-down social formation, workers’ roles were to follow the instructions of bosses and complete the tasks as quickly as possible without errors. Therefore, the workers in the system did not need to think critically. This trend also influenced learning, so specialists, such as teachers,

imposed knowledge on students (Gee, 2004; New London Group, 1996, 2000). However, the new capitalism replaced the old system.

PostFordism replaces the old hierarchical command structures epitomized in Henry Ford's development of mass production techniques and represented in caricature by Charlie Chaplin in *Modern Times*—an image of mindless, repetitive unskilled work on the industrial production line. Instead, with the development of postFordism or fast capitalism, more and more workplaces are opting for a flattened hierarchy. Commitment, responsibility, and motivation are won by developing a workplace culture in which the members of an organization identify with its vision, mission, and corporate values. The old vertical chains of command are replaced by the horizontal relationships of teamwork. . . . This means that, as educators, we have a greater responsibility to consider the implications of what we do in relation to a productive working life. (New London Group, 2000, p. 11)

In the new capitalism, workers need to think critically and productively. They are required to be flexible in diverse and fast-changing working environments and work collaboratively in teams. Collaborative works are more efficient and effective than individual works because knowledge becomes outdated rapidly and technological innovation is frequent and common (Gee, 2004). In working lives, “cross-cultural communication and the negotiated dialogue of different languages and discourses” are the basis for these, and developing people’s discourses and negotiations within their work places is important (New London Group, 2000, p. 13).

*Public Lives*

As the world changes and becomes more complex, public lives, as citizenship, are not the exception. The New London Group (2000) argues:

Over the past two decades, the century-long trend towards an expanding, interventionist welfare state has been reversed. The domain of citizenship, and the power and importance of public spaces, is diminishing. Economic rationalism, privatization, deregulation, and the transformation of public institutions such as schools and universities so that they operate according to market logic are changes that are part of a global shift that coincides with the end of the Cold War. (p. 13)

After the Cold War, the focus of the world moved from the conflict between communism and capitalism to the role of societies. In addition, liberalism influences almost every aspect of contemporary societies. “Market logic has become a much bigger part of our lives. In some parts of the world, once strong centralizing and homogenizing states have all but collapsed, and states everywhere are diminished in their roles and responsibilities” (p. 14). Therefore, national standards and homogeneous discourse patterns that people imposed on others in the old world do not work in the new world. Linguistic and cultural diversities also facilitate civic pluralism. The civic pluralism changes the public lives from public rights and responsibilities to institutional and curricular details of literacy pedagogy. Moreover, this change influences the literacy pedagogy and emphasizes that current students need to learn how to negotiate diverse regional, ethnic, cross-cultural discourses and contexts (New London Group, 1996, 2000).

### *Private Lives*

People live in a world in which subcultural differences are becoming clearer and more significant. They have multiple discourses of identity and multiple discourses of recognition to be negotiated in their private lives and socially situated identities (Gee, 2004; New London Group, 1996). The markers for these differences include gender, ethnicity, affiliation, generation, and sexual orientation. As individuals' lifeworlds become diverse and the boundaries between each lifeworld blur more, there are multiple layers to everyone's identity and discourse in their everyday life (New London Group, 1996). Therefore, students' private lives are also an issue in their literacy development and pedagogy.

### *Language as a Designing Process*

The New London Group (1996, 2000) regards semiotic activities, such as language use, as a designing process and suggests three components constituting the process: *Available Designs*, *Designing*, and *The Redesigned*. The New London Group argues that “[t]ogether these three elements emphasize the fact that meaning-making is an active and dynamic process, and not something governed by static rules” (New London Group, 2000, p. 20).

While learners use language, they use *Available Designs*, such as existing discourses, genres, styles, dialects, and voices, and make new meanings based on them. The meaning-making process refers to *Designing*, which consists of reading, seeing, and listening in the semiotic activities. The *Designing* does not merely refer to reproducing *Available Designs*, but it means the process of reconceptualizing and transforming knowledge, identities, and social relations in diverse social contexts. *The Redesigned* is

the outcome of the *Designing* process, and it automatically turns out to be a new *Available Design* and becomes another meaning-making resource. Through this circulating and repetitive *Design* process, learners actively make meaning in the world.

The New London Group coined the concept of multiliteracies, which covers complex literacy contexts and provides a greater lens through which people see the world. From the traditional literacy environments to technology-integrated literacy environments, the idea of multiliteracies encompasses multicultural and sociocultural reading contexts. Furthermore, the group views literacy as a holistic and procedural process, so I think multiliteracies fit for the new literacy concepts in diverse sociocultural contexts. In the context of multiliteracies, students' critical interpretations of their lives and literacies are important components, so I review critical literacy in the next section.

### Critical Literacy

Critical literacy comes from a critical perspective on reality, and it has multiple meanings (Jongsma, 1991; Moje, Young, Readence, & Moore, 2000). One meaning implies the use of higher-order thinking, such as inferring, reasoning and problem solving for literacy activities. Another meaning comes from the work of Friere (1970) (Moje, Young, Readence, & Moore, 2000; Siegel & Fernandez, 2000). Friere (1970) believed that literacy empowers people by encouraging them to actively question and transform the world around them. He argued that the “[w]orld and human beings do not exist apart from each other, they exist in constant interaction” (p. 50). In addition, the ability to name the world makes people aware of their social and political contexts, and this awareness enables them to transform the world and the culture.



From the critical perspectives, the world is not equal regarding power and resource distributions, so certain groups of people have systematic privilege based on their ethnicity, race, gender, and social status (Jongsma, 1991; Moje, Young, Readence, & Moore, 2000, p. 407). Moreover, the critical approach to literacy treats literacy as a political matter of reading and writing the world instead of the traditional decoding skills (Freire, 1973; Jongsma, 1991).

As the change of the current society and economy influences students' literacy lives, the roles of family in literacy also become an important component. In addition, it is critical to consider ELLs' home settings and experiences to get a holistic understanding of their lives. The review of family literacy follows.

#### Family Literacy

Literacy is not a narrow concept referring to one's ability to read and write; neither is it a skill one can develop only through formal education. Rather, literacy develops during a child's early years through informal activities of everyday family life (Wasik, 2004). It is also crucial for children's future success in a literate culture and society, and they experience early language and literacy opportunities throughout the cultural and societal contexts (Carter, Chard, & Pool, 2009; Mui & Anderson, 2008; Otto, 2006; Saracho, 2000a, 2000b, 2002; Weigel, Martin, & Bennett, 2006). Therefore, researchers emphasize the family environments and literacy activities for children's early literacy development.

Family literacy refers to "literacy beliefs and practices among family members and the intergenerational transfer of literacy to children" (Wasik & Hermann, 2004, p. 3). Wasik and Hermann (2004) indicate the concept of family as the following:

For much of the 20th century, the term family referred to two parents and their children living in the same household. Our contemporary understanding is much broader. Two-parent families; one-parent families; blended families; extended families, adults, and children living in one household; and other individuals living together who call themselves family—All are captured by the term family. (p. 6)

Family is full of literacy resources, and children interact with different family members to learn literacy skills (Mui & Anderson, 2008). For example, family members read out loud for children and interact with them. These activities promote children's literacy development, and the children learn the importance of print through these experiences (Saracho, 2000a, 2000b, 2002). In addition, children's literacy outcomes are relevant to parental literacy beliefs and home literacy environments (Weigel, Martin, & Bennett, 2006).

However, the concept of family literacy designates not only family members but includes communities, such as neighbors and religious contexts, too (Bloome, Katz, Soisken, Willet, & Wilson-Keenan, 2000). Literacy experiences both at home and in communities can enhance children's literacy development (Saracho, 2000a, 2000b, 2002). Furthermore, "children ... incorporate television and other forms of popular culture into their home routines" (Mui & Anderson, 2008, p. 241), but the use of technological and cultural resources in family literacy has not been investigated much.

### Identity

Gee (2001a) argues that identity is an important tool to analyze and understand our societies as the world becomes complex and global. He defines identity as the following:

When any human being acts and interacts in a given context, others recognize that person as acting and interacting as a certain “kind of person” or even as several different “kinds” at once. . . . A person might be recognized as being a certain kind of radical feminist, homeless person, overly macho male, “yuppie,” street gang member, community activist, academic, kindergarten teacher, “at risk” student, and so on and so forth, through countless possibilities. The “kind of person” one is recognized as “being,” at a given time and place, can change from moment to moment in the interaction, can change from context to context, and, of course, can be ambiguous or unstable. Being recognized as a certain “kind of person,” in a given context, is what I mean here by “identity.” (p. 99)

Gee stresses others’ recognition of an individual in a certain context, and Kim (2009) extends the definition of identity to include both others’ recognition and his or her own recognition of the individual. In addition, Norton (1997) associates identity with “the desire for recognition, the desire for affiliation, and the desire for security and safety” (p. 410). He argues that an individual’s identity alters as social and economic relations change.

In addition, “all human identities are . . . social identities, and identifying ourselves and others is a matter of meaning, and meaning always involves interaction: agreement and disagreement, convention and innovation, communication and negotiation” (Jenkins, 2000, p. 17). Tajfel (1981) defines the ethnic identity as “part of an individual’s self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership” (p. 255). Based on these approaches to identity, I focused on the ELLs’

perceptions and experiences to have a better understanding of them in home and school contexts.

Gee (2001a) divides identity into four categories: nature-identity (N-identity), institution-identity (I-identity), discourse-identity (D-identity), and affinity-identity (A-identity). However, the categories are not completely separate but interrelated, and each individual can have multiple identities at the same time depending on the contexts. An individual gets N-identity by birth, and it is given by nature. For example, if two people are identical twins, they get the identity from their birth, and they cannot control or resist it. I-identity refers to a person's position, and institutions and authorities assign the position to the individual through the process of authorization. D-identity indicates an individual's individual characteristics, and others recognize this through the individual's semiotic activities, such as discourses and dialogues. A-identity, as a trait from affinity groups, focuses on creating and sustaining group affiliations, and others recognize it through distinctive social practices of the individual.

Identity is not a static concept but a dynamic one, and others' recognition is important for the identity (Gee, 2001a). It is also relevant to the literacy in multicultural and sociocultural contexts, and the environments of the home, the school, and the community influence an individual's ethnic identity. Therefore, people select or abandon their ethnic identity depending on whether the school or the society values the ethnicity (Akbari, 2008; Lee, 1996; Li, 2000, 2003, 2006; Nieto, 2000). In addition, in the case of ELLs, other factors, such as parents' perceptions of their minority status, the attitudes toward the role of L1 and L2, and the media, play important roles in children's language choices and uses at home (Li, 2006).

## Playing Electronic Games

Vygotsky (1978) argues that “play contains all developmental tendencies in a condensed form and is itself a major source of development” (p. 102); he further argues that “[t]he influence of play on a child’s development is enormous” (p. 96). Therefore, playing games is an important part of children’s social and mental development (Amory, Naicker, Vincent, & Adams, 1999; Facer, 2003). As technology has developed, interactive electronic games, including video and computer games, have become increasingly popular among young people (Fromme, 2003). In the recent thirty years or more, electronic games have become one of the most pervasive, profitable, and influential entertainment media in the U.S. and other countries (Squire, 2003). Although educators have ignored the educational benefits of the electronic games to some extent, they still have an appreciation for the learning of general skills that games provide. Moreover, some researchers show that electronic games frequently use interactive media and contain many potential educational benefits (Beentjes, Koolstra, Marseille, & van der Voort, 2001; McFarlane, Sparrowhawk, & Heald, 2002). In addition, “[g]ames bring together ways of knowing, ways of doing, ways of being, and ways of caring, making the players experts in the situated environment” (Chen, Lien, Annetta, & Lu, 2010, p. 95). I view electronic games as one of the components of the expanded text concept and include playing electronic games as students’ literacy activity. The review of electronic games and electronic games in education follows this section.

### *Electronic Games*

U.S. retail sales of computer and video games have grown from 7 billion dollars in 2005 to 10.5 billion dollars in 2009. Gamers play games on electronic game players,

such as the Sony PlayStation 3 and the Microsoft Xbox 360, on their personal computers (PCs), and on mobile video players, such as the PlayStation Portable (PSP), the Game Boy Advance, and the Nintendo DS. They also play the games online with multiple players who have the necessary Internet connection (Siwek, 2010). The gamers include millions of Americans of a variety of age groups and backgrounds, and more than 67 percent of all American households play games (Entertainment Software Association, 2010). In the development of the game industry, younger generations have become an important target group, and playing electronic games has become easier than ever (Fromme, 2003). Based on the enormous sales growth of the game industry and high usage frequency of the games, it is clear that interactive video and computer games have become the new multimedia culture (Fromme, 2003; Goldstein, 2010).

The electronic games have six characteristics: “fantasy, rules/goals, sensory stimuli, challenge, mystery, and control” (Garris, Ahlers, & Driskell, 2002, p. 447). Fantasy refers to the game factor that separates game activities from real life. In other words, games involve imaginary worlds, so the activities inside these worlds do not have any impact on the real world. These imaginary and fantasy contexts, themes, and characters allow users to interact in game situations that do not belong to normal experiences. However, gamers play games in designated environments, such as a fixed space and time period, and game rules govern the game play. The rules of a game describe the goal structure of the game, and clear and meaningful goal structures enhance players’ motivations and performances. Other characteristics of games are new visual and auditory stimuli. Those sensory stimuli allow the users to experience a distortion of perception, which they may not have experienced in the real world before. Challenge is

one of the favorite characteristics of games (Myers, 1990), and it refers to the optimal level of difficulty and uncertain goal attainment (Garris, Ahlers, & Driskell, 2002). Garris, Ahlers, and Driskell (2002) suggest that the optimal level of difficulty can be obtained by employing multiple goals, progressive difficulty levels, and a certain amount of informational ambiguity to ensure an uncertain outcome. Different from the informational ambiguity, an optimal level of informational complexity and gap enhance mystery, which is the next external feature of games. The last feature of games is control, which refers to the ability or authority of regulating and directing something during the game (Garris, Ahlers, & Driskell, 2002).

### *Electronic Games in Education*

In 2003, 91% of students in the U.S. from nursery school through grade 12 (53 million persons) used computers and 59% (35 million persons) used the Internet. In addition, 83% of students used computers at school, and 68% of them used computers at home. The students used the computers for playing games (56%), working on school assignments (47%), and connecting to the Internet (45%) (National Center for Education Statistics, 2006). As technology continues to dominate youth culture, integrating technology into the classroom is inevitable (Goldstein, 2010).

Electronic games are the most popular medium of entertainment, but there is not much consensus on what and how the games support learning and teaching in educational contexts (Garris, Ahlers, & Driskell, 2002; Heim, Brandtzæg, Kaare, Endestad, & Torgersen, 2007; Square & Jenkins, 2003). Moreover, educators often have not considered the educational benefits of the electronic games (Beentjes, Koolstra, Marseille, & van der Voort, 2001).

However, researchers began to view electronic games as educational media and text, so they valued the benefits (Amory, Naicker, Vincent, & Adams, 1999; Beentjes, Koolstra, Marseille, & van der Voort, 2001; Chen, Lien, Annetta, & Lu, 2010; Kirriemuir & McFarlane, 2004; Myers, 1990; Prensky, 2001a, 2001d, 2002). According to Garris, Ahlers and Driskell (2002), computer games also began to attract training professionals' and educators' attention for two reasons. First, "there has been a major shift in the field of learning from a traditional, didactic model of instruction to a learner-centered model that emphasizes a more active learner role. This represents a shift away from the 'learning by listening' model of instruction to one in which students learn by doing" (p. 441). Today's young people expect more interactive and less linear approaches to learning (Prensky, 2001b, 2001c). Second, empirical evidence of the effectiveness and the intensity of engagement that computer games invoke have also intrigued educators (Garris, Ahlers, & Driskell, 2002). Therefore, educators also started to integrate computer games into educational contexts in order to modernize and adopt students' learning experiences (Goldstein, 2010).

To support the educational use of electronic games, some researchers argue that the computer games offer new teaching forms, such as dynamic and rich presentations of a particular subject, which may give students opportunities to engage and challenge through interactions (Egenfeldt-Nielsen, 2004). In addition to the presentation of computer games, the interactive community also contributes to learning. Through a variety of communication environments, such as websites and discussion boards, game players discuss and reflect on the games and collaborate with others (Kirriemuir & McFarlane, 2004). Children's learning develops when they interact, negotiate, and



collaborate with others in social and cultural communities (Vygotsky, 1978). In addition, they enjoy the learning process when it is relevant and appropriate to them and when they sense their progression (Kirriemuir & McFarlane, 2004). Computer games have those basic learning components.

Using electronic games in formal and informal educational contexts is at the transitional stage, so we need to be circumspect in connecting two different worlds. However, the benefits of incorporating electronic games into educational contexts pass beyond the negative effects (Prensky, 2001a, 2002). In addition, game developers and educators may consider these issues before they create and use the educational electronic games. The time and effort to use electronic games in educational contexts are of great worth.

## CHAPTER 3: METHODOLOGY

### Introduction

In this chapter, I present information regarding the methodology I employed in this study. Specifically, I discuss (1) research methods, (2) sites for data collection, (3) participant selection, (4) researcher's roles, (5) data collection, (6) data analysis, (7) trustworthiness and transferability of the data, and (8) limitations of the study.

The purposes of this dissertation study were to ascertain the holistic understandings of four ELLs' reading development, their dialogic interactions, and their use of strategies in diverse reading contexts from sociocultural perspectives. I also focused on what participants' computer-relevant literacy experiences were in their home and school contexts. These focuses guided this study. Due to the holistic and dynamic aspects of the topics of this study, I conducted a qualitative case study, and the following questions guided the research:

1. What strategies do four elementary ELLs use when they read computer-based texts in their home context?
2. In what ways do these elementary ELLs describe their use of these strategies in their home context?
3. What influences these ELLs to use the strategies when they read computer-based texts in their home context?
4. What strategies do these elementary ELLs use when they read computer-based texts in their school context?

5. In what ways do these elementary ELLs describe their use of these strategies in their school context?
6. What influences these ELLs to use the strategies when they read computer-based texts in their school context?
7. In what ways do ELLs' use of strategies differ when they read computer-based texts in their home and school contexts, and what influences these potential differences?

### Research Method

Methodology refers to “[a] way of thinking about and studying social reality,” and methods mean “[a] set of procedures and techniques for gathering and analyzing data” (Strauss & Corbin, 1998, p. 3). In other words, methods indicate what we do when we conduct research (Maxwell, 1996). For the purpose of this study, I adopted a qualitative case study.

#### *Qualitative Case Studies*

Case study is one type of research design and analysis, and it also refers to a method, a strategy, and an outcome of research depending on different researchers (Duff, 2008; Yin, 1981, 2003). “[A] qualitative case study is an intensive, holistic description and analysis of a single instance, phenomenon, or social unit” (Merriam, 1998, p. 21). “[It] can be defined in terms of the process of actually carrying out the investigation, the unit of analysis (the bounded system, the case), or the end product” (Merriam, 1998, p. 34). The qualitative case study is also “an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources” (Baxter & Jack,

2008). The purpose of the study was to collect comprehensive, systematic, and in-depth information and analysis of each of four cases.

Each case of the case study refers to a unit which has boundaries around it. If a unit does not have finite boundaries, such as the number of participants or the time for observations, it is not a case. The case can comprise a program, a group, a policy, and so on (Merriam, 1998). In this study, cases were individual ELLs, homes, and schools, but I also interpreted the four ELLs in this study as a single case when I discussed findings. Parents, teachers, and siblings contributed information to the research.

My participants were primary level ELLs with different ethnic backgrounds, but they also shared some similarities regarding their culture and language. For instance, they were ELLs and received ELD service from the state; they had multiple cultural and linguistic backgrounds; and they might have similar experiences among their parents, friends, schools, and communities. In addition, since I try to understand meanings, situations, and interactions in particular contexts in this study, the qualitative approach fit my study. In addition, I adopted a case study and treated individual and whole ELLs with diverse cultural and linguistic contexts in my study as a single case. Through this qualitative approach, I was able to see how each case worked as an ELL, a parent, a teacher, a classroom, and a school in sociocultural contexts. Moreover, I was able to find the social, cultural, and ideological interrelations of each case in the learning environments of multiliteracies.

#### Sites

The sites in this study were (1) the homes in which the ELLs interacted with family members who shared a common culture and language and (2) three public

elementary schools in the Oracle Unified School District which the ELLs attended. The sites were in the western part of the U.S., and each context was relevant to the ELLs' experiences in the settings of multiliteracies. The information about the home and school sites follows, and the names of the district, schools, and participants are pseudonyms. However, the information is directly from the official websites of the sites, the interviews with participants, and the observations of the contexts.

### *Home*

The home context is an important environment for children's success or failure in achieving literacy development, and it is also crucial for their primary discourse (Gee, 1989b; Li, 2006). In addition, children are active members of diverse cultural and linguistic groups, and they appropriate membership in dynamic and nonlinear manners. Families, as one of these basic groups, are contexts for numerous literacy activities, and the interaction patterns in families are not unidirectional from parents to children but complex (Gregory, 2005; Mui & Anderson, 2008). Therefore, it is important to understand ELLs' home environments with regard to (1) parents' perspectives of education, (2) cultural, linguistic, and ethnic identities, and (3) family members' support for children's literacy development. I describe specific home environments in Chapter 4.

### *School District*

The Oracle Unified School District comprised 35 schools, of which 21 were elementary schools. The district served more than 28,000 students from Kindergarten through Grade 12. The goals of the Oracle Unified School District were to increase the academic achievement of all students and apply actions that foster personal responsibility and respect for diversity in a safe and caring environment. The district implemented

consistent district-wide practices that enhanced a welcoming and responsive environment for students, staff, parents, and community.

The Oracle Unified School District educated ELLs to become proficient in English as rapidly as possible and to have success in academic programs. The district adopted an English Language Development Test (ELDT), which consisted of listening, speaking, reading, writing, and comprehension sections. When new students were enrolled in a public school in this school district for the first time, their parents responded to a Home Language Survey (HLS). If the students' L1 was not English, they had to take the test.

The ELLs also needed to take the ELDT annually until they were reclassified (California Department of Education, 2009). According to their scores, overall English proficiency on the test was identified by one of five categories: *Beginning*, *Early Intermediate*, *Intermediate*, *Early Advanced*, and *Advanced*. Based on the data from the California Department of Education (2009), 67 percent of all students in the District fell into the categories of early advanced and intermediate, which referred to the majority of the student population. In addition, 64 percent of English learners in ELD programs of the District were in the level of early advanced and intermediate; 65 percent of fourth grade ELLs in ELD programs were in the same category.

Regarding technology incorporation in education, the Oracle Unified School District was attempting to integrate 21st century skills of innovation, creativity, collaboration, critical thinking, and problem solving. In addition, it attempted to incorporate information, media, and communication literacy into the core curriculum. Each school in the district had one or more fixed labs with Internet-connected computers

for an entire class of children. In addition, several schools had implemented mobile labs of notebook computers, known as Computers on Wheels (COWS), which enabled a one-on-one or near one-on-one digital learning environment. Normally, a technology specialist staffed the fixed computer labs, and classroom teachers implemented COWS. Additional handheld computing and response devices, such as iPods and iPads, as well as interactive presentation systems, were becoming more common in the schools.

### *Schools and Classroom Teachers*

The school sites for this study were three public elementary schools in the northern area of the county: Dover Elementary School, Hilley Elementary School, and Haynes Elementary School. The schools supervised ELD programs, and ELLs were assigned to the programs depending on their ELDT results. According to the schools' curriculum, ELLs took the majority of their classes in mainstream classrooms with their English-speaking monolingual and multilingual peers, but they moved to the ELD classes on a regular basis to receive support from ESL teachers. The main contexts for learning were their mainstream classrooms, where students spent most of their time, but students also engaged in other learning environments, such as computer labs, libraries, and science classrooms depending on their class schedules.

#### *Dover E.S.*

Dover E.S. was one of the newest schools in the Oracle Unified School District, and 840 students with diverse ethnic backgrounds were enrolled in grades pre-K through five. The school opened in 2006, and the student population was Asian (47.8 %), Caucasian (24.4%), Filipino (6.4%), African American (5.2%), and others or no response

(16.2%) according to the 2009 school report; therefore, Asian students were almost 50 percent of the whole student body.

One of the missions of Dover E.S. was to meet each student's needs to reach their potential development as learners. The school provided differentiated instruction and academic programs, which were rigorous and engaging. These programs included music, art, science, physical education (PE), After School programs, Gifted and Talented Education (GATE) program (for high-achieving students), and other special needs programs, such as Health programs, and Speech and Language programs.

Dover E.S. had a library media center, a computer lab, a daycare center, a modular restroom building, a multi-purpose room, and 31 classrooms. It actively incorporated technology into education, and parents' participation was important. For example, the Dover E.S. Learning Fund was a parent-run, non-profit organization, and it had raised funds to supplement the children's education. To support the use of technology at Dover E.S., the fund had sponsored a One-to-one Laptop Program for all fifth grade students, so that the students were able to go deeply into curriculum at a new level of understanding. Each fifth-grade classroom had a laptop cart with 25 MacBooks, and other grade level teachers were also able to use them too. In addition, every classroom had a *Document Camera*, a real-time image capture device, and a projector; therefore, classroom teachers could show books, handouts, and computer-based texts to students in order to enhance teaching and learning. Several classrooms utilized a *SMARTBoard*, an interactive electronic whiteboard, and a wall-mounted *REDCAT*, an all-in-one audio speaker system. Teachers at Dover E.S. attended training sessions and collaborated with each other in integrating technology.



In this study, three classroom teachers at Dover E.S. participated: Mrs. Anna Chang, Mr. Clay Hill, and Mrs. Violet Davis. Mrs. Chang was a 42-year-old Korean-American female teacher at Dover E.S., and she was a classroom teacher of ELLs Jae-Hoon and Stacy<sup>2</sup> in spring and summer 2010. Brian, another ELL, was also her student during summer 2010. Mrs. Chang was fluent both in Korean and English, but she spoke English in school. She used Korean only when new Korean ELLs, with limited English proficiency levels, asked for her help. She had taught at elementary schools for 12 years, and this was her fifth year at Dover E.S. She was a collaborative teacher.

Mrs. Chang believed the use of computer technology was helpful for her classes. She oftentimes accessed diverse websites on the Internet during her classes and actively adopted computer-based texts into her lecture. For example, Mrs. Chang provided useful website addresses for her students on her school website and accessed educational websites or news websites to show diverse computer-based texts to her students. In addition, she instructed her students on how to create documents in diverse text formats.

Mr. Hill was a 30-year-old White American male teacher at Dover E.S., and he was Jae-Hoon's classroom teacher in fall 2010. He had taught at elementary schools for six years, and it was his fourth year at Dover E.S. He was an active teacher and told a lot of fun stories to his students during class.

Mr. Hill believed that using computer technology was beneficial for both his students and himself. He kept learning how to use computer technology for his classes and then proceeded to practice these new skills throughout the school year. Mr. Hill had a

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<sup>2</sup> Jae-Hoon, Kyoung-Min, Stacy, and Brian are the ELLs of this study. They will be introduced in more detail later in this chapter and described further in Chapter 4.

laptop cart in his classroom; therefore, he frequently allowed his students to use the computers, and he accessed online and media resources throughout his classes.

Mrs. Davis was a 35-year-old White American female teacher at Dover E.S., and she was Kyoung-Min's classroom teacher in spring, summer, and fall 2010. She had taught at Dover E.S. for two and a half years. Before she came to teach at Dover E.S., she had worked for eight years at an after school program, which was 35 miles away from the school.

Mrs. Davis believed that using computer technology was helpful for her classes, and she was willing to use it as often as she could. However, she was too busy teaching mathematics, science, and language arts; therefore, her students could not frequently use the technology. She oftentimes instructed her students on how to create documents in diverse text formats.

#### *Hilley E.S.*

Hilley E.S. opened in 2004 in a rapidly growing residential community, so it was also one of the newest schools in the Oracle Unified School District. The school enrolled 942 students with diverse ethnic backgrounds in grades K through five, and the student population was Asian (53.6 %), Caucasian (22.5%), Filipino (10.4%), Hispanic (1.6%), African American (0.8%), and others or no response (11.1%).

The missions of Hilley E.S. were to (1) promote safe, positive, and respectful learning environments, (2) support each student to achieve success academically, artistically, and athletically, and (3) cultivate a community that involved families and staff members in every aspect of learning. The school also provided supplemental programs including music, art, computer instruction, library media center, science, PE,

GATE program, and other special needs programs, such as Health, Speech and Language, and Psychology and Counseling programs.

Hilley E.S. had a library media center, a computer lab, a daycare center, a multi-purpose room, and 33 classrooms. As at Dover E.S., parents' participation and support were important for Hilley E.S. For example, the purpose of the Hawks Education Fund of Hilley E.S. was to offer diverse quality educational programs and services, such as the supplemental programs. It doubled the library media hours and paid salaries for teacher specialists in technology, art, PE, and music. In addition, the fund planned to purchase COWS before long. Each classroom of Hilley E.S. had a *Document Camera* and a projector to enhance teaching and learning, and several classrooms had a *SMARTBoard*.

At this school, the teacher who participated in this study was Mrs. Louise White. Mrs. White was a 43-year-old White American female teacher at Hilley E.S., and she was Stacy's classroom teacher in fall 2010. She had taught at elementary schools for 15 years, and it was her sixth year at Hilley E.S. Since she was an active and interactive teacher, Mrs. White always had dialogues with her students in class.

Mrs. White believed that her students were computer literate and that they learned how to use computer technology very fast. She believed that the technology support in Oracle Unified School District was remarkable and appreciated the assistance from the parents' association. However, Mrs. White did not often use computers for her class because the association had not yet purchased technology equipment.

#### *Haynes E.S.*

Haynes E.S. opened in 1989, so it was one of the oldest schools in the District. This school enrolled 440 students with diverse ethnic backgrounds in grades K through

five. The student population was Caucasian (55.2%), Asian (21.5 %), Hispanic or Latino (4.8%), Filipino (3.2%), African American (1.2%), and others or no response (14.1%).

One of the missions of Haynes E.S. was to meet each student's needs to reach their potential development as learners. The school provided differentiated instruction and academic programs, which were rigorous and engaging. These programs included music, art, science, PE, After School programs, GATE program, and other special needs programs, such as Health programs and Speech and Language programs.

Haynes E.S. had a library media center, two computer labs, a science lab, a daycare center, a multi-use room with a stage and sound system, and 22 classrooms. The Mac computer lab had been built recently, and the PC lab was under construction. The parents' support and involvement were also key factors at Haynes E.S. The Gator Fund of Haynes E.S. had raised money to support classroom professionals, a choral music assistant, a reading intervention teacher, and a technology assistant. Each classroom had a *Document Camera* and a projector, and a few classrooms had a *SMARTBoard*. Teachers at Haynes E.S. attended training sessions and collaborated with each other in integrating technology.

The teacher participant at Haynes E.S. was Mrs. July Bryant, a 49-year-old White American female teacher, who was Brian's classroom teacher in spring and fall 2010. She had taught at elementary schools for 19 years, and this was her fifth year at Haynes E.S. Mrs. Bryant was an interactive teacher and an active technology user.

Mrs. Bryant believed that using computer technology was helpful for her classes, and she frequently provided computer-based texts to her students. For example, Mrs. Bryant provided useful web resources to her students and their parents on her website and

accessed educational websites or videos to assist her students during class time. In addition, Mrs. Bryant instructed her students on how to create documents and multimedia resources, and she actively communicated with other teachers and computer specialists in order to help her students. The following section describes the participant selection process.

## Participant Selection

### *Purposeful Sampling*

Since this study included many information-rich cases in a variety of contexts, I adopted purposeful sampling, a strategy to select my participants and research sites. “Purposeful sampling focuses on selecting information-rich cases whose study will illuminate the questions under study. [It] is sometimes called purposive or judgment sampling” (Patton, 2002, p. 230). It helps researchers select the settings that will purposefully inform them of the central phenomenon in the study (Creswell, 2007). Specifically, I used “combination or mixed purposeful sampling” strategy (Patton, 2002, p. 242), and I adopted both maximum variation sampling and emergent sampling.

Maximum variation sampling, or heterogeneity sampling, is a strategy to capture and describe the central themes that cut across a great deal of variation. The logic for the strategy is that the themes and patterns emerging from great variation can capture core experiences of people and central dimensions of phenomena. The research using this sampling process yields detailed description of each case and important patterns across heterogeneous cases. Emergent sampling, or opportunistic sampling, is another strategy to approach the participants and sites in this study. Fieldwork, as one of the main resources for qualitative research, often involves impromptu decisions about sampling,

and it is almost impossible to observe every event and aspect through the data collection process. In emergent sampling, researchers make their decisions on the activities and tasks to observe, people to interview, and the time to collect data during fieldwork (Patton, 2002).

In this study, I initially selected Dover E.S. based on public documents, discussions with the principal, and classroom observations, and I selected the ELLs during the observation process. Therefore, one single sampling strategy did not satisfy my approach to this study. The combination or mixed purposeful sampling between maximum variation sampling and emergent sampling were an adequate approach in this study.

#### *Participant Selection Processes*

My ELL selection criteria consisted of three elements: fourth or fifth grade students who (1) were ELLs with their own backgrounds of first language and culture, (2) had been assigned to the ELD program at the time of this study or in the previous year, and (3) had a computer or a device to connect to the online texts and media at home. Based on ongoing observations at five elementary schools in Oracle Unified School District, I selected two fourth graders and two fifth graders through a purposive sampling process (Creswell, 2007; Patton, 2002; Merriam, 1998). Other participants were the students' parents and teachers. I focused on fourth and fifth graders because they had more opportunities to access computer labs and laptop computers than did younger students in the school district. I selected students from two grades to observe more diverse computer-assisted learning contexts; fifth graders at Dover E.S. had laptop

computers in class, but fourth graders at the school did not. In addition, I considered that older students worked on more critical and complex computer-assisted literacy activities.

After I secured Institutional Review Board (IRB) approval from my university and received the permits from the superintendent of the school district and the principals of the schools, I accessed the ELLs from school settings first. After receiving the permit from the superintendent and the elementary school principals, I communicated with classroom teachers to schedule my classroom observations. When I found potential ELLs for this study, I talked with them regarding this research and sent advertisement letters to their parents. After I received the parents' signed Informed Consent Forms and Parental Permission Forms, I officially observed those ELLs.

The ELLs' genders and families' socioeconomic statuses were not the focus of my study. I included both boys and girls in the study. However, I checked if they had a computer or a device to connect the online texts and media at home because I had to observe what computer-based texts they accessed and read at home. In total, I sent advertisement letters to 75 parents—they were 25 Korean, 22 Chinese, 17 Indian, 10 Hispanic. Of these, one Filipino, five Korean, and two Chinese responded to my letters. Their response rate was 10.6%, and 50% of the respondents did not want to participate in this study because they did not feel comfortable with my home visits. After this selection process, I finally had four ELLs: three Korean and one Filipino/Chinese. The participants' information is presented in Table 1. I describe individual ELLs' profiles in detail in Chapter 4.

Table 1

*ELL's Information as of April 2010*

Participant	Grade Level	Original Nationality	Schooling in the U.S. (years)	Level of English Proficiency	Classroom Teacher	School
Jae-Hoon Woo	5	Korean	2.3	Early Advanced	Mrs. Chang; Mr. Hill	Dover E.S.
Kyoung-Min Bae	4	Korean	4.1	Early Advanced	Mrs. Davis	Dover E.S.
Stacy Shim	5	Korean	2.4	Intermediate	Mrs. Chang; Mrs. White	Hilley E.S.
Brian Te	4	Filipino/ Chinese	3.0	Intermediate	Mrs. Bryant	Haynes E.S.

### Researcher's Roles

The qualitative researchers' roles have diverse and multiple images, such as scientists, naturalists, fieldworkers, journalists, social critics, artists, performers, jazz musicians, filmmakers, quilt makers, and essayists (Denzin & Lincoln, 2005). The qualitative researchers should be tolerant of ambiguity and uncertainty, sensitive to research context, communicative throughout the study, and balanced between science and creativity (Merriam, 1998; Strauss & Corbin, 1998). Merriam (1998) argues that qualitative researchers need to be tolerant of the uncertain situations from the process of research design to data analysis. Depending on the researchers' approach, the study can become "an adventure full of promise for discovery" or "a disorienting and unproductive experience" (p. 21).

Qualitative researchers should also be sensitive to all the information that they encounter, including participants, sites, and all other variables of the study. In addition, they should be good communicators throughout the study. "The extent to which inquirers are able to communicate warmth and empathy often marks them as good or not-so-good data collectors" (Guba & Lincoln, 1994, p. 140). The researchers also need to balance



between scientific aspects of research, such as maintaining a certain degree of rigor, and creative aspects of research, such as naming categories, comparing data and interpretations, and extracting integrated schemes (Strauss & Corbin, 1998).

My role as a researcher in this study was a tolerant, sensitive, communicative, and balancing component or member of each case. In addition, I tried to become “the primary instrument for gathering and analyzing opportunities for collecting and producing meaningful information” (Merriam, 1998, p. 20). In this sense, I became a part of this study as a researcher, an international student, a contributor in communities, and a participant observer. My experience and multiple perspectives helped me approach each participant and context as both an outsider and an insider. In addition, as a participant observer, I specifically employed multiple and overlapping data collection strategies to strengthen my interpretations of data (Patton, 2002).

#### Data Collection

This research consisted of two different data collecting settings. For the first session, I observed research sites and participants, interviewed participants, collected documents, took field notes, and kept reflective journals. The second session was the ELLs’ computer-based text reading sessions. In both home and school contexts, I focused on ELLs’ experiences and their use of strategies when they read computer-based texts, so I observed what they normally did. The data collection process officially started when my IRB application was approved on April 19, 2010, and lasted until December 8th, 2010, a period of nine months.

### *Observations*

An important and basic data resource for this study was observation, which is one of the popular forms of qualitative data. According to Patton (2002), direct observations have several advantages. The observations make it possible for researchers to feel and understand dialogical and interactional settings better. In addition, researchers can have diverse and inductive perspectives through some information that they cannot get from interviews or other methods to collect data.

During spring, summer, and fall school sessions in 2010, I observed classrooms at Dover E.S, Hilley E.S., and Haynes E.S. The observations for the school contexts helped me understand what the ELLs' experiences of reading computer-based texts were like in a formal academic setting and what teachers' supports were. I also observed the ELLs' home environments.

#### *Classrooms and Computer Labs*

I visited the three schools once every week or two weeks on a regular basis and observed classroom or computer lab settings. I visited in the morning or afternoon depending on the class and the school schedules. Each computer lab period was less than thirty-five minutes in length, and each observation at the schools took two to three hours. The focuses of the observations were on the ELLs' experiences in computer-based text reading and teachers' support.

In every classroom or computer lab session, my role was an "observer as participant" (Merriam, 1998, p. 101), and I informed teachers and students of this role. I initially minimized the role as a participant to keep the settings more natural; therefore, my primary role was to collect and interpret data. However, after I built rapport with

students and teachers, I got more of an insider point of view by sharing my own experiences as an L2 learner.

### *Home*

Another observation site was home settings in which the ELLs read computer-based texts and verbally reported what they thought and did. I describe the reading tasks in a separate section. For each observation, I took field notes and wrote reflective journals to gain as much information as I could.

I visited the ELLs' homes four times until December 2010. For each visit, I observed the ELLs' reading activities and their use of strategies; I also observed home settings before and after the reading activities. Each observation at a home took two or three hours, and it included the ELLs' reading time. I visited home settings during the ELLs' summer break when they did not have regular class. I decided to visit them during this period in order to minimize the direct influence of teachers' assignments on the ELLs' reading of computer-based texts because I wanted to observe their autonomous and natural use of computers in their lives. The focuses of the observations at home were on ELLs' experiences in computer-based text reading and family members' support in home settings. In the field notes of the observations, I wrote what I saw and heard at the ELLs' home and also included my impressions and interpretations.

### *Interviews*

Another data resource for this study was interviews. The purpose of an interview is to help an interviewer understand another person's thoughts, and the qualitative interview begins with the assumption that we need to know others' perspectives because they are meaningful and knowable (Patton, 2002). I adopted semistructured interviews

and unstructured or informal conversational interviews. The semistructured interview is a mixed approach between the standardized interview and the unstructured interview. It offers interviewers more flexibility but still has some guiding questions. The unstructured and informal conversational interview is the least structured one, so it does not have any predetermined questions. This type of interview is exploratory (Creswell, 2007; Merriam, 1998; Patton, 2002).

I interviewed each participant to fill in the gap between my observations and participants' actual thoughts and to enter into participants' perspectives and information. This study had different participants in diverse research contexts, so one interview type was not sufficient. I adopted the informal conversational interviews and the semistructured interviews, with my selection depending on the interview contexts and interviewees' situations. Table 2 presents the interview types for each participant.

Table 2

*Interview Types for Each Participant*

Interviewee	Interview Type	Where and How Many Times/Duration
ELLs	• Informal conversational interview	• At home and at school; multiple times (duration varied) when time and situation allowed
	• Semistructured interview	• At home and at school; one time (15 minutes) at home and one time (15 minutes) at school after their reading
Parents	• Semistructured interview	• At home; one time (20 minutes) after observing the home settings
Classroom Teachers	• Informal conversational interview	• At school; multiple times (duration varied) when time and situation allowed
	• Semistructured interview	• At school; one time (20 minutes) after observing their classroom settings

I interviewed participants either in English or in Korean according to their preferences and needs. For example, I interviewed Kyoung-Min, Brian, Brian's mother,

and every classroom teacher in English but interviewed Jae-Hoon, Stacy, and the other parents in Korean. These interviews were helpful for my study to get more information from each participant.

### *ELLs*

For all the ELLs, I used both informal conversational interviews and semistructured interviews. For nine months, I observed the ELLs once every week or two weeks, and I frequently spoke with them. I tried to understand their thoughts and opinions through a variety of routes throughout the research period.

First of all, I informally interviewed all the ELLs at home and at school multiple times. When I interviewed them informally, I asked them simple questions and tried to avoid interrupting their routines in each context. The informal conversational interviews were more like dialogues and interactions with the participants, and I recorded the interviews with a voice recorder only when it did not interrupt ELLs in each site. If there was any possibility of disturbing their natural environments, I recorded the interviews with only field notes and summarized them right after they were concluded. This might have reduced the possible stress the interviewees experienced when I used a recorder.

In their homes I asked all the ELLs the semistructured interview questions after they had completed their computer-based reading activities. At school, I asked these questions during the ELLs' free time. Each interview took 15 minutes. The predetermined questions are in Appendix A, and I asked additional questions depending on the interviewees' responses and reactions. After conducting the semistructured interviews, I transcribed the recordings for the future analysis.

### *ELLs' Parents*

For the ELLs' parents, I adopted semistructured interviews because I needed to know their thoughts and experiences through limited interview opportunities. I interviewed them one time when I visited their home, and the interviews took 20 minutes. The predetermined interview questions are in Appendix A, and I asked additional questions depending on parents' individual responses and reactions. I recorded the interviews with a digital voice recorder and transcribed them for the following analysis process.

### *Classroom Teachers*

For the classroom teachers, I also used both semistructured interviews and informal conversational interviews. I informally interviewed classroom teachers before, during, and after class multiple times for nine months. When I interviewed the teachers informally, I asked them simple questions and recorded the interviews with a voice recorder only when the interview did not interrupt the classroom environments. If there was any possibility of disturbing the natural environments of each site, I just recorded the interviews with field notes. I asked teachers the semistructured interview questions during their preparation hours. Each interview took 20 minutes. The predetermined questions are in Appendix A, and I asked additional questions depending on their responses and reactions. After semistructured interviews, I transcribed the recordings for the future analysis.

### *Field Notes and Reflective Journals*

Taking field notes and writing reflective journals were other important ways to record data, and they supported and completed my observation and interview processes.

Lofland (as cited in Patton, 2002) regarded field notes as “the most important determinant of later bringing off a qualitative analysis. Field notes provide the observer’s *raison d’être*. If ... not doing them, [the observer] might as well not be in the setting” (p. 102). Field notes are crucial because we cannot fully trust our vulnerable memory. The field notes contain the description through observations including what researchers observe, feel, and experience as well as what other people say. They also contain researchers’ interpretations, insights, working hypotheses, and initial analyses (Merriam, 1998; Patton, 2002). In addition to the field notes, I occasionally wrote a reflective journal after observations in order to record what I could not write on site and to add my explanations and questions.

For verbal reports, observations, interviews, and documents, I took field notes before, during, and after the processes depending on the data-collecting situations. In addition, I wrote reflective journals after observing research sites. When I took field notes and wrote reflective journals, I included the time and place of recording, specific situations and information of the site, and participants’ names. I put my notes regarding the interesting points, my comments and impressions, and what I saw and heard at each site, such as participants’ reactions and interactions.

### *Documents*

A document is “a wide range of written, visual, and physical material relevant to the study at hand,” and documents are “ready-made” data sources (Merriam, 1998, p. 112). In current societies, all kinds of entities leave paper documents and records, and they can be rich resources as part of fieldwork (Patton, 2002). Merriam (1998) divides the documents into three types: public records, personal documents, and physical materials.

Public records include such things as the U.S. census, program documents, mass media, and government documents as ongoing records of societies. Personal documents, as individuals' narratives, include diaries, letters, autobiographies, and so on. Physical material "as a form of document, broadly defined, consists of physical objects found within the study setting, and includes tools and instruments" (p. 117).

I used all three types of documents—public records, personal documents, and physical material—to get more information about ELLs' experiences. Public records included (1) formal school policy statements regarding ELD service, reading, and technology, (2) school bulletin boards for parent involvement, (3) official records of ELLs' academic achievement, and (4) any other records regarding populations and history. These resources provided the overall guidelines and trends, which referred to authority and power. Personal documents contained ELLs' writing samples, such as school projects. Through reviewing the personal documents, I identified ELLs' reading and writing activities and their performances. The last document type was physical material, which provided the information about educational and technological supports for ELLs in each site. I considered those documents as information to support my interpretations of ELLs and their experiences rather than as independent resources.

#### *Verbal Reports*

Recorded verbalizations are valuable data, and the verbal protocol and its analysis help researchers understand readers' motivations, struggles, and reading strategy awareness and use. Furthermore, the systematic analysis of the protocols is as important as reliable reporting procedures (Afflerbach, 2000; Ericsson & Simon, 1980, 1993; Kasper, 1998; Kormos, 1998; Pressley & Afflerbach, 1995). There are three forms of



verbal reports—concurrent, introspective, and retrospective—and they “can claim to being the closest reflection of the cognitive processes” (Ericsson & Simon, 1993, p. 16).

The concurrent verbal reports are think-aloud reports, in which readers directly verbalize their thoughts and behaviors without theorizing them. These verbal reports provide a view of readers’ mental processes, which remain in their short-term memory (STM). For introspective reports, readers do not only verbalize their thoughts but describe and explain them. Therefore, these reports include information that is also not in readers’ STM. Researchers can obtain these two types of verbal reports, concurrent and introspective, during reading activities. However, for retrospective verbal reports, readers verbalize their sequence of thoughts after they perform the tasks (Afflerbach, 2000; Block, 1986; Bowles & Leow, 2005; Ericsson & Simon, 1980, 1993; Kormos, 1998; Kucan & Beck, 1997).

Olson, Duffy, and Mack (1984) expand the meaning of think-aloud protocols and suggest *sentence-by-sentence talking*, *selective talking*, and *after-the-fact talking* as three types of the protocols. *Sentence-by-sentence talking* is the most basic form of think-aloud protocols; here readers verbalize their thoughts after each sentence. For *selective talking*, readers think aloud after certain designated points in a text. In *After the fact* talking, readers talk after they finish reading whole resources. However, Ericsson and Simon (1993) regard after-the-fact talking as a retrospective protocol rather than a think-aloud protocol. In this study, I adopted selective talking and after-the-fact talking for ELLs’ reading of computer-based texts.

Verbal protocols and the protocol analysis have a number of strengths. They provide access to readers’ responsive reading processes and the individual characteristics,

such as their motivation, emotion, and learning style. In addition, the protocol and the analysis allow researchers to study contextual influences, such as texts and settings (Afflerbach, 2000). These think-alouds help teachers and students learn reading strategy instructions and strategy use respectively (Wilhelm, 2001). Therefore, researchers can use the data from think-aloud protocol and protocol analysis for a wide range of literacy-related processes, such as reading instruction, assessment, and teachers' decision making (Afflerbach, 2000; van Someren, Barnard, & Sandberg, 1994; Wilhelm, 2001).

However, some scholars argue that they also have some shortcomings. Think-aloud, as a method, is highly dependent on the readers' verbal reports; thus the results are different according to their language proficiency, reporting environments, process disruption, and inaccessibility of thinking (Afflerbach & Johnston, 1984; Ericsson & Simon, 1994; Garner, 1987). In addition, Long and Bourg (1996) argue that readers do not report their real underlying thoughts when they think aloud. Instead they construct a text representation and use it to tell a story with regard to their understanding. Even though some researchers are still skeptical about verbal reports, I believe the advantages of verbal protocol surpass the shortcomings, and I provided enough pausing time during their verbal reports. Furthermore, the think-aloud protocol, as a method of inquiry and instruction, can provide what other methods cannot offer.

In this study, I adopted all concurrent (selective talking), introspective, and retrospective (after-the-fact talking) verbal reports together and modified them for computer-based reading environments. ELLs' concurrent and introspective verbal reports provided the strategies they used when they read computer-based texts and how they used them. In addition, retrospective reports offered ELLs' additional thoughts, which they did

not verbalize during the reading activities. The detailed descriptions of reading sessions follow this section.

In this study, ELLs thought aloud while they read computer-based texts in both home and classroom contexts. As *selective talking*, they thought aloud at certain designated points in a text, and they talked after they finished reading the whole resources as *after-the-fact talking*. The parents, classroom teachers, or ELLs selected what the ELLs would read as they normally did, and in each reading material, I provided them verbal cues instead of red dots. The last prompt included requesting them to talk about what they remembered from the story that they read, and this provided ELLs' retrospective reports regarding each computer-based reading. Throughout ELLs' reading activities, I recorded their responses, interactions, and think-alouds with a digital voice recorder depending on the contexts. Each recording contained ELLs' discourses, strategy use, and dialogic interactions. The dialogic natures showed the ELLs' interactions with others, themselves, and computer-based texts.

#### *Computer-Based Text Reading Sessions*

For computer-based reading sessions in both home and school contexts, I did not provide the ELLs and teachers any designated texts or media to keep the educational settings natural. Instead, all the ELLs and classroom teachers selected the computer-based reading resources that they usually used in either home or school contexts. These computer-based resources included a variety of text formats, which included textual resources, audios, pictures, videos, and computer games.

In their home settings, all the ELLs used computers with Internet access, read computer-based texts, and made meaning as they usually did for either information or fun.

While the ELLs read those texts, I offered them verbal cues by asking questions or requesting their verbal reports. When the ELLs received the cues, they verbally reported their thoughts. I recorded their reports with a digital voice recorder and transcribed them for the analysis.

In home contexts, Jae-Hoon used his father's desktop computer and his iPod Touch in the living room. He moved to other places while he used his iPod Touch and frequently switched these tools as he wanted. Kyoung-Min used his family desktop computer, which was outdated and slow, in the living room; therefore, other family members could monitor what Kyoung-Min was doing when he used the computer. Stacy also used a family desktop computer in a study area, which was on the second floor of her parents' house, and she shared the computer with her two older sisters. Stacy's family computer was comparatively new and fast. Brian used his mother's laptop computer to access computer-based texts, and his mother allowed him to use her computer only when he needed to use it. Otherwise, Brian's mother placed it in her room.

In their school settings, the ELLs or teachers selected the computer-based texts for their own lectures or school activities. I observed teachers' use of those computer-based texts and ELLs' responses. For the school settings, I recorded parts of the lectures and the ELLs' verbal reports when the recording did not interrupt the classes and other students. I focused more on field notes and reflective journals for the data analysis.

In school contexts, Jae-Hoon used a laptop computer in his classroom. There was a laptop cart in the classroom, and Mr. Hill (Jae-Hoon's 5th grade teacher) frequently allowed his students to use the computers during the classes. Kyoung-Min used a desktop computer in a computer lab. The computers in the lab were old and slow, and a computer

specialist did not stay in the lab; therefore, Mrs. Davis (Kyoung-Min's fourth-grade teacher) did not often have computer sessions. When she had a computer session, her students mostly searched for online information to complete their school projects. Stacy also used a desktop computer in a computer lab. The desktop computers in the lab were old and slow, too. A part-time computer specialist stayed at the lab, but she did not help students. Mrs. White (Stacy's fifth-grade teacher) had a computer session for her students once every week, and her students mostly typed their school projects, practiced keyboarding skills, or played educational games. Brian used a laptop computer in a Mac computer lab. The computer lab was newly opened, and the computers at the lab were new and fast. A full-time computer specialist stayed in the lab and helped students and teachers use the computers. Mrs. Bryant (Brian's fourth-grade teacher) had a computer session for her students once or twice every week after the lab was opened, and her students typed their school projects into the computer, created multimedia texts, and searched for information for their school projects.

### *Reading Session Schedule*

As their reading activities, all the ELLs read computer-based texts in both home and school contexts during spring, summer, and fall semesters in 2010. I visited the ELLs at school between two and three hours throughout nine months, and I met them in person four times in their home contexts during summer. Each reading session at home lasted from one-and-a-half to three hours; the session times were different depending on the ELLs' and their parents' schedules and the speed of the students' reading. In addition, I conducted two semistructured interviews and several informal conversational interviews with the ELLs in home and school contexts.

All the ELLs had a practice session prior to their reading of computer-based texts at home, and I demonstrated how they could access the contents and use the options of the website in general. When they became familiar with the web resources and options, I helped them understand how they could report their thoughts verbally. This practice session continued until the ELLs fully understood and completed the reading activity by themselves and got used to verbal reports as Ericsson and Simon (1993) suggested.

After they completed the practice session and accustomed themselves to the activities, they read computer-based texts in home and school contexts from spring to fall semesters. The ELLs chose what they would read, or their parents or classroom teachers assigned them computer-based texts. During the reading sessions, I observed ELLs' dialogic interactions with computer-based texts and their use of strategies. I recorded them with my digital voice recorder.

### Data Analysis

Qualitative research does not follow a linear order, so data collection and data analysis are not separate procedures. Instead they may occur simultaneously and recursively, so researchers usually do not know who their interviewees will be and what the next steps will be until they analyze the data already collected (Merriam, 1998). Analysis refers to “organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories” (Hatch, 2002, p. 148). Data analysis also refers to the interactive and systematic meaning-making process (Merriam, 1998; Strauss & Corbin, 1990). In addition, Merriam (1998) regards data analysis as “the process of making sense out of the collected data. . . . it is the process of making meaning.

(p. 178). In the meaning-making process, researchers produce trustworthy and transferable findings throughout the interactive process (Merriam, 1998; Patton, 2002).

My analysis consisted of five steps: (1) preparing and organizing data; (2) reading the data and developing categories based on semantic relationships; (3) identifying salient categories, assigning them a code, and putting others aside; (4) rereading data, refining salient categories and interpretations, and keeping a record of where relationships are found in the data; and (5) completing an analysis within categories and searching for themes across categories.

### *Preparing and Organizing Data*

This step is a transitional process between data collection and data analysis, and many researchers consider it as the initial stage of data analysis (Creswell, 2007; Maxwell, 1996; Merriam, 1998; Patton, 2002). To manage data efficiently, I created and organized data files for each data set in my laptop computer, which consisted of observation and interview protocols, audio files and transcriptions, field notes, reflective journals, and personal and public documents. I read and listened to the texts and audio data and transcribed them for further analysis at this step. I revisited the textual data to make short marginal notes and summarized my field notes and reflective journals. The short notes and memos were about tentative ideas about categories and relationships of data. If the data set was paper-based, such as personal and public documents, the notes were on the margin of the copied information. However, if the data set was electronic, I imported the data to *Atlas.ti*, which I used to facilitate the data analysis process. For the most data sets, I analyzed data twice: one time for paper-based data sets and one time for electronic versions of data. The last step before the actual analysis process was describing

research settings: homes and schools. In this process, I drew pictures of the diverse settings and described each case and its context including social and educational settings, participants, and events.

### *Atlas.ti*

*Atlas.ti* is a Windows-based computer software application for qualitative data analysis. The software helps users organize data, code data, make notes, and compare findings. Users can search and retrieve the data, codes, and notes quickly. In addition, multiple users can access the same data set, so collaborative work is possible (Atlas.ti, 2009; Creswell, 2007).

I used this software for efficient analysis of data. I opened the electronic documents, such as text and image files, with the software and assigned the documents as primary documents (PDs). I read each word, sentence, and paragraph and selected what might intrigue me. I assigned key words by using a coding option of *Atlas.ti* and typed memos regarding my thoughts and impressions on the data. Throughout the analysis process, I used the software to facilitate my data management and analysis process.

### *Reading the Data and Developing Categories Based on Semantic Relationships*

After the data sets were ready, I analyzed the data from the observations, interviews, documents, verbal reports, field notes, and reflective journals. In order to make sense out of the data and to move forward in the analytic process, I carefully read the data sets. In this step, I decided whether particular words, ideas, events, dialogues, and information could be relevant to technological diversity in each research site and ELLs' computer-based reading strategies. I also developed specific categories and used



my knowledge and experience to connect each category. I revisited these categories and identified whether they made sense.

*Identifying Salient Categories, Assigning Them a Code, and Putting Others Aside*

I identified what categories were salient for my study at this step. In a previous step, I identified multiple categories, but not all the categories were meaningful for my study. Therefore, I put aside less meaningful terms and domains. After I identified salient categories, I assigned codes to them. To represent codes, I used simplified words rather than Roman numerals, Arabic numerals, and alphabet letters because it was clear when I coded each word, sentence, event, memo, etc.

*Rereading Data, Refining Salient Categories and Interpretations, and Keeping a Record of Where Relationships Are Found in the Data*

In this step, I reread the data and refined salient categories. For each reading, I focused on particular categories to approach data as precisely as possible and identified whether the data supported current categories and codes. Since it was an important process to search for the supporting data, I recorded where I found the examples, which represented domains and interpretations. Although I identified salient categories and assigned codes to them in the previous steps, I still paid attention to additional categories, interpretations, and codes. In the next step, I searched for disconfirming or negative cases (Lincoln & Guba, 1985; Patton, 2002).

*Completing an Analysis within Categories and Searching for Themes across Categories*

In this step, I studied the data and the categories further and looked for themes across the categories. When I further studied the data within individual categories, I revisited and constantly compared the salient codes and their semantic relationships in a

search for other possible ways to organize them. I also identified subcategories under each category. I considered the probability to reorganize and develop new categories and codes.

After reconsidering the organizations within categories, I found themes across the categories. In this process, I looked for connections among the categories and identified what the connections meant. I started from temporary and potential themes and searched for patterns that occurred in the data repeatedly. In addition, I looked for similarities and differences among the categories. During and after each process, I wrote a summary and an outline for further analysis.

#### Trustworthiness and Transferability

Qualitative research is “trustworthy to the extent that there has been some accounting for [the] validity and reliability, and the nature of qualitative research means that this accounting takes different forms than in more positivist, quantitative research” (Merriam, 1998, p. 198). The basic issue relevant to trustworthiness is how researchers can persuade both the audiences and themselves that the findings are worth paying attention to and taking account of (Lincoln & Guba, 1985). Validity refers to how congruent the findings are with reality and how applicable the findings of one study are to other situations; reliability is relevant to the extent to which research findings can be replicated (Creswell, 2007; Merriam, 1998; Patton, 2002). Transferability refers to whether findings “in Context A might be applicable in Context B. . . . the degree of transferability is a direct function of the similarity between the two contexts” (Lincoln & Guba, 1985, p. 124). To make this study more trustworthy and transferable, I adopted several strategies to approach the data, participants, and the study.

I adopted triangulation, especially data triangulation and investigator triangulation (Denzin, 1978; Mathison, 1988). Triangulation is a strategy to improve the validity of research or evaluation of findings. Triangulation is particularly important for naturalistic and qualitative inquiry, and it helps researchers control their biases and establish valid propositions (Mathison, 1988).

For data triangulation, I used diverse data resources to enhance my understandings in the situated contexts of each case, and they consisted of observations, interviews, verbal reports, and documents. I regarded each data set as interrelated to other data resources. The concept of data triangulation included time and space based on the assumption that social phenomena need to be examined in diversity contexts (Denzin, 1978). Therefore, I observed ELLs' literacy experiences in different places, such as homes and classrooms, at different times. In addition to the data triangulation, two graduate students, critical friends, also examined whether my interpretations were reasonable or not, as the investigator triangulation. They were both doctoral students in my department and had considerable understanding of ELLs' language acquisition processes. I picked one of my data sets and sent it to the critical friends for coding. They also reviewed my domains and codes to see if they were agreeable to them, and I discussed the similarities and differences of our coding with them. I also checked if my interpretations of data sets were acceptable to participants through various routes, such as face-to-face interactions, phone calls, and email.

At the beginning of the study, I clarified my assumptions and theoretical framework of the study as well as worldviews, and made sure my approaches and interpretations would be circumspect and consistent. I continuously interacted with the

theoretical framework, worldviews, and previous literatures (Creswell, 2007; Merriam, 1998). Throughout the study, I also provided participants' emic voices and rich and thick descriptions regarding participants, contexts, and findings for readers to decide on the trustworthiness and transferability of this study. Another strategy for trustworthiness was member checks. I took my tentative representations back to the people from whom I got the data and checked if my understanding of the data was plausible. I asked my participants questions when I met them or sent email to them in order to make sure that my understanding of particular data was correct.

#### Limitations of the Study

Several potential limitations of the inquiry need to be considered in this study. They are generalizability and research subjectivity. From the experimental and quantitative perspective, the assumptions and findings of this study are not to be generalized to other institutional and social contexts. For this study, I particularly investigated four fourth- and fifth-grade ELLs in the western part of the U.S., and the research sites were socially situated. In addition, the individuals' thoughts, identities, reactions, and experiences were different in specific sociocultural contexts. Therefore, the results may not be generalizable from the experimental and quantitative perspective.

However, from the naturalistic perspective I adopted for this study, the research focus is not upon the generalizability but the transferability (Creswell, 2007; Lincoln & Guba, 1985; Merriam, 1998; Patton, 2002). In this study, I focused on the transferability instead of generalizability and provided rich descriptions of research contexts and findings. The participants' emic voices and thick descriptions will allow readers to select what they can use from the study depending on their needs. This qualitative case study

offers parents, teachers, administrators, and researchers in education a chance to observe ELLs' lives and provide them another worldview. Therefore, generalizability is not actually a limitation of this study.

In addition, since this research is a qualitative case study, researcher subjectivity can be another potential issue (Alvermann, 2000) from the experimental perspective. Patton (2002) argues, "The conventional means for controlling subjectivity and maintaining objectivity are the methods of quantitative social science. . . . Numbers do not protect against bias" (p. 574). Lincoln and Guba (1985, 1986) suggest trustworthiness and authenticity to replace the traditional mandate objectivity. For trustworthiness and authenticity, they emphasize being balanced, fair, and conscientious for multiple perspectives and contexts.

From the qualitative research perspective, I considered myself as a research tool (Creswell, 2007; Lincoln & Guba, 1985; Merriam, 1998; Patton, 2002), and I played the roles of researcher, interviewer, and participant observer with as few biases as possible. However, as an individual in complex societies, I have my own schema, personal experiences, educational philosophy, and background knowledge, and I incorporated them into the study. For example, I adopted the lens of SCT (Vygotsky, 1978, 1986) and dialogism (Bakhtin, 1981, 1986) to interpret the process and analyze data in the learning contexts of multiliteracies (New London Group, 1996). As I mentioned in the previous section, I explicitly provided my assumptions and theoretical framework as well as my own worldviews and constantly compared data throughout the study. I made sure my approaches and interpretations would be circumspect and consistent.

## CHAPTER 4: HOLISTIC UNDERSTANDING OF FOUR CASES

### Introduction

The purpose of this study was to investigate elementary level ELLs' use of strategies and other influential factors when they make meaning in contexts of multiliteracies. I adopted a holistic approach to understand the ELLs' literacy experiences in depth and view their meaning-making processes and dialogic interactions within the zone of personal development (ZPD) in reading computer-based texts. I also explored the influences of the environments of homes and schools on the ELLs' literacy experiences.

In Chapters 4 and 5, I address the ELLs' use of strategies when they read computer-based texts by exploring the following research questions:

1. What strategies do four elementary ELLs use when they read computer-based texts in their home context?
2. In what ways do these elementary ELLs describe their use of these strategies in their home context?
3. What influences these ELLs to use the strategies when they read computer-based texts in their home context?
4. What strategies do these elementary ELLs use when they read computer-based texts in their school context?
5. In what ways do these elementary ELLs describe their use of these strategies in their school context?

6. What influences these ELLs to use the strategies when they read computer-based texts in their school context?
7. In what ways do ELLs' use of strategies differ when they read computer-based texts in their home and school contexts, and what influences these potential differences?

To understand the ELLs' computer-based text reading experiences, I used data from my observations, interviews, field notes, reflective journals, documents, and participants' verbal reports. I conducted a qualitative analysis of these data sets, and these processes allowed me to identify the readers' strategies. I summarize the findings of the study in two chapters. Chapter 4 presents a holistic view of the ELLs' computer-based text reading experiences in four cases. Chapter 5 shows the findings regarding use of strategies.

#### Procedure for Compiling the Profiles

Each case begins with descriptions of the ELL, including family background, their reasons and motivations for coming to the U.S., the life in the U.S., home literacy, their educational opinions for their child, their expectations from their child, and their support regarding educational and technological resources for their child. Then I describe the readers' reading behaviors and use of strategies, as well as my comments. I also explore special factors that might influence the ELLs' reading of computer-based texts and their use of strategies.

#### The Cases

Participants of this study were four ELLs, their parents, and their classroom teachers. Although the ELLs were the key participants for the study, their parents and

teachers also offered meaningful information and perspectives because all participants play important roles in the sociocultural and educational contexts. The student participants were four fourth- or fifth-grade ELLs who were classified as English Learners (ELs) or had been classified ELs in two years in the Oracle Unified School District. Each ELL's English proficiency level was between Intermediate and Early Advanced based on the standard of the Oracle Unified School District, and they had been in the U.S. between two and four years.

All the ELLs were also different with regard to their abilities of using technologies, comprehending computer-based texts, and adopting reading strategies. I met them in home and school contexts and observed and interviewed them to gain a better understanding of their thoughts and experiences of computer-based literacy activities and their use of strategies.

In addition to the ELLs, I invited their parents for an interview session and visited their home because the roles of parents and other family members are very important in family literacy environments (Kendrick, Rogers, Smythe, & Anderson, 2005; Li, 2000, 2006). I asked the parents about (1) their reasons and motivations for coming to the U.S. and the life in the U.S., (2) their educational opinions about their child, (3) their expectations from their child, and (4) their support regarding educational and technological resources for their child.

I also observed and interviewed the ELLs' classroom teachers to have a better understanding of the ELLs' computer-based literacy experiences at school. I observed how the teachers adopted electronic literacies into their classes and how they assisted their students. I also asked the teachers several interview questions, which included (1)



their general teaching experiences, (2) the activities and resources that they used to enhance their students' use of computers, and (3) their perceptions of using computer technology for their classes.

*Jae-Hoon Woo: An Active Communicator*

Jae-Hoon was an 11-year-old boy with very positive attitudes towards his parents, siblings, teachers, peers, and computer-based texts. He was the tallest boy in his class and had a big smile most of the time. Jae-Hoon had Korean ethnic background. He was born in Korea and learned Korean there, so his articulation and pronunciation while speaking Korean were perfect. Jae-Hoon had been in Korea until he moved to the U.S. with his family in 2008, and he had been in the U.S. for two years and three months when his father allowed him to participate in this study. When I first met Jae-Hoon, he was a fourth-grade student at Dover E.S., but his participation in the study was mostly in his fifth-grade year in fall 2010. He spoke English at school all the time but used Korean when he was at home. Even though he had been in the U.S. for a comparatively short time, his English proficiency level was Early Advanced, and he expressed confidence in his English:

I didn't have any problem with language. I studied English [in Korea], so I could speak English... I prepared it in Korea. So I think I learned English a little bit faster than others. So I didn't have anything inconvenient. Yeah. (interview with Jae-Hoon, December 1, 2010)

Most of his classes at school were in the mainstream classroom, and he actively participated in classroom activities. In addition, he got along well with his classmates.

His classroom teacher described Jae-Hoon as follows:

Um, he is funny, he is bright, he is respectful, he is considerate. Um he is not afraid to ask for help, um, he, he, he's a student that other students, I think wanna be around. Um, been learning English for two and a half years now, learning it remarkably quickly. (interview with Mr. Hill, November 4, 2010)

Jae-Hoon had Korean parents and one older brother. His father owned a deli restaurant, which was 30 miles away from his home, and his mother took care of the children full time. Jae-Hoon's father spoke English fluently while he ran the business; however, his mother did not speak English very well, so she felt stressed because she could not help with her children's schoolwork. His brother was a high school senior playing golf, and he had difficulties in following the school curriculum due to his lack of English proficiency. Jae-Hoon's parents decided to come to the U.S. for their children's education. They believed education in the U.S. was beneficial for their children. Jae-Hoon's mother said:

[I]t is very good for Jae-Hoon to come here. In Korea, he was very active, so teachers thought that he was annoying. He kept asking questions and wanted to talk with teachers. Teachers responded [to] his questions for a while, but they didn't do that anymore. Here in America, teachers don't do that, so it is good... The education system of the U.S. is much better... In America, there are a lot of choices as alternatives other than the study if a student does not study at school very well. Schools can support students to do whatever they can do. Yes, I think the choices are diverse. (interview with Jae-Hoon's mother, July 23, 2010)

In addition to the education in the U.S., Jae-Hoon's mother had a positive attitude toward life in the U.S. Especially, she commented on the influences of life in the U.S. on their family relationships. She said:

I guess all the family members were individual when we were in Korea. Father had his own business; my older son was a high school senior, so he needed to study; and the little one, as a student, might need to go to private institutes. Therefore, there must not be a lot of time to share with other family members, but my sons play sports with their father [in America]. They play golf with their father. They have much time to talk with their father. So they can talk to each other and become confidential with each other here in America. If sons have a difficult time, if it is not their ways of life, we can discuss it, find a middle ground, and change the directions. Yes, it is [a] family oriented society, so I love it. However, fathers have a hard time when they come here first. They don't have friends. (interview with Jae-Hoon's mother, July 23, 2010)

He enjoyed the school life in the U.S. and still considered whether he would play golf as his brother did or would study for his future.

*Reading Behavior and Use of Strategies*

In his interview, Jae-Hoon said that he learned English by watching television and communicating with people in meaningful contexts. As both his mother and his teacher, Mr. Hill, mentioned, Jae-Hoon was a very active and social person, and Mr. Hill loved him because he was not afraid of asking for help. Jae-Hoon learned from his parents, older brother, teachers, peers, and diverse computer-based texts. At the same time, he taught his parents, teachers, and peers, too. Through these multiple communications, Jae-Hoon became both a more capable and a less capable individual in his ZPD. For example, Jae-Hoon was a less capable individual when he learned about a YouTube video, *UNICEF video: Trick-or-Treat for UNICEF-2009 Elementary School Kit Video* at [http://www.youtube.com/watch?v=0FS\\_6svNzNo](http://www.youtube.com/watch?v=0FS_6svNzNo) from Mr. Hill; but he was a more capable individual when he helped Mr. Hill access the video more efficiently. In particular, Jae-Hoon's dialogues with computer-based texts were remarkable. One day, he demonstrated that he learned how to restore his iPod touch by watching several YouTube videos and fixed the computer device by himself.

In addition to watching video texts, Jae-Hoon also actively solved problems by using textual resources, images, and computer games when he read computer-based texts at home and school. He used diverse types of computers, such as a Windows-based desktop computer, a Windows-based laptop computer, a Mac laptop computer, and an iPod, and he adopted most of the reading strategies mentioned in this study. He understood the URL construction and was familiar with multitasking. However, most of

all, Jae-Hoon's dialogic skills with others, himself, and computer-based texts empowered him to become an active communicator and critical thinker in the learning contexts of multiliteracies.

*Kyoung-Min Bae: A Lucky Searcher*

Kyoung-Min, a 10-year-old boy, was nice to his family members, teachers, and peers, and he loved to read books at home and school. I first met Kyoung-Min at his home at the beginning of summer break in 2010, and he became a fourth grader at Dover E.S. in fall 2010. He was born in Korea and had Korean ethnic background. Kyoung-Min learned Korean when he was in Korea, but he barely spoke his L1, even when I observed him at his home. Kyoung-Min understood his mother and older sister speaking in Korean to some extent but never responded to them in Korean, except for several simple words, such as *Eom-Ma* (엄마; mom) and *Nu-Na* (누나; older sister). Kyoung-Min's mother attributed the loss of his native language to his extreme stress and said that he sometimes cried after he came home from school. The interview with Kyoung-Min shows how he felt when he entered a new educational environment in the U.S.:

Kyoung-Min: [When I first went to school] I felt nervous.

Researcher: Oh, you felt nervous?

Kyoung-Min: Yes. I was not really used to it. I only have like, maybe like that . . .  
Those are kind of difficulties.

Researcher: Why?

Kyoung-Min: I don't really know.

Researcher: Oh, you don't really know, but you felt difficulty? So when you had a problem or difficulty, what did you do?

Kyoung-Min: I kept trying to fit in. (interview with Kyoung-Min, November 21, 2010)

Regarding Kyoung-Min's L1 loss, Kyoung-Min's mother felt guilty because she could not help her son due to her lack of English proficiency. She described her feelings this way:

When we first came to America, Kyoung-Min experienced difficulties very much. Because of the English. So he told us that he didn't like to go to school. We didn't speak English, so we could not help him at all. So we worried so much. After that, he began to assimilate into the school lives, but he refused to speak Korean. He said that he didn't need Korean any more. I thought that it was more important for him to learn English as soon as possible. Fortunately, he began to speak English little by little. Now, he forgot all Korean and use only English. (interview with Kyoung-Min's mother, August 7, 2010)

Kyoung-Min's English proficiency level was Early Advanced, and most of his classes at school were in the mainstream classroom. However, he went to a learning lab every day for thirty minutes due to his insufficient academic achievement. At the learning lab, he studied language arts, science, math, and social studies, and two teachers helped him, as well as other students.

Kyoung-Min had Korean parents, one older sister, and one younger brother, and they moved to the U.S. together in 2006; thus, Kyoung-Min had been in the U.S. for four years and two months in the year of 2010. Kyoung-Min's father worked at a small construction company but stayed at home if he did not have work. Kyoung-Min's mother mostly took care of the children, but she also worked at a Korean restaurant in the evening from time to time. Furthermore, she cut people's hair at home when people personally requested, making additional income from this service. Both parents spoke very little English and used Korean to communicate with their children at home, but Kyoung-Min responded to them in English. Kyoung-Min's sister was a high school junior, and his younger brother was four years old. Kyoung-Min's sister had translated English for her parents; therefore when Kyoung-Min's mother needed to communicate

with Kyoung-Min's teacher, she helped her mother. However, Kyoung-Min's sister also felt stress for this work because she was required to speak with English-speaking adults.

Kyoung-Min's parents decided to come to the U.S. for their children's education. Kyoung-Min's mother believed education in the U.S. had many advantages for her three children:

We came here for my children's education as other family does. Yes, we came here for their education. I think the education in America is much better than that in Korea about the creativity and children's autonomy. . . . [I]n Korea, every education is through teaching by rote, and all different students learn the same knowledge. However, in America, such privacy is protected, so I think children are respected by others. I think the education in America is much better. In Korea, every student goes to the same private institute. They live in the same apartment complex and go to the same private institute in the neighborhood. When a parent does something for her child, others just follow her. They tend to do that, but I don't know. In America, people educate their children in the way that is good for them. They seem to educate their children by themselves. (interview with Kyoung-Min's mother, August 7, 2010)

He felt more comfortable at school when I observed and interviewed him. He actively interacted with his classmates and helped them when he could. However, he still did not think Korean was necessary for his life.

#### *Reading Behavior and Use of Strategies*

Kyoung-Min experienced too much stress when he first came to the U.S. His culture shock and lack of English proficiency did not allow him to actively participate in the new academic community. He finally renounced his L1, Korean, and native culture. After abandoning his Korean characteristics, Kyoung-Min began to become acculturated to the mainstream culture, and his struggles diminished. At the very least, Kyoung-Min and his parents believed his transition into his new academic environment was complete; however, his parents did not even know that Kyoung-Min still received special academic treatment from Dover E.S.

Kyoung-Min learned from his parents, older sister, teachers, and peers. At the same time, he also taught his parents and peers. However, he dialogued with himself or texts more often than he interacted with others. Unlike other ELLs, Kyoung-Min considered the reading of computer-based texts more seriously; therefore, he accessed informative texts frequently at home. Kyoung-Min was not proficient at operating a computer, but he believed that he was lucky when he searched for information on the Internet and he searched for computer-based texts faster than other students did. Kyoung-Min mostly read computer-based texts linearly, but he still clicked hypermedia to obtain more information.

*Stacy Shim: A Quiet Computer Savvy Person*

Stacy was an 11-year-old girl, and she was one of the tallest girls in her class. She was very shy at school, so she did not often speak with her classmates and teachers in class. She only communicated with a few classmates. Stacy had Korean ethnic background. She was born in Korea and learned Korean there. Stacy spoke Korean when she communicated with her family members, but her reading and writing in Korean were limited. She spoke English when she worked at school, and her English proficiency level was Intermediate.

Stacy moved to the U.S. in 2008 and had been in the U.S. for two years and five months when her mother allowed her to participate in this study. When I first met Stacy, she was a fourth-grade student at Dover E.S., and she was in the same class with Jae-Hoon. However, she transferred to Hilley E.S. in summer 2010 because it was much closer to her house, so her participation in the study was mostly in the study in her fifth-grade year in fall 2010 at Hilley E.S. As other ELLs did, Stacy also experienced

difficulties with English. She added, “I directly came from Korea, so English was so difficult. . . . Well, when I do a project, uh, I have to use a dictionary very much”

(interview with Stacy, November 18, 2010).

Stacy had become comfortable in educational settings in the U.S. when I interviewed her; however, she did not actively participate in classroom activities. Her fifth grade classroom teacher, Mrs. White, commented on Stacy’s school life as follows:

She, um, is becoming more comfortable participating in English; at the beginning of the year, she was painfully shy. She didn’t raise her hand and share, she’s still . . . a little bit [shy], but she’s getting better. Um, she has tons of friends; she is always on tasks; she picks up concepts easily. . . . [S]he is socially, she fits right in, and the kids love her, and she’s got loved friends. She comes to school happy. (interview with Mrs. White, November 19, 2010)

She did not raise her hand to share her ideas or experiences with her whole class unless her teacher, Mrs. White, called on her to share her ideas. However, she actively participated in small-group activities and commented on the ideas of others in the group.

Stacy had Korean parents and two older sisters. Her father owned a company and worked in both Korea and the U.S. Therefore, he frequently went back and forth between Korea and the U.S. Her mother took care of the children full time and actively participated in school activities, too. Stacy’s parents spoke fluent English, but they used Korean when they communicated with their children at home. Stacy’s sisters were seventh-grade and 10th-grade students. The parents were very much interested in their children’s education; therefore, they decided to leave Korea and support their children’s education in the U.S. They believed their children felt too much stress from schools in Korea:

[I]n Korea, although students study individually very hard, they can’t catch up [with] other students without private education. They can’t improve their grades more even though they learn at school and study very hard by themselves; they can just run on the spot without the private education. . . . One day, my second



child came back from school and said that she could not catch up with English classes. The textbooks looked very very easy, so I asked “why can’t you catch up with the class?” She answered that reading the textbooks was easy but [that] she did not even understand the teacher at free-talking times. The teacher was certainly a native English speaker. However, she said that other students talked freely without many problems in class. . . . Yes, so I met other parents, and the students already had been in other countries to study languages. So it was a very hard time for my children, and they suffered from stress too much. (interview with Stacy’s mother, August 6, 2010)

At first, Stacy’s family moved to Singapore because her father needed to do his business in Korea and it was close to Korea. The parents also chose Singapore because the people in the country spoke both English and Chinese. Stacy’s mother said, “These days, the second language is not enough, so we went to Singapore to teach my children Chinese” (interview with Stacy’s mother, August 6, 2010). However, the educational situations did not satisfy Stacy’s parents, so they decided to move to the U.S. After they moved to the U.S., she became satisfied with her children’s change and believed that it was a great choice to move to the U.S.

[My child] becomes confident. In Korea, she was not acknowledged even though she worked hard; however, here, teachers praised her, so her personality changed. She thinks, “I can do anything well.” When we were in Korea, she said, “I can’t.” She said, “Mom, this doesn’t work. This is difficult. That is difficult, too.” However, she now changes and boasts like “I will be able to do everything well if I do my best.” I love her change. (interview with Stacy’s mother, August 6, 2010)

Stacy enjoyed the school life in the U.S. Although she might need to be more confident when she spoke in front of her class, she did not experience too many difficulties at the time of my interview.

### *Reading Behavior and Use of Strategies*

Different from Kyoung-Min, Stacy experienced less stress after she came to the U.S. Stacy and her mother were satisfied with the school system in the U.S. Stacy was a self-regulated learner; therefore, she learned more by dialoguing with herself. However,

she interacted with her teachers or peers at school less frequently, which made Mrs. White concerned about Stacy's linguistic development. However, Stacy frequently communicated with her family members at home and with her peers when she worked within a small group at school. Stacy was very good at using computers and reading computer-based texts. She was very fluent in CMC literacy, computer literacy, multimedia literacy, and information literacy. Stacy searched for and accessed diverse computer-based texts and actively solved problems while she read the texts. Like Jae-Hoon, Stacy adopted most of the reading strategies mentioned in this study and understood the URL construction. She loved to read books and oftentimes read computer-based texts linearly, from top to bottom.

*Brian Te: Computer Game Lover*

Brian was a 10-year-old boy with very active and friendly attitudes toward his family, teachers, and peers. He loved to speak with others at home and school, but this frequently distracted his teachers and peers at school. Brian had both Chinese and Filipino ethnic backgrounds as he had a Chinese father and a Filipino mother, but he believed he was Filipino. He had been in the U.S. for three years, having come in 2007.

When I first met Brian, he was in a summer ESL program at Dover E.S., but he was enrolled at Haynes E.S. He mostly participated in the study in his fourth-grade year in the fall of 2010. Even though Filipino people use English for their public education, Brian did not speak English when he came to the U.S. because it was before his official school year. Therefore, he began to learn English in 2007, and his English proficiency level was Intermediate when he participated in this study. He remembered the day when he first came to a school in the U.S. and said, "when I came here like, I don't really know

how to speak English. . . I said something, but they couldn't understand it" (interview with Brian, November 5, 2010). However, Brian was an optimistic person, so he overcame the difficulties. He attributed it to the official education:

I had to go to, I really, when I first came here, I really go to school. It take one month ago. Like I had to, my mom sent me to a language art? And uh, and I got better and better. And then, I became English person now. (interview with Brian, November 5, 2010)

Most of his classes at school were in the mainstream classroom, and he actively participated in classroom activities. However, he was easily distracted and did not concentrate on classroom tasks very often. Mrs. Bryant, Brian's fourth-grade teacher, commented on Brian as follows:

He is a really sweet boy; he tries so hard, um, I, I get a little pressure, sometimes, just because you ask him a question, and I know he knows the answer, but he doesn't, he gets, maybe he gets nervous or stressed, so he won't think about it. Two plus what is two, and, and he knows the answer is 0. He just, like, throws it out, and he doesn't think about it or tries it. (interview with Mr. Hill, November 4, 2010)

Brian was the only son of his family and had a Chinese father, a Filipino mother, and a father-side grandmother. His father had been in the U.S. for 23 years and drove a large truck for a wholesale warehouse store. His mother owned a small business for the U.S. government. Both parents spoke English fluently. Brian's grandmother only spoke Chinese and taught him Chinese from time to time. Brian's mother spoke Filipino and his father spoke English when they communicated with Brian at home.

Brian's parents had left Brian in the Philippines, so he had lived with his grandparents there before he came to the U.S. Unlike the three Korean ELLs, Brian came to the U.S. for the family reunion. Brian's mother did not bring Brian to the U.S. for his education, but she thought that the financial aid would be beneficial in the U.S. education system.

[I]n the Philippine, we don't have good education compared to the education here. But it just needs to have, you know, we need more, I mean more money [in the Philippines] to support if you wanna to get the very good education. . . . if you have a dream of, ok, if I want to be a nurse, like that. But you don't have money, you can't do it. You don't have like a here, you have a financial aid and education loan. (interview with Brian's mother, July 23, 2010)

As his mother described, Brian was "a happy boy," so he had very good relationships with his classmates. He was also satisfied with the school environments of the U.S.

### *Reading Behavior and Use of Strategies*

Brian was a very optimistic boy. Brian loved to communicate with other people, and he thought that he learned English by communicating with others. However, he was distracting in class; he kept asking irrelevant questions without raising his hand. In addition, he still had a hard time understanding his teacher's instructions and directions. Brian usually relied on others when he solved any problem and needed others' scaffolding at home and school. In other words, Brian needed to have capable individuals to assist in his development within his ZPD.

Brian was not a proficient student with regard to electronic literacies but loved to search for computer-based texts, usually game-related resources for entertainment purposes. Even though he needed to search for information about his school projects at home, he did not read computer-based texts for information. Instead, he looked for the information from paper-based books or asked his parents questions about the project. Brian was not a strategic reader but mostly completed multiple tasks at the same time; he listened to music while he read computer-based texts. Furthermore, he played computer games at the same time, so Brian and his parents were concerned that he played computer games too often.

## CHAPTER 5: FINDINGS

### Introduction

In this study, I investigated the fourth- and fifth-grade ELLs' use of strategies and their experiences of reading computer-based texts in home and school contexts. My goals for this study were to identify ELLs' use of strategies in their literacy activities and to gain a holistic understanding of their reading experiences in technology-incorporated sociocultural contexts and in contexts of multiliteracies.

In this chapter, I describe findings for seven research questions as follows:

1. What strategies do four elementary ELLs use when they read computer-based texts in their home context?
2. In what ways do these elementary ELLs describe their use of these strategies in their home context?
3. What influences these ELLs to use the strategies when they read computer-based texts in their home context?
4. What strategies do these elementary ELLs use when they read computer-based texts in their school context?
5. In what ways do these elementary ELLs describe their use of these strategies in their school context?
6. What influences these ELLs to use the strategies when they read computer-based texts in their school context?

7. In what ways do ELLs' use of strategies differ when they read computer-based texts in their home and school contexts, and what influences these potential differences?

I combine Research Questions 1 and 2 and Research Questions 4 and 5 for efficient descriptions. I describe each case for each individual strategy or sub-strategy throughout this chapter.

### Findings

1. *What Strategies Do Four Elementary ELLs Use When They Read Computer-Based Texts in Their Home Context?*
2. *In What Ways Do These Elementary ELLs Describe Their Use of These Strategies in Their Home Context?*

One of my main foci of this study was ELLs' use of strategies when they read diverse computer-based texts at home. Before and during the analysis of the verbal reports, interviews, and observations, I examined diverse categorizations from previous research on reading and learning strategies. These readings helped me see the overall view while I analyzed data, but I was cautious about the influence of that knowledge on me.

Fifteen main categories emerged to describe the ELLs' use of strategies when they read computer-based texts at home. I also present subcategories of each category when applicable and offered participants' emic voices from their verbal reports, interviews, and observations. I did not correct participants' grammatical errors unless they would cause a misunderstanding of the data. I entitled each data source by using the participant's name, the data type, and the research context. For example, "Stacy Think-

Aloud 1H” meant that the data set was from Stacy’s first think-aloud data in her home context. I also included participants’ affective reactions, such as “laughing,” and behavioral reactions, such as “clicking on hyperlinks” and “playing a computer game: *Call of Duty*,” between parentheses. Participants’ reading texts aloud was underlined, and the title of each text was italicized.

The 15 reading strategies were (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) inferring the text, (11) scrolling up and down and getting back and forth, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source. The list of the strategies is in Table 3, and the descriptions of these strategies or sub-strategies follow. At the beginning of each section, I explain what each strategy or sub-strategy means and include participants’ emic voices, which show what they really said and thought about the strategies and how they used them. In addition, I embed each case description, as individual ELLs’ use of strategies, in each section.

#### *Accessing a Web Page*

This category describes the initial stage of the ELLs’ computer-based text reading: how they found and accessed web pages in meaningful ways. Before all the ELLs began to read computer-based texts, they found a whole website or a single web page to read. The ELLs accessed what they had already visited from time to time, or they found a new page to read. This strategy included sub-strategies to navigate through the computer-based text before their reading.

Table 3

*Reading Strategy Categorization at Home*

Number	Category	Sub-Category
1	Accessing a Web Page	<ul style="list-style-type: none"> <li>• Clicking a Hyperlink of an Open Website</li> <li>• Typing a Web Address into the Address Bar</li> <li>• Typing Keywords into a Search Engine</li> <li>• Clicking a Bookmark</li> <li>• Modifying a Web Address</li> </ul>
2	Accessing Hypermedia	<ul style="list-style-type: none"> <li>• Accessing a Textual Resource</li> <li>• Accessing a Video</li> <li>• Accessing a Computer Game</li> <li>• Accessing an Image</li> <li>• Accessing an Audio</li> </ul>
3	Evaluating the Computer-Based Text and Deciding What to Read	<ul style="list-style-type: none"> <li>• Considering if the Text is Informative</li> <li>• Considering if the Text is Appropriate</li> <li>• Considering if the Text is Interesting</li> <li>• Considering if the Text is Familiar</li> <li>• Considering if the Text is Long</li> <li>• Considering if the Text is Relevant</li> </ul>
4	Setting up the Purpose	
5	Previewing	<ul style="list-style-type: none"> <li>• Previewing Titles</li> <li>• Previewing and Clicking Menu Buttons</li> <li>• Previewing Texts</li> </ul>
6	Making a Connection	<ul style="list-style-type: none"> <li>• Connecting Text to Self</li> <li>• Connecting Text to Text</li> <li>• Connecting Text to World</li> </ul>
7	Dialoguing	<ul style="list-style-type: none"> <li>• Dialoguing with Others</li> <li>• Dialoguing with Self</li> <li>• Dialoguing with Texts and Authors</li> </ul>
8	Adjusting the Reading Pattern	<ul style="list-style-type: none"> <li>• Reading Aloud or Silently</li> <li>• Reading Quickly or Slowly</li> <li>• Rereading</li> </ul>
9	Monitoring the Comprehension	
10	Inferring the Text	<ul style="list-style-type: none"> <li>• Predicting the Story or the Content</li> <li>• Guessing the Meaning</li> </ul>
11	Scrolling Up and Down and Getting Back and Forth	
12	Using References	<ul style="list-style-type: none"> <li>• Referring to a Computer-Based Resource</li> <li>• Referring to a Paper-Based Resource</li> </ul>
13	Using Computer Skills and Devices	<ul style="list-style-type: none"> <li>• Downloading</li> <li>• Using a Computer Mouse</li> <li>• Printing a Hardcopy</li> </ul>
14	Confirming a Prediction	
15	Sharing an Information Source	



As Kuiper, Volmam, and Terwel (2005) argue, information searches on the Internet could be approached in a variety of ways. I could identify five sub-strategies to find and access a website or a web page. The sub-strategies were (1) clicking a hyperlink of an open website, (2) typing a web address into the address bar, (3) typing keywords into a search engine, (4) clicking a bookmark, and (5) modifying a web address.

*Clicking a Hyperlink of an Open Website*

Clicking a hyperlink was the most-frequently used strategy to find and access a website or a web page at home, and students used this strategy more often than typing keywords as Hirsh (1997) found. As hyperlinks, including hypertext and hypermedia, create links to other online and electronic resources (Kommers, Grabinger, & Dunlap, 1996), they allow the participants to easily access other computer-based texts and move to other locations.

Stacy visited a computer game website at <http://funschool.kaboose.com> and previewed hyperlinks and menus on the web page. She did not click each hyperlink or menu in a linear way but clicked what looked or sounded interesting based on her previewing processes. She previewed the game list and played *Homerun Derby* (a baseball game), *Mad Moves* (a dancing game), *Wild Word West* (a word game), *Fun City* (a spelling game), *Balloon Tycoon* (a geography and history game), and *Tiki Treasure Island* (an adventure game) in order.

Brian also clicked hyperlinks to find and access web pages. He typed keywords based on his interest and watched diverse videos on YouTube. When Brian searched for videos about *Spongebob SquarePants*, a character of a TV animation program, and accessed *Spongebob song - Ripped pants song (Korean)* and *SpongeBob Square Pants in*

*China*, he selected and clicked hyperlinks from the list of search results of “SpongeBob song.” However, he entered new keywords to see other hyperlinks when he looked for *I’ve Got a Feeling Black Eyed Peas, Black Eyed Peas - I gotta feeling (w/lyrics)* and *Michael Jackson and Slash Beat It (Live)*. Jae-Hoon and Kyoung-Min also clicked hyperlinks when they navigated the Internet; I asked about the reason when Kyoung-Min clicked a hyperlink about the Moon, and he answered, “Because you can actually like learn really good things, so you can find information in it” (Kyoung-Min Think-Aloud 1H).

Hypertext and hypermedia offered links to new or relevant resources either in the same website, as “internal links,” or in a new website, as “external links” (Kuiper, Volmam, & Terwel, 2005, p. 289). All the ELLs in this study actively clicked the diverse links in the computer-based text reading contexts.

#### *Typing a Web Address into the Address Bar*

The first strategy to access a web page at home was to directly type the web address, or URL, into the address bar. According to Dillon and Leonard (1998), URL stands for Uniform Resource Locator, and it is the standard way to specify the absolute address of a resource on the Internet. They explain the organization of the URL as follows:

The access *scheme* or *protocol* for a URL is the first part before the colon. The format of the rest of the URL depends on the *protocol*. For “http” it includes the *host number* or a *domain name*, path, the resource or file and, optionally, attributes or a command. For example, if we look at the following URL address: “http://wagner.princeton.edu/foldoc/cgiscrypt?NCSA”—“http” is the protocol,

"wagner.princeton.edu" is the domain name, "foldoc" is the path, "cgiscript" is the program file, and "?NCSA" is a query string. The "?" indicates a fragment identifier or a specific location in the document. (p. 291)

When all the ELLs typed the website addresses, they referred to both paper-based texts and computer-based texts. For example, they used books and handouts as paper-based texts and teachers' websites as computer-based texts. The ELLs also recalled some addresses from their memories. Kyoung-Min wanted to find a website about galaxy, which was one of his favorite topics, but he did not like the results of the online search. Instead, Kyoung-Min looked for his books on his bookshelf and referred to two books: *Meteors and Meteorites: Origins and Observations* and *Night Wonders*. In those books, the authors recommended several websites containing relevant topics, and Kyoung-Min usually found new websites in this way. When he picked up another book to find website addresses, he said:

Kyoung-Min: (bringing another book: *Captain Underpants*) This is the *Captain Underpants* book. And they have websites here, too. I'm going to type the websites here. (typing "www.pikl; retyping www.pilkey.com) I don't know. I'll go to each one. (Kyoung-Min Think-Aloud 4H)

Brian recalled URLs from his memory and accessed several websites that he usually visited. He just typed URLs into the address bar and checked if the addresses were right. This was a scene I frequently observed when I visited the ELLs' home contexts. Jae-Hoon, Stacy, and Kyoung-Min frequently recalled URLs from their memories, too.

In addition to the paper-based texts and memories, the ELLs accessed websites in order to find another URL at home. For example, Jae-Hoon and Stacy accessed Mrs. Chang's (Jae-Hoon's and Stacy's fourth-grade teacher) website from time to time. They

mostly accessed her site to check the homework, but Mrs. Chang also provided a list of useful URLs for her students on her website as in Figure 1; I did not include the URL of her website due to the credential issue. Students accessed a variety of websites either by copying and typing the URLs or directly clicking the hyperlinks on their teachers' websites. Instead of using a website, Mrs. Davis offered handouts to share URLs with her students, and Kyoung-Min used the handout for his project at home.

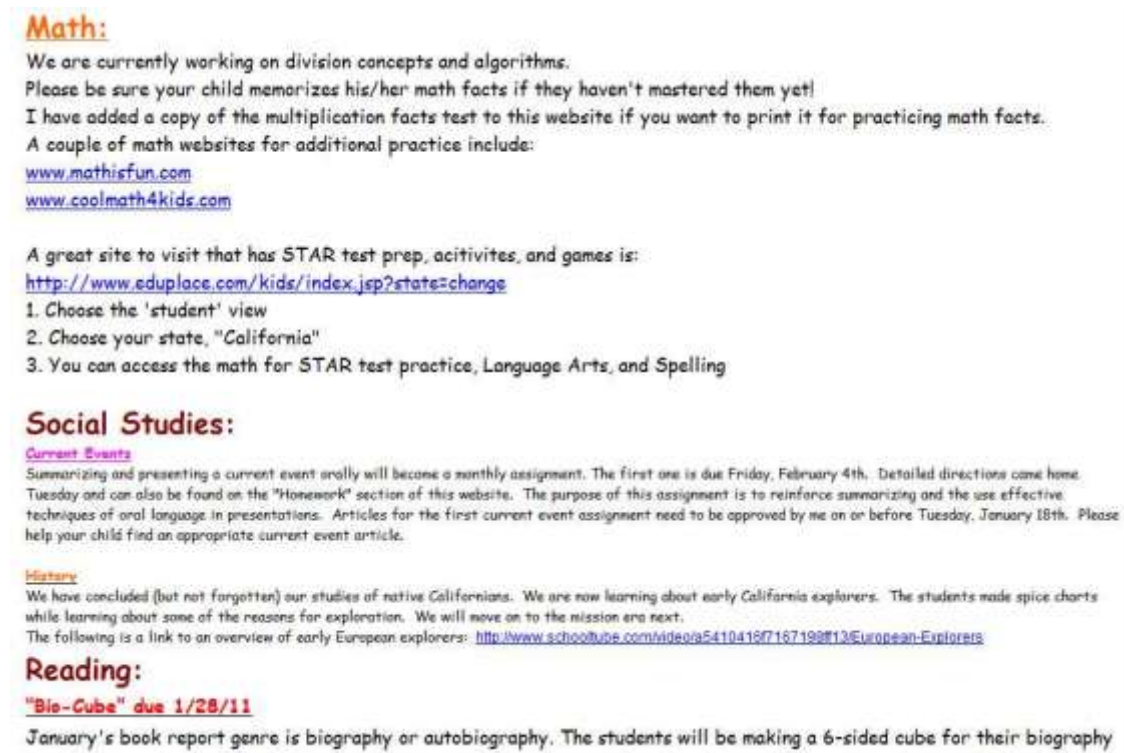


Figure 1. A screenshot of Mrs. Bryant's personal website

In this study, all the ELLs typed URLs directly into the address bar to access websites. "To use URLs effectively, one needs to have a specific address" (Kuiper, Volmam, & Terwel, 2005, p. 289), and the ELLs usually visited their favorite websites at home. They often used this strategy at home. To make the process of entering URLs into the address bar efficient, they either recalled the URLs from their memories or referred to computer-based and paper-based resources. Among other subcategories, "typing a web

address into the address bar” was the second most frequently used strategy to access a web page at home. The frequency of strategies of accessing a web page is shown in Table 4.

Table 4

*Frequency of Strategies of Accessing a Web Page at Home*

	Sub-Category	Frequency (%)
1	Clicking Hyperlink of an Open Website	41.1
2	Typing a Web Address into the Address Bar	30.1
3	Typing Keywords into a Search Engine	25.4
4	Clicking a Bookmark	2.0
5	Modifying a Web Address	1.4
	Total	100

To calculate the frequency of the ELLs’ use of the strategies to access a web page and hypermedia, I referred to observation recordings, field notes, and verbal reports. I counted how many times they used the strategies in total while they read computer-based texts in each context and calculated the portion of each strategy out of the total number of occurrences of the strategy.

*Typing Keywords into a Search Engine*

Another way to search for a website and computer-based texts was to use an online search engine. According to Dillon and Leonard (1998), a search engine refers to:

[A] program designed to search large amounts of text documents for specified *keywords* and return the *addresses* of documents that meet the selection criteria. . . . Search engines like AltaVista, Yahoo, and others maintain large databases of cataloged entries based on keywords, titles, or the full text of the document for millions of Web sites. (p. 251)

Stacy searched for computer-based texts for her school project, “the California Gold Rush.” She accessed search engines and typed her keywords into the search bar. When the website showed the search results, Stacy clicked the topmost website at [http://en.wikipedia.org/wiki/California\\_Gold\\_Rush](http://en.wikipedia.org/wiki/California_Gold_Rush). After she read the website, she revised and typed new keywords. She looked for the web resources for her academic and efferent reading in this case based on Rosenblatt’s (1978, 1982) two types of reading. In another case, Stacy also searched for computer-based texts; however, she found the texts for her entertainment reading purposes at this time. Mostly, when she searched for resources on a computer for fun, the texts were news articles about Korean singers and celebrities. For example, Stacy typed “Lee Seung Gi” into the search bar and read an article about a Korean singer: *Lee Seung Gi unleashes new track, “Losing My mind”* at <http://www.allkpop.com/2010/08/lee-seung-gi-unleashes-new-track-losing-my-mind>. After reading the article, Stacy searched for an article on another Korean singer: *A Greeting for Shinee to allkpop raders!* at <http://www.allkpop.com/2010/07/a-greeting-from-shinee-to-allkpop-readers>. She read both articles from top to bottom linearly but did not click the video links in the two articles.

Jae-Hoon, Kyoung-Min, and Brian also found computer-based texts through search engines, and everyone except Brian read computer-based texts both for information and for fun. Brian only used search engines to find computer game-related information. In a think-aloud session, Kyoung-Min mentioned:

I really search the websites related to particular information because I want to learn more if it is really interesting. . . . For example, I was like look at this place, like a black hole book, if I like to look at it, if it is like a really fun story, I would like to study more about black holes, so I love to do that. (Kyoung-Min Think-Aloud 2H)

Since Kyoung-Min was interested in science, he often looked for information about science topics at home. However, he also searched for computer-based texts about the Pokémon game at home.

While all the ELLs in this study searched for computer-based texts through search engines, they entered a keyword into a search engine, previewed the search results, and revised and retyped the keyword. When the ELLs entered keywords into a search engine, the searching tool automatically recommended alternative keywords and listed relevant web resources. All the ELLs in this study referred to the recommendations of the search engine from time to time before they finished typing complete keywords. For example, when Kyoung-Min searched for information to learn how to catch a Nintendo game character, he began to type “Pokémon platinum how to” into the Google search engine. Immediately, the search engine listed ten recommended keywords as in Figure 2, and Kyoung-Min clicked *Pokémon platinum how to get heatran* for his search. In this process, Kyoung-Min had to choose which websites would be more meaningful for his reading purpose. Brian also mentioned, “If you write ‘F,’ it shows *FusionFall*” (Brian Think-Aloud 2H). However, when Brian searched for “How to download *World of Warcraft*” on YouTube, the site also listed several inappropriate keywords, such as “how to kiss,” “how to make money on the web,” and “how to be gangster.” The automatic recommendations option had both positive and negative influences on the ELLs.

When the search engine listed the relevant web resources, the ELLs actively previewed the list and decided to access particular texts. After the previewing process, they revised their keywords to find more appropriate web resources or narrow down their search as Stacy did in her case. Since these “information seeking” processes were

iterative and recursive, information seekers refined the keywords and questions in order to repeat the process (Wallace, Kupperman, Krajcik, & Soloway, 2000, p. 78).

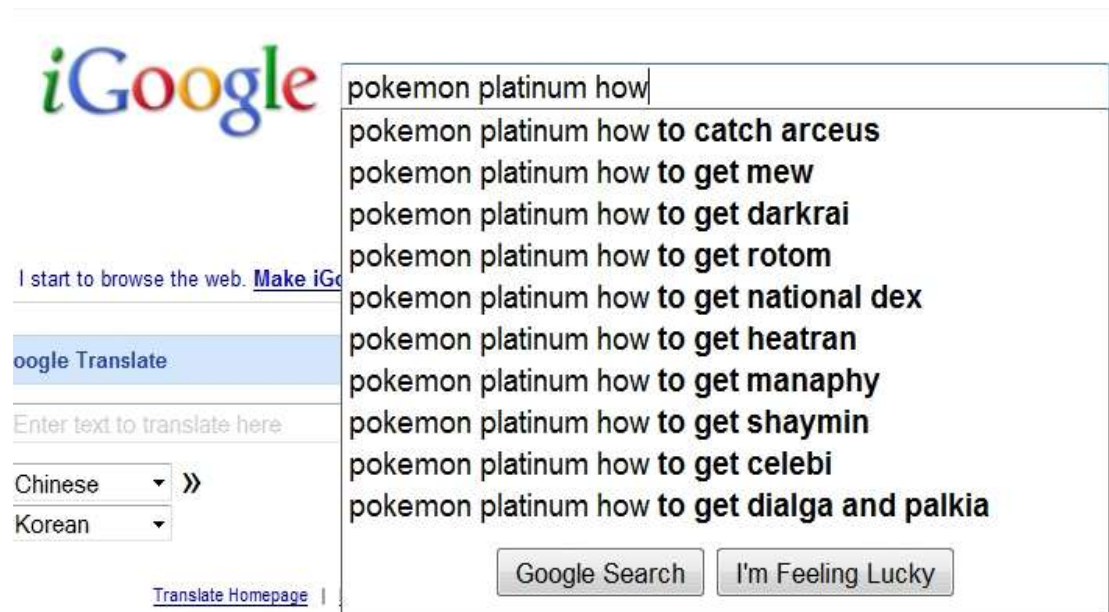


Figure 2. A screenshot of Google search recommendations

#### *Clicking a Bookmark*

Compared with other strategies to find and access a web page, the ELLs did not often use this strategy. Brian mostly used his mother's laptop to play computer games, and there were many shortcuts and bookmarks, such as *HP Games*, *Penguins Arena*, *War Craft*, and *League of Legends* for him. He clicked the *League of Legends* bookmark and played the game. Other ELLs shared the electronic resources by bookmarking them, too. For example, Jae-Hoon shared *iTunes* with his older brother to download music, and Kyoung-Min and Stacy shared game websites with their siblings. However, in general, the bookmarking was a limited option for the ELLs because they did not know how to bookmark URLs. They preferred directly typing URLs, using search engines, and clicking hyperlinks to clicking bookmarks.



### *Modifying a Web Address*

The least frequently used strategy to find and access a website was to modify a web address. As Kuiper, Volmam, and Terwel (2005) argue, website users need to know the construction of URLs so that they can use the URLs effectively, but only Jae-Hoon and Stacy knew this. Jae-Hoon accessed an electronic storybook link with his iPod Touch. An iPod Touch is Apple Inc.'s electronic portable device to perform complex tasks (Apple Inc., 2011; Banister, 2010). iPod Touch users control the device by touching the screen, and the screen can become a compact keyboard, too. It can display clear presentation of textual resources, images, and audio and video content, and users can adjust the size of the texts. It is also designed to connect to wireless computer networks and the Internet (Apple Inc., 2011; Skylar, 2008). Due to the multiple functions and capacities, I considered iPod Touch as a pocket computer and included the device for the ELLs' computer-based text readings in this study.

Jae-Hoon had technical difficulty with opening an electronic storybook. To solve this problem, he modified a part of the URL by deleting the file name. In this way, he wanted to move to the higher directory and make the web resource work. He added, "If I access the link [again], it shows the same web page, *California*. So if I delete the part of the URL, [the storybook] works normally" (Jae-Hoon Think-Aloud 3H). Stacy also used this strategy and clarified why she deleted a part of the current URL:

Stacy: I have never played that [computer game] before. I usually click the "Math" or the "Game." (clicking the *School Rules! Mad Libs Junior* link under the "Reading" menu) For this one. This guy likes to go to school. (scanning the web page; reading aloud several words) delicious, adjective, wiggle, verb. This is what I did last time. (deleting the last part of the URL)

Researcher: Why did you delete the last part?

Stacy: To go to the home page. (Stacy Think-Aloud 4H)

Stacy did not learn the technique from any educational institute, but she knew that deleting the last part of the URL allowed her to move to the previous location or the main webpage. She learned the construction of the URL from her experiences of accessing websites. Therefore, she left the protocol and domain name but deleted the path and document name to access the main web page. Since Kyoung-Min and Brian did not know the construction, they did not use this strategy.

### *Accessing Hypermedia*

When all the ELLs read computer-based texts at home in this study, they clicked hypertext and hypermedia to access textual resources, images, audios, videos, and computer games, as the five formats of computer-based texts in this study. To avoid confusion, I use “textual resources” or “textual information” to refer to traditional texts. However, accessing hypertext and hypermedia was more than just clicking a link on the page. It was an active and critical task when the ELLs read computer-based texts, and they clicked hyperlinks most frequently when they read computer-based texts at home. Moreover, since students preferred browsing websites to using key words (Schacter, Chung, & Dorr, 1998), “accessing hypermedia” was a significant strategy. I assigned it as an independent strategy.

### *Accessing a Textual Resource*

All the ELLs read textual information at home, and this was also true when they read computer-based texts; they clicked hypermedia to access textual information at home. Brian looked for information about a famous basketball player, LeBron James, on the Internet and found a textual resource. Brian read the player’s profile and laughed while he read the computer-based text. The ELLs in this study referred to textual

resources more often than other resources at home. Table 5 is the frequency of strategies of accessing hypermedia and shows that, among other computer-based multimedia resources, textual information was 41.4%. This means textual resources were the most frequently used material for their computer-based text readings at home.

Table 5

*Frequency of Strategies of Accessing Hypermedia at Home*

	Sub-Category	Frequency (%)
1	Accessing a Textual Resource	41.4
2	Accessing a Video	27.6
3	Accessing a Computer Game	18.1
4	Accessing an Image	8.7
5	Accessing an Audio	4.2
	Total	100

In most cases, the ELLs in this study accessed textual resources for entertainment purposes at home. For example, Jae-Hoon visited websites about sports, such as the *FIFA* website and the *NBA* website; Kyoung-Min accessed *Dav Pilkey's Extra-Crunchy Website O'Fun* website. In addition, Stacy visited *All Kpop*, and Brian opened the *NBA* website and the *Cartoon Network* website as textual information. However, the ELLs also read other textual resources for academic or efferent purposes at home. For example, Jae-Hoon clicked the *Study Island* and *PBS* websites; Kyoung-Min accessed the *Hubble* website and the *Beestar* website. Moreover, Stacy used *Study Island* and *TumbleBook Library* websites; however, Brian did not access any website for academic purposes at home. Table 6 lists the websites that the ELLs accessed at home and describes what they did on the computer.

Table 6

Website List that ELLs Accessed in the Study at Home

	ELL's Name	Name of Website (URL)/Topic	What the ELL Does
1	Jae-Hoon	<ul style="list-style-type: none"> <li>● Brothers in Arms (<a href="http://brothersinarmsgame.us.ubi.com/">http://brothersinarmsgame.us.ubi.com/</a>)/Computer game</li> <li>● Elementary Reading website (<a href="http://www.alline.org/euro/ereading.html">http://www.alline.org/euro/ereading.html</a>)/Education (English reading)</li> <li>● ESL writing (<a href="http://www.eslwriting.org/">http://www.eslwriting.org/</a>)/Education (English writing)</li> <li>● Facebook (<a href="http://www.facebook.com/">http://www.facebook.com/</a>)/Social networking; Information</li> <li>● FIFA website (<a href="http://www.fifa.com/">http://www.fifa.com/</a>)/Sports</li> <li>● G-mail (<a href="https://mail.google.com/">https://mail.google.com/</a>)/Email</li> <li>● Google Site (<a href="http://www.google.com/">http://www.google.com/</a>)/English portal site</li> <li>● iTunes (<a href="http://itunes.apple.com/">http://itunes.apple.com/</a>)/Download (multimedia)</li> <li>● NBA website (<a href="http://www.nba.com/">http://www.nba.com/</a>)/Sports</li> <li>● Online dictionary (<a href="http://dictionary.reference.com/">http://dictionary.reference.com/</a>)/Online dictionary</li> <li>● PBS website (<a href="http://www.pbs.org/">http://www.pbs.org/</a>)/Education; game</li> <li>● Scholastic website (<a href="http://www2.scholastic.com/">http://www2.scholastic.com/</a>)/Education</li> <li>● Sports Illustrated for Kids (<a href="http://www.sikids.com/">http://www.sikids.com/</a>)/Sports</li> <li>● Starfall website (<a href="http://www.starfall.com/">http://www.starfall.com/</a>)/Education</li> <li>● Study Island (<a href="http://www.studyisland.com/">http://www.studyisland.com/</a>)/Education</li> <li>● Teacher's website (<a href="http://web.me.com/">http://web.me.com/</a>)/Education</li> <li>● TumbleBook Library (<a href="http://www.tumblebooks.com/">http://www.tumblebooks.com/</a>)/Education (reading)</li> <li>● YouTube (<a href="http://www.youtube.com/">http://www.youtube.com/</a>)/Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>● Accesses electronic storybooks: <i>Ma, I'm a farmer</i> and <i>Our California</i></li> <li>● Accesses websites: see the left column</li> <li>● Checks and completes the homework at the teacher's website</li> <li>● Checks and sends email</li> <li>● Checks messages at Facebook</li> <li>● Downloads and listens to music</li> <li>● Downloads computer games</li> <li>● Plays computer games: <i>Call of Duty, Doodle Jump, Brothers in Arms, Cartoon Wars</i>, etc.</li> <li>● Reads textual information: NBA games, NBA players, Gold Rush, apostrophe, etc.</li> <li>● Refers to an online dictionary</li> <li>● Watches videos (YouTube): Korean TV programs, missing sports, interesting sports videos, iPod restoration, etc.</li> </ul>

Table 6 (continued).

	ELL's Name	Name of Website (URL)/Topic	What the ELL Does
2	Kyoung-Min	<ul style="list-style-type: none"> <li>● Beestar (<a href="http://www.beestar.org">http://www.beestar.org</a>) /Education</li> <li>● Dav Pilkey's Extra-Crunchy Website O'Fun (<a href="http://www.pilkey.com">http://www.pilkey.com</a>) /Book; game</li> <li>● Drama Style (<a href="http://dramastyle.com">http://dramastyle.com</a>) /Korean TV program</li> <li>● Google Site (<a href="http://www.google.com">http://www.google.com</a>) / Portal site</li> <li>● Hubblesite (<a href="http://hubblesite.org">http://hubblesite.org</a>) /Education</li> <li>● PBS Kids (<a href="http://pbskids.org">http://pbskids.org</a>) /Education; game</li> <li>● YouTube (<a href="http://www.youtube.com">http://www.youtube.com</a>) /Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>● Accesses websites: see the left column</li> <li>● Plays computer games: <i>George and Harold's Sidewalk Surfer 2000</i> and <i>Sulu the Bionic Hamster</i></li> <li>● Plays Nintendo DSI game: <i>Pokémon</i></li> <li>● Takes quiz online: Beestar and Hubblesite</li> <li>● Watches videos (YouTube; Google): Korean TV programs, interesting game videos, astronomy videos, funny videos, etc.</li> </ul>
3	Stacy	<ul style="list-style-type: none"> <li>● 4 Shared (<a href="http://www.4shared.com">http://www.4shared.com</a>) / Download (music)</li> <li>● All Kpop (<a href="http://www.allkpop.com">www.allkpop.com</a>) /Entertainment</li> <li>● Book Adventure (<a href="http://www.bookadventure.com">http://www.bookadventure.com</a>) /Education</li> <li>● Daum Kids Jjang (<a href="http://kids.daum.net">http://kids.daum.net</a>) /Korean Portal site</li> <li>● Facebook (<a href="http://www.facebook.com">http://www.facebook.com</a>) /Social networking; Information</li> <li>● Fun Brain (<a href="http://www.funbrain.com">http://www.funbrain.com</a>) /Game</li> <li>● Funschool Game (<a href="http://funschool.kaboose.com">http://funschool.kaboose.com</a>) /Game</li> <li>● Google Site (<a href="http://www.google.com">http://www.google.com</a>) / Portal site</li> <li>● Joon Media (<a href="http://joonmedia.net">http://joonmedia.net</a>) / Korean TV program</li> <li>● Junior Naver (<a href="http://jr.naver.com">http://jr.naver.com</a>) /Korean portal site</li> <li>● Kids Newsroom (<a href="http://www.kidsnewsroom.org">www.kidsnewsroom.org</a>) /Education</li> <li>● Kids Reads (<a href="http://kidsreads.com">http://kidsreads.com</a>) /Education (English reading)</li> <li>● Naver (<a href="http://www.naver.com">www.naver.com</a>) /Korean portal site</li> <li>● Online dictionary (<a href="http://dictionary.reference.com">http://dictionary.reference.com</a>) /Online dictionary</li> <li>● Open Court Resources (<a href="http://www.opencourtresources.com">http://www.opencourtresources.com</a>) /Education</li> </ul>	<ul style="list-style-type: none"> <li>● Accesses electronic storybooks: <i>Hannah is My Name</i>, <i>Little Red in Cyber Space</i>, and <i>The Best Excuse</i></li> <li>● Accesses websites: see the left column</li> <li>● Chats with friends: Facebook</li> <li>● Checks and completes the homework at the teacher's website</li> <li>● Checks and sends email</li> <li>● Downloads and listens to music: Korean songs</li> <li>● Plays computer games: a quiz game, Addition Attack, Bu-Ra-Bo game, Balloon Tycoon, Circus Simon, Deo-Wi-Sa-Nyang game, Facebook-Idol quiz, Fishin' Fun, Fun City, Funschool Game, Homerun Derby, Jeong-Gul-Mong-Ki-Dol-Deon-Ji-Ki game, Kwa-Ja-Ui-Jip game, Kwa-Ja-Na-Ra-Ji-Ki game, Let's Get Cookin', Mad Moves, Tiki Treasure, and Wild Word West</li> <li>● Reads articles: <i>Lee Seung Gi unleashes new track, "Losing My mind"</i>, <i>2PM likely to succeed in Japan?</i>, and <i>A Greeting for Shinee to allkpop readers!</i></li> </ul>

Table 6 (continued).

	ELL's Name	Name of Website (URL)/Topic	What the ELL Does
3	Stacy	<ul style="list-style-type: none"> <li>● Reading Games for Younger Kids (<a href="http://resources.kaboose.com/games/read1.html">http://resources.kaboose.com/games/read1.html</a>)/Education; game</li> <li>● Study Island (<a href="http://www.studyisland.com">http://www.studyisland.com</a>)/Education</li> <li>● Teacher's website (<a href="http://web.me.com">http://web.me.com</a>)/Education</li> <li>● TumbleBook Library (<a href="http://www.tumblebooks.com">http://www.tumblebooks.com</a>)/Education (reading)</li> <li>● YouTube (<a href="http://www.youtube.com">http://www.youtube.com</a>)/Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>● Refers to an online dictionary</li> <li>● Watches videos (YouTube): Korean TV programs, music videos</li> </ul>
4	Brian	<ul style="list-style-type: none"> <li>● Cartoon Network (<a href="http://www.cartoonnetwork.com">http://www.cartoonnetwork.com</a>)/Entertainment</li> <li>● FusionFall (<a href="http://fusionfall.cartoonnetwork.com">http://fusionfall.cartoonnetwork.com</a>)/Game</li> <li>● Online dictionary (<a href="http://dictionary.reference.com">http://dictionary.reference.com</a>)/Online dictionary</li> <li>● Facebook (<a href="http://www.facebook.com">http://www.facebook.com</a>)/Social networking; Information</li> <li>● Games.com (<a href="http://www.games.com">http://www.games.com</a>)/Game</li> <li>● Google Site (<a href="http://www.google.com">http://www.google.com</a>)/Portal site</li> <li>● Scoobydoo (<a href="http://scoobydoo.kidswb.com">http://scoobydoo.kidswb.com</a>)/games)/Game</li> <li>● Gameninja (<a href="http://www.gameninja.com">http://www.gameninja.com</a>)/Game</li> <li>● Astronomy (<a href="http://jupiterplanet.com">http://jupiterplanet.com</a>)/Education (science)</li> <li>● League of Legends (<a href="http://www.leagueoflegends.com">http://www.leagueoflegends.com</a>)/Game</li> <li>● NBA website (<a href="http://www.nba.com">http://www.nba.com</a>)/Sports</li> <li>● Reading Games for Younger Kids (<a href="http://resources.kaboose.com/games/read1.html">http://resources.kaboose.com/games/read1.html</a>)/Education; game</li> <li>● TumbleBook Library (<a href="http://www.tumblebooks.com">http://www.tumblebooks.com</a>)/Education (reading)</li> </ul>	<ul style="list-style-type: none"> <li>● Accesses electronic storybooks: <i>Big or Little</i> and <i>Our California</i></li> <li>● Accesses websites see the left column</li> <li>● Plays computer games: Ben 10, Bob the Builder Can-Do-Zoo, Bonnie Coaster, Fusion Fall, Games.com, HP games, League of Legends, Reading games for younger kids, World of Goo, Yahoo.com, etc.</li> <li>● Refers to an online dictionary</li> <li>● Watches videos (YouTube): cartoon videos, game videos, sports videos, astronomy videos, and music videos</li> </ul>

Table 6 (continued).

	ELL's Name	Name of Website (URL)/Topic	What the ELL Does
4	Brian	<ul style="list-style-type: none"> <li>• World of Warcraft (<a href="https://www.wowbee.com">https://www.wowbee.com</a>)/Game</li> <li>• Yahoo Answers (<a href="http://answers.yahoo.com">http://answers.yahoo.com</a>)/Portal site</li> <li>• Yahoo Site (<a href="http://www.yahoo.com">http://www.yahoo.com</a>)/Portal site</li> <li>• YouTube (<a href="http://www.youtube.com">http://www.youtube.com</a>)/Multimedia</li> </ul>	

When they navigated websites, all the ELLs usually clicked hypermedia to access diverse computer-based texts, such as textual, image, audio, video, and computer game resources. Among other materials, textual resources were ubiquitous. In other words, the ELLs could see textual resources even though they accessed other multimedia resources, such as videos and computer games. When the ELLs watched videos, they also had opportunities to read (1) textual descriptions of each video and (2) textual information and instruction in the video. Furthermore, when they played computer games, they read (1) the instruction of the game and (2) communicative messages in the game. I describe each case and offer the ELLs' emic voices in "accessing a video" and "accessing a computer game" sections respectively.

#### *Accessing a Video*

All the ELLs in this study accessed video resources very often (27.6%) when they read computer-based texts at home. Kyoung-Min accessed the *Hubblesite* website (a science website) at <http://hubblesite.org> to acquire scientific knowledge about black holes. He clicked the "Explore Astronomy" menu button to access another web page and previewed the menu buttons. He selected the "Black Hole" button, and an introductory flash video about black holes played automatically as in Figure 3. Kyoung-Min paid close attention to and accessed the video text for efferent purposes.

Jae-Hoon visited YouTube to learn how to resolve a problem that he encountered. Since his iPod Touch worked slowly and did not work properly from time to time, he decided to solve these issues by restoring the device. He searched for the information from a computer book, but he failed. After that, he accessed the Internet and typed "how to restore your iPod touch?" into the search bar, and YouTube showed the search results.



Jae-Hoon scrolled down and previewed the list of videos to select one video. In the video, a narrator explained how to restore iPod Touch and fix freezing and errors. Since the person demonstrated how to recover it step by step, Jae-Hoon paused the video from time to time and followed the direction. In this case, without specific knowledge about the restoration, Jae-Hoon searched for a video on YouTube and actively dialogued with the resource, including the video text and its narrator or creator. Like Kyoung-Min, Jae-Hoon also used video texts for efferent purposes.

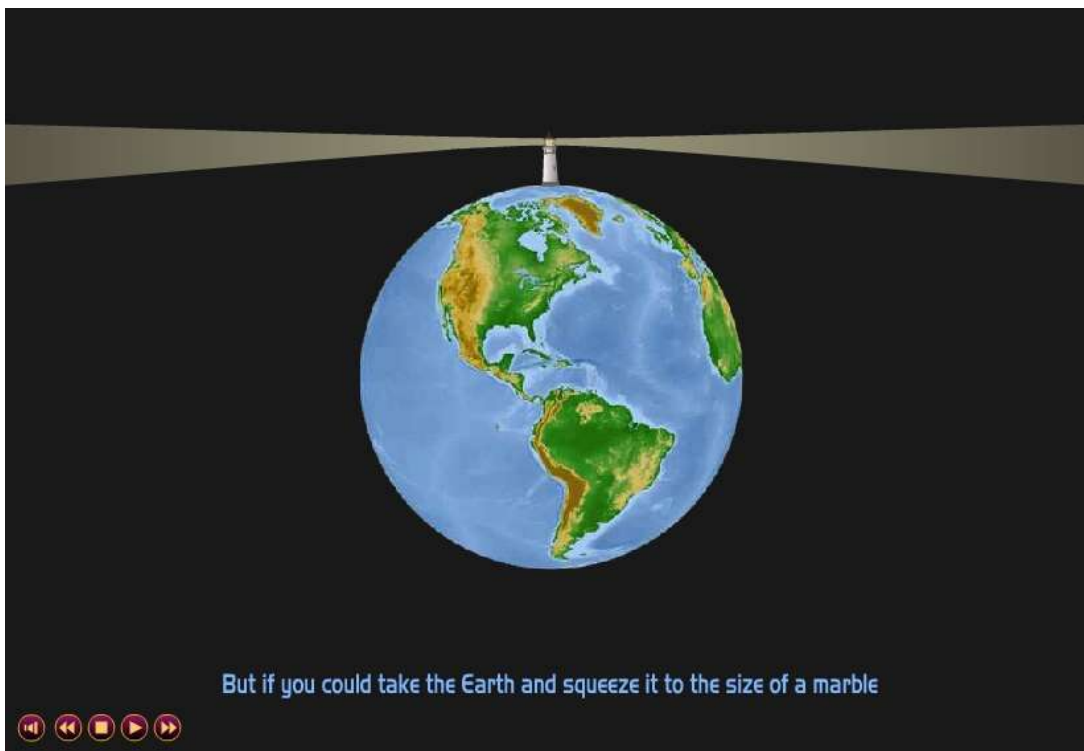


Figure 3. A screenshot of an introductory video about black holes

Brian accessed YouTube to search for videos about *Spongebob SquarePants*, a character of a TV cartoon program, and clicked multilingual video texts for entertainment purposes. For example, Brian accessed *Spongebob in Korean* at <http://www.youtube.com/watch?v=HLeEH3ISzNk>, *Spongebob song – Ripped pants song (Korean)* at <http://www.youtube.com/watch?v=R-hF8S9ZWsoA>, and *SpongeBob Square Pants in*

*China* at <http://www.youtube.com/-watch?v=PxywmwN7nYQQ>. Even though he did not understand the Korean language and understood a little Chinese, Brian enjoyed the Korean and Chinese videos; he watched music videos in English, too. Stacy also watched Korean music videos on YouTube.

The video was one of the frequently accessed resources. As all the ELLs showed in each case, they used those resources to acquire knowledge, solve problems, and entertain themselves. For example, they watched TV programs, funny videos, music videos, scientific or academic videos, instructional videos, etc. To search for those videos for information and for fun, all the ELLs accessed YouTube, and they believed that it was a very useful site. With regard to the YouTube site, Jae-Hoon mentioned, “For me, I think YouTube is really good. There is everything in YouTube. If I don’t know anything, YouTube shows the answer to me and teaches me. If there is anything that I don’t know about *iPod*, I can find the answer [from the YouTube site]” (Jae-Hoon Think-Aloud 2H). Among other ELLs, Jae-Hoon and Brian said that videos were their favorite and most helpful resource. Jae-Hoon emphasized, “Videos show the information. They also tell. So. For texts, I need to read them, but videos show everything, tell everything, and explain everything. So, I think it is the best resource” (Jae-Hoon Think-Aloud 2H).

Even though the visual information was the key source of the video texts, textual information also played important roles when the ELLs accessed and comprehended the videos. The ELLs still read the textual resources on videos in two ways: (1) textual descriptions of each video and (2) textual information and instruction in the video. When Jae-Hoon and Kyoung-Min searched for videos, they read short textual descriptions of them. The descriptions showed brief information about the videos, such as the content of

the videos and the video creators; these textual resources were significant because the ELLs referred to them in order to decide to access the videos or not. In a think-aloud session, Kyoung-Min searched for funny videos on the Internet and read aloud the titles and descriptions:

How to be ninja. This is a DVD that shows you how to be an excellent ninja.  
Songs Used: Carl Douglas - Kung Fu Fighting, Mortal Kombat Theme Song, Pink Panther Theme Song, Fergie - Clumsy. I don't know how to be a ninja. (accessing the video) What is this? Yeah. (laughing) Ha-Ha. OK. That's weird. . . . Oh, it is funny. (Kyoung-Min Think-Aloud 1H)

Jae-Hoon and Kyoung-Min also evaluated video texts and decided whether to access them or not based on the descriptions. Before Kyoung-Min clicked a video, he previewed the title and short description of the video to briefly know its content. The short information enabled Kyoung-Min to evaluate the video. However, not every ELL focused on or was interested in the short textual descriptions. Stacy said that she did not read website descriptions because they were tedious. Instead of reading the textual descriptions, Stacy and Brian decided to look at the still images of the videos. The image texts also offered the information about the content of the video.

In addition to reading textual descriptions of video texts, Kyoung-Min and Brian referred to the textual information and instruction in the video. Not all the videos contained comments or subtitles, but several videos did. For example, Figure 3 shows a screenshot of the introductory video about black holes that Kyoung-Min accessed. The video creator offered subtitles at the bottom of the video, and a narrator spoke them aloud simultaneously. Figure 4 shows another example of textual information on a video that Brian accessed. In the video, the video creator posted a short description outside the video. In addition, while he recorded his computer screen, he opened a simple word processing application, the Notepad, in order to type in his greetings and instructions. In

this way, the video creator recorded his computer screen and his message together to actually dialogue with his readers or viewers. Brian viewed the video, read the textual information aloud, and responded to the creator's comments from time to time. In a think-aloud session, Brian said:

I'll [access] *Wowbeez download*. (accessing a video: *Wowbeez download* at <http://www.youtube.com/watch?v=dm5JjDN2dqM>) How do you find the download? Hello you tubers I'm here to show you how to get world of Warcraft for free!!! Oh, that's what I'm looking for. That's what I'm looking for. I'm supposed to download *World of Warcraft* first. Impossible you say. . . . nah that's for froobs watch. . . . First go to Google.com. We get that. Type in wowbeez.com. (Brian Think-Aloud 4H)



Figure 4. A screenshot of a YouTube video about “how to download World of Warcraft full version FREE!!”

This case showed that Brian did not passively view or read the video resources. As an active participant of the literacy task, he viewed and read the video texts to comprehend what the content was about and to solve his problems. In addition, he responded to the texts, especially the video creator's text and oral utterances, which made the interactions dialogic. However, I did not observe Jae-Hoon and Stacy access videos with those textual resources during their think-aloud sessions at home.

#### *Accessing a Computer Game*

The last subcategory of the "accessing hypermedia" strategy was to access computer games, as another type of computer-based text. The ELLs accessed computer games as often as 18.1% of their computer time. Stacy accessed two websites that she usually visited to play computer games, and they were both Korean Internet portal sites: *Naver* at <http://www.naver.com> and *Daum* at <http://www.daum.net>. They provided diverse content for site users, and *Junior Naver* at <http://jr.naver.com> and *Daum Kids Zzang* at <http://kids.daum.net> especially offered content for P-6 students. For example, *Junior Naver* had hypermedia for children's studies, games, cartoons, flash animations, electronic storybooks, TV programs, homework, songs, etc. Moreover, it had a space for the parents. Even though Stacy was not a fluent Korean reader, she navigated the kids' websites to play computer games. She searched for the instruction for each game to learn how to play the game before she tried it, or she just played the game and learned how to play it. Stacy sometimes visited English-language websites to play games, but she mostly accessed Korean websites to entertain herself. She emphasized, "I don't usually read text [on the computer] if it is not necessary. I read it if I need some information. I read Korean websites for fun. I don't read the English websites for fun" (Stacy Think-Aloud 2H).

Jae-Hoon used an iPod Touch to play computer games. Instead of sitting on a chair in front of a computer, he sat on a couch and nestled down among the cushions to play games. He could even walk around the living room while he played them. About the electronic game, *Doodle Jump*, that he played, Jae-Hoon mentioned:

This is a really good game. If I wait for a person, if I wait for my friend, I play games like *Doodle Jump*. I just play this. Just keep the balance and keep working on. If you keep playing, it is addictive. This does not end. This game does not end. I just play to get the highest record. . . . He is dead when he falls down like this. Then the high score is 40,000. Yes. Some kids go up to 100,000. Yes, it is really fun. (Jae-Hoon Think-Aloud 2H)

Even though the game was simple, the unique settings, such as an easy control and an endless game structure, attracted Jae-Hoon. Furthermore, he liked the game because of the goals, gaining higher scores, among Garris, Ahlers, and Driskell's (2002) game characteristics. As Prensky (2001a) argues, achieving the goals in a computer game also motivated Jae-Hoon.

Brian accessed the *World of Goo* game for the first time. Instead of searching for the instructions, he just began to play it. He did neither read the textual instruction, "Drag n' drop to build to the pipe", nor see the pictorial instruction on the computer screen for a while. The goal of the game was to connect two points with suction pipes to collect a certain number of Goo-balls, game characters and items, and game players could build each pipe by dragging and dropping a Goo to form a connection. An instructional flash image and a text message appeared and disappeared from time to time when he tried to find out how to play the game. However, he did not initially pay attention to the instruction methods. Finally, he found how to play the game by viewing the flash image.

The cases of Stacy and Brian showed that textual information played important roles when the ELLs played computer games. The ELLs learned how to play the games

by reading and comprehending the instructional information with diverse text formats: textual resources, images, and videos. I focus on the textual resource in this study. When the ELLs played computer games, the textual information appeared as two formats: (1) the instruction of the game and (2) communicative messages in the game.

The textual resource was the major instruction of computer games that the ELLs played during their think-aloud sessions. Most computer games in this study offered the “How to Play” button, and the ELLs clicked it if they did not know how to play the games. The instruction also contained the descriptions of the game missions and items. When Stacy accessed the *Naver* website and played a newly released game, *Jeong-Gul-Mong-Ki-Dol-Deon-Ji-Ki* (정글 몽키 돌던지기; Jungle Monkey’s Tossing Rocks) at <http://game.jr.naver.com/game/hangame/view.nhn?nid=138&page=4&od=nid>, she mentioned, “[The instruction] shows the way to play the game. I read them before I play new games (reading the instruction aloud) . . . I have played similar games before” (Stacy Think-Aloud 1H). In this case, the game creator offered textual resources as well as a series of animations to explain the rules and functions of the computer game, as in Figure 5. In the instruction, real game characters demonstrated how the game worked, and textual resources guided players. Stacy read those resources linearly when the information appeared step by step on the screen. However, when textboxes describing game items popped up non-linearly (see Figure 5), she began to pick several of the descriptions and read them non-linearly.

As electronic games were the frequently used interactive media (Beentjes, Koolstra, Marseille, & van der Voort, 2001; McFarlane, Sparrowhawk, & Heald, 2002), textual resources caught the ELLs’ attention and influenced their interactions. Textual

information in computer games also appeared as communicative messages. The examples of communicative messages in this study were the messages either from the game or from other gamers. Prensky (2001a) also selected the interaction of game players with the computer and with other people as two important interactive actions. Those textual resources facilitated the ELLs' dialogic interactions while they played computer games. Stacy accessed *Kids Daum* and clicked the "English Quiz" menu at <http://kids.daum.net/kids/-do/fun/quiz/category/6>. She scrolled up and down to preview the list of the English quizzes and selected a game: *Finding Acronyms* at <http://kids.daum.net/kids/do/fun/-quiz/quiz/start/normal?categoryId=30>. The quiz game offered a question, "Which one has the opposite meaning from others?" (Stacy Fieldnote 3H), and expected Stacy to respond to the question by clicking a correct answer.



Figure 5. A screenshot of the instruction of the *Jeong-Gul-Mong-Ki-Dol-Deon-Ji-Ki* game



In Brian's case, the *World of Goo* game provided the instructional message, "Drag n' drop to build to the pipe" (Brian Fieldnote 4H), and expected Brian to react to the message. Stacy and Brian read to comprehend those messages and responded to them properly to play computer games. Jae-Hoon and Kyoung-Min also read and responded to those messages when they played computer games. In these cases, computers initiated automated utterances, and the ELLs responded to them. The computer games also provided immediate feedback by evaluating players' responses; for example, the feedback could be comments about whether the player's reactions were right or wrong, or it could be in the form of a numeric value, such as a game score. Therefore, the interactions between students and computer games were dialogic. Prensky (2001a) emphasizes:

It is from the feedback in a game that learning takes place. . . . The player is learning constantly how the game works, what the designer's underlying model is, how to succeed, and how to get to the next level and win. (p. 121)

Through the dialogic interactions with the computer-based texts in computer games, the ELLs continuously learned.

All the ELLs in this study read communicative messages from other players, too. For example, Brian often accessed the *Cartoon Network* website to play computer games, such as *FusionFall*. *FusionFall* is a multiplayer online role-playing game, and a player selects and takes control of a third-person character. While playing this game, Brian ran around within the game area and talked to other game players. Figure 6 shows the screen when Brian asked for help from another gamer, and there was a dialogue box in the lower left corner. Brian chatted with his friends in the game, collected information from other

players, and requested help from them while he played *FusionFall*. He paid attention to those messages and valued the online interactions on computer games.



Figure 6. A screenshot of the *FusionFall* game

### *Accessing an Image*

All the ELLs did not often access computer-based texts at home as Table 5 shows. Images constituted only 8.7% of all the text formats that the ELLs accessed. However, Table 7 shows that the ELLs equally accessed the images when they read computer-based texts at home. Jae-Hoon (27.6%) and Stacy (27.6%) used images for their readings more frequently than Brian (20.7%).

Jae-Hoon opened a website at <http://www2.scholastic.com> and previewed the menus on the website. He scrolled down to access the *Scholastic News* page and decided to read an article, *Success! Sun's Rays Fuel Flight*, after previewing an image on the web

page. When I asked why he selected the article, he responded, “Well, it looks like an airplane. Airplanes are my favorite. Yes, I share this kind of articles at school. We ask questions at the end of the article project. [This website] is very helpful” (Jae-Hoon Fieldnote 1H). He selected the article because he thought it would be appropriate for his school project for which he would need both images and textual resources. In addition, he used the image in the article to predict the content of the text, and he transferred what he learned at school to his computer-based text reading at home. He clarified the prediction and the transfer in another case, too:

(clicking an article: *Samsung Vibrant Galaxy S Series* at <http://www.sikids.com/blogs/2010/07/23/samsung-vibrant-galaxy-s-series>) Wow! T-mobile cell phone. It is Samsung. I think it is just about this cellular phone. Whenever we practice reading at school, we see pictures and read the title to make a prediction about stories. It helps me a lot when I read. I use the prediction very much and I can recognize that it is really about the cellular phone. Yes. (Jae-Hoon Think-Aloud 4H)

Stacy opened a Korean website at <http://kids.daum.net> and navigated the website to select a quiz game, *Star Quiz*. She began the quiz game about a Korean girls group, *So-Nyeo-Si-Dae* (소녀시대; Girls’ Generation). While Stacy answered the questions, she saw the images on the web page and quickly selected answers instead of reading the questions carefully. Since her Korean was not fluent enough, Stacy depended more on the images than the textual information for the quiz game. She clarified her focus on the images during a conversation and said, “I don’t understand [Korean well]. I just look at the pictures and answer it. I find the answer from the picture” (Stacy Think-Aloud 3H). Stacy used the images to compensate for her lack of Korean language proficiency. She understood some Korean words from the questions but mostly used the pictures to understand the questions. Interestingly, 15 out of her 17 answers were correct. The next think aloud session also shows how Stacy used images when she read online articles:

Stacy: For me, I think pictures are more helpful than others. (pointing to a picture of an accident) This one, this picture shows an accident. (pointing to another picture of a volcano) This picture is like about a volcano.

Researcher: Do the pictures help you?

Stacy: (pointing to the textual resource) Because I don't understand the text. Sometimes, I don't understand the text well, but when I see pictures, they show the fire. The pictures tell you many things. When I don't understand the text, the picture explains the text, so I can understand it. (Stacy Think-Aloud 1H)

In home contexts, Jae-Hoon and Stacy accessed images, including pictures, tables, and figures, when they read computer-based texts. Kyoung-Min and Brian also referred to images when they read computer-based texts. All the ELLs used the images to predict the content of the textual resources and to accommodate their lack of language proficiency.

Table 7

*Frequency of Strategies of Accessing Hypermedia per Each ELL at Home*

	Sub-Category	Frequency (%)				
		Jae-Hoon	Kyoung-Min	Stacy	Brian	Total
1	Accessing a Text	41.4	21.7	18.1	18.8	100
2	Accessing an Image	27.6	24.1	27.6	20.7	100
3	Accessing an Audio	35.8	7.1	7.1	50.0	100
4	Accessing a Video	19.5	41.3	3.3	35.9	100
5	Accessing a Computer Game	15.1	8.3	58.3	18.3	100
	Total	29.2	24.3	21.6	24.9	

*Accessing an Audio*

As shown in Table 5, the frequency rate to access audio links was 4.2%, which indicates that the ELLs did not often access them at home; they mostly accessed the audio texts to download and listen to music. Stacy visited the *Naver* website at <http://www.naver.com>, a Korean Internet portal site. She clicked the “Music” link and

found a list of Korean pop music songs. Stacy scrolled down the list of the songs. She opened another website, the *4Shared* website at <http://www.4shared.com>, and downloaded the songs from the website. In this way, she could listen to recent Korean music and experience Korean culture.

Jae-Hoon and Brian listened to music during the think-aloud sessions too. When Jae-Hoon navigated the Internet and searched for information on his father's desktop computer, he clicked a music folder to open it. He clicked a list of songs that his older brother had downloaded from *iTunes*, and played them on the computer. However, Brian accessed YouTube to listen to music; he played music videos while he played computer games.

Regarding the reason why she did not oftentimes use audio resources, Stacy responded that audio resources did not offer her much information. She accessed them mostly for entertainment purposes. Instead of accessing an individual audio resource, the ELLs chose to click video resources that contained textual information, audios, and pictures.

#### *Evaluating the Computer-Based Text and Deciding What to Read*

The strategy to evaluate computer-based texts and decide to read a particular text among others was one of the critical strategies for all the ELLs; it automatically included deciding not to read certain texts or skipping a part of the texts, too. As there were innumerable computer-based texts on the Internet, the ELLs could not read every text. Furthermore, the “evaluating the computer-based text and deciding what to read” strategy enabled the ELLs to participate actively in the reading activities.

Jae-Hoon accessed the *NBA* website at <http://www.nba.com>. He looked for information about LeBron James, a famous basketball player, and previewed the “Menu” buttons. He decided to access video resources instead of textual resources due to his preference for video texts; he wanted to watch cool videos, such as dunk shots. In his think-aloud session, Jae-Hoon said:

I just watch videos, and that’s it. I am not interested in the news, so I just check the scores and watch videos. . . . No news. A television tells you news. Here I don’t read them [in this website] often. I am not interested in the news, so I just check the scores and watch videos. (Jae-Hoon Think-Aloud 1H)

Kyoung-Min clicked the “News Center” button of the *Hubblesite* website and found good information. Even though he thought the information was good, Kyoung-Min decided to leave the web page because that was not what he wanted at that time. He wanted general information about black holes instead of the news. Stacy and Brian played computer games but decided to read the textual information selectively depending on their information needs.

All the ELLs evaluated computer-based texts and decided on what texts to read or not to read at home based on six factors regarding the resources. The factors included considering if the texts were (1) informative, (2) appropriate, (3) interesting, (4) familiar, (5) long, and (6) relevant.

#### *Considering if the Text is Informative*

Being informative was a factor that all the ELLs considered when they selected computer-based texts. When they previewed and evaluated texts, they checked whether the resource had enough information. If it was informative enough, the ELLs stayed at the site; however, if it did not have much information, they left the selected resource. If the ELLs read computer-based texts for efferent purposes, this factor was more important.

For example, Jae-Hoon accessed the Google website at <http://www.google.com> and searched for information about the apostrophe. He typed “information about apostrophe” into the search bar and previewed the list of the search results. Kyoung-Min typed “how to catch Pokémon” on YouTube and clicked *How to catch darkrai* and *My legendary Pokémons*. In each case, Jae-Hoon and Kyoung-Min checked if the texts contained the appropriate amount of information. In addition, Brian preferred video resources to other text formats because they had more information. In his think-aloud session, Brian compared computer-based resources and said, “videos are best because, yeah, you can, you can see more information about it. That’s why I like videos more” (Brian Think-Aloud 2H).

However, the large amount of electronic information did not attract every ELL; Kyoung-Min preferred paper-based resources, such as books and handouts, to computer-based textual resources because he thought that paper-based resources were more reliable. Furthermore, Jae-Hoon and Stacy did not like too much information because they needed to read too much. However, all the ELLs in this study paid attention to the informative factors when they read computer-based texts at home.

#### *Considering if the Text is Appropriate*

In addition to the information issue in the previous subsection, all the ELLs paid attention to whether a computer-based text was an appropriate resource or not, especially for their ages, capabilities, and topics. They made decisions on staying at or leaving the resources depending on if the texts were appropriate. While Brian was searching for information on “how to download *World of Warcraft*” on the Google site, he accessed an inappropriate website for young students. He immediately closed the web resource and

said, “I don’t wanna do that. I wanna go, uh, I don’t go to this. (whispering) This is adult thing” (Brian Think-Aloud 4H). As I described in the previous subsection, “typing keywords into a search engine,” when the ELLs inserted keywords into a search engine, it recommended a list of relevant websites. However, since none of the home computers had any content filter software to protect children, the ELLs often unintentionally saw resources that were not appropriate for their ages.

The difficulty level also influenced the ELLs’ decision-making process. When Stacy played an English quiz game, she clarified:

Stacy: (pointing to the “How to Play” button of the *Connect the Opposites* game; reading the instruction silently) I learn from this. I think this is too easy.  
(laughing; playing the game) Yes, this is too easy.

Researcher: What do you do when a game is too easy?

Stacy: Just go to other place. (Stacy Think-Aloud 4H)

Challenge is one of the favorite characteristics of computer games (Garris, Ahlers, & Driskell, 2002; Myers, 1990). If the games were too difficult or too easy, they could not attract players.

Moreover, all the ELLs judged particular computer-based texts difficult due to the language of the text. For example, when Kyoung-Min introduced a Korean website, *Drama Style* at <http://dramastyle.com>, he said, “I don’t like Korean language, but I like to watch these [Korean TV programs]. Korean is too difficult” (Kyoung-Min Think-Aloud 3H). Stacy also did not understand Korean well, so she just referred to images when she answered Korean quiz questions. Jae-Hoon and Brian also thought that the computer-based texts in their L1s were difficult.



*Considering if the Text is Interesting*

Whether the resource was interesting or not was one of the factors that all the ELLs considered when they evaluated and decided to read computer-based texts. As they used computers for fun at home, being interesting was a critical element of their resource choice. Jae-Hoon accessed YouTube to watch several fun videos as follows:

Because there are interesting videos. When I am bored, I access YouTube and watch Korean videos. (pointing to a *Roller Coaster* video at <http://www.youtube.com/watch?v=RzJVFbheUbY&feature=gvrec&context=G2170210RVAAAAAAAg>) There is *Roller Coaster*. It is a Korean TV show. It is about behaviors of men and women. It is really funny. It is Korean. (Jae-Hoon Think-Aloud 1H)

He was not searching for a specific resource at this time; he navigated the YouTube website to entertain himself. The interesting resources did not need to be informative; if the resources were “fun” and “cool” to them, it was enough. While he was watching the *How to be Ninja* video, Kyoung-Min mentioned:

Kyoung-Min: It’s really funny.

Researcher: Do you think this information is good?

Kyoung-Min: No, but I just like to watch this. It’s fun. (watching the video) OK, that happens a lot. OK, that’s cool. (laughing) Ha-Ha. (Kyoung-Min Think-Aloud 1H)

All the ELLs also played computer games at home and thought that the games were interesting. However, if the resources were not interesting, they just left the resources to find other ones or they did not access the site anymore. Stacy visited a computer game website at <http://funschool.kaboose.com> and played the *Homerun Derby* game, the *Mad Moves* game, the *Wild Word West* game, the *Fun City* game, the *Balloon Tycoon* game, the *Circus Simon* game, and the *Tiki Treasure Island* game. However, Stacy spent most of the time playing the *Wild Word West* game and the *Tiki Treasure*

*Island* game because they were interesting to her; she did not play other computer games longer than a minute.

Jae-Hoon and Stacy accessed the Facebook website; however, they had not recently visited the site much because they thought the site was not interesting any more.

In a think-aloud session, Jae-Hoon said:

I used to access Facebook, but it became boring when I used it many times. I just, completely, it was nothing. It was just meeting friends online. It was not interesting. So I don't access it now. (Jae-Hoon Think-Aloud 1H)

In addition, when Stacy searched for Korean TV programs on the Internet, she mentioned that she would not read the descriptions of video texts. Instead of reading the “tedious” textual description for a TV program on a website, Stacy viewed the still images or just clicked the video hyperlink.

When Stacy read computer-based texts, she also pre-determined the purposes of the readings depending on the language of the resources. Stacy accessed a website in her L1, Korean, for fun but visited a website in her L2, English, for academic purposes.

#### *Considering if the Text is Familiar*

All the ELLs, when they decided on reading a particular computer-based text, considered if they already knew its content well or if they had read it before. As Brian selectively read computer game messages, Kyoung-Min also accessed certain communicative messages but not others. When I asked about his selective reading style, Kyoung-Min responded:

Researcher: So don't you read these [instructions and chats] anymore?

Kyoung-Min: I, at first, started reading everything carefully. Now, I just know what she is all saying, so I do not read them anymore.

Researcher: When there is new information, do you read that?

Kyoung-Min: Yeah. Like, when [someone] was also telling me like the legendary Pokémon is [at some place], then I just read it and then just listen.

Researcher: Do they say something?

Kyoung-Min: They are like [typing a message]. (Kyoung-Min Think-Aloud 4H)

As Kyoung-Min mentioned, he read all information carefully if he was not familiar with the text. However, if he knew what the textual resource would be, he decided not to read it. Brian also selectively accessed a website if he had visited it before. He said, “My friends in my neighbor, they showed me this website. . . . For this [website], if they say the same thing, I just ignore [the message] because I already read it at my friend’s house” (Brian Think-Aloud 3H). Stacy did not access her teacher’s particular message on the website because she could expect the content of the message.

#### *Considering if the Text is Long*

Since most ELLs in this study did not like to read long computer-based texts at home, they checked the length of the texts. Jae-Hoon clicked the *SIKIDS.com Q&A: Eric Berry* link of a website, *Sports Illustrated for Kids*, at <http://www.sikids.com/index.html>. When the website opened, Jae-Hoon previewed the web page but said, “Ah, I won’t read this. It is too long” (Jae-Hoon Think-Aloud 4H). After reading another article, he recalled, “I clicked an article and checked if it was long or short. It was too long, so I didn’t read it. It is boring. (laughing)” (Jae-Hoon Think-Aloud 4H).

Stacy did not like to read a long text, either. About reading a long text, she said, “I can’t read long texts. If I keep reading long, long text, I forget the first part” (Stacy Think-Aloud 2H). When Stacy deemed a computer-based text was too long, she just left the resource without a further consideration. Brian did not read long computer-based texts either, but Kyoung-Min did not care about the length of the texts at home.

### *Considering if the Text is Relevant*

The last factor that influenced the ELLs' evaluations of computer-based texts and their decisions of what to read was if the resource was relevant to their search topic or themselves. As Wallace, Kupperman, Krajcik, and Soloway (2000) found, most students quickly decided whether particular texts were related to their reading purposes at the beginning of their computer-based text readings. The ELLs in this study previewed whether the resource was relevant (1) to their search topic in general, (2) to their specific purpose, and (3) to themselves.

When the ELLs checked the relevance, they focused on whether the resource was related to their search topic in general. In other words, they previewed titles, short resource descriptions, images, and main text to identify if the computer-based text was a good fit for their search topic in general. When Jae-Hoon searched for information about his favorite basketball player, LeBron James, he previewed each text and made sure if the resources contained appropriate topics. Jae-Hoon decided to read texts if they contained information about the player; however, he immediately left the texts if they were advertisements. To my question about the general relevance issue, Stacy responded, "I quickly preview the online text first, and if it is not necessary or related, I don't read it. It is a waste of time. First of all, I scan the content" (Stacy Think-Aloud 2H). Kyoung-Min and Brian also considered whether a computer-based text was related to their general search purposes before they fully read the text.

The ELLs also considered if the computer-based resources were related to the specific purposes of their search. Kyoung-Min accessed a website, *Hubblesite*, at <http://hubblesite.org> and looked for recent information about black holes. He found 850

articles about black holes, but he wanted conceptual explanations and principles of black holes rather than those descriptions of past events and observations; therefore, he left those web pages. Those many articles might have been relevant to the topic in general, but they were not what Kyoung-Min had in mind. All other ELLs in this study also previewed computer-based texts and checked whether they were relevant to their specific needs or interests before they decided to read particular texts.

However, when the ELLs were not looking for resources with specific topics, they selected the texts relevant to themselves to some extent. For example, when Jae-Hoon accessed the *TumbleBook Library* website, he decided to read an electronic storybook, *Our California*. He chose the text because he lived in California. Without any pressure of doing their assignment, in home contexts the ELLs identified and selected resources that related to them personally.

#### *Setting up the Purpose*

As active participants in literacy activities in the learning environments of multiliteracies, all the ELLs set up their purposes when they read computer-based texts. I categorized the purposes into (1) reading for information and (2) reading for fun. Even though the ELLs sometimes seemed to navigate the Internet without any specific purpose at the beginning, they eventually accessed computer-based texts for information or fun. Thus I assumed that all the ELLs fundamentally had a purpose. Rosenblatt (1978, 1982) categorizes reading into two types: efferent reading and aesthetic reading. The reading for information in this study was consistent with Rosenblatt's efferent reading, in which readers paid attention to accumulating the meanings, ideas, and directions after reading informative texts.

Kyoung-Min accessed the website *Hubblesite* at <http://hubblesite.org> and looked for information about the Moon. To my question about his purpose in accessing the particular web resource, Kyoung-Min responded:

I just want to go to *Explore Astronomy* [page] again. Maybe, I might find something like some really good information there. Let's see. (moving a cursor to "the Moon" image) . . . You can actually like learn really good things, so you can find information in it. (Kyoung-Min Think-Aloud 1H)

Kyoung-Min earned his knowledge by navigating websites and accessing diverse resources on the Internet to find good information. Jae-Hoon and Brian also navigated the YouTube website and found, respectively, information about how to restore his iPod Touch and how Jupiter was created. Jae-Hoon and Stacy searched for school-related information at teachers' websites, too.

Different from the cases for informative readings, all the ELLs also frequently read computer-based texts for fun, which was consistent with Rosenblatt's (1978, 1982) aesthetic reading concept. In this study, the category included ELLs' reading of computer-based texts to entertain themselves. Reading for information and reading for fun were not completely exclusive; both readings could occur during the same literacy activity.

Jae-Hoon watched videos to entertain himself. He navigated the YouTube website with a general purpose, for fun, and accessed Korean or English videos. For this purpose, all the ELLs in this study accessed funny videos, TV programs, computer games, music, or news articles. However, even though the fundamental purpose for reading was for fun, the ELLs also collected information from the reading. For example, when Jae-Hoon, Stacy, and Brian played computer games for fun, they also read instructions to learn how

to play the games. Furthermore, they looked for supplementary information about those computer games on the Internet.

In home contexts, the ELLs set up their purposes when they read computer-based texts. However, since their readings at home did not usually have clear requirements, such as collecting information for a certain paper, the ELLs read computer-based texts flexibly.

### *Previewing*

All the ELLs previewed when they read computer-based texts. Because of the tremendous amount of information on the Internet, it was not plausible for the ELLs to read entire computer-based text resources when they searched for information. They previewed titles, menus, and texts before they fully began to read the texts.

#### *Previewing Titles*

Stacy accessed a book-related website, *Kidsreads.com*, at <http://kidsreads.com>. The website creator provided lists of newly released books, book reviews, books in movies, information about authors, etc. Stacy previewed the images and titles to predict the stories and decided whether to read the texts more. This was Stacy's routine previewing process, and all other ELLs in this study also previewed computer-based texts in similar ways.

In addition to Stacy, other ELLs collected an abundance of information from titles. As I described in the "accessing a web page" section, ELLs in most cases read through the titles to understand and predict the content of each web resource and made decisions to access a particular resource.

### *Previewing and Clicking Menu Buttons*

In the previous section, Stacy previewed titles, but she also previewed menus on the website. When the ELLs accessed a website, they paid attention to the “menu” buttons or hyperlinks on the web page. As Dillon and Leonard (1998) define, the menu is “the most basic element of graphical user interface (GUI) design, the menu is a pull-down list of functions available in a software application” (p. 177), and website menus show the organization of the website. All the ELLs in this study previewed the menus to determine the content on the web page. Stacy also previewed menus and understood the web page content in a think-aloud session:

It’s about cool books and new books. (previewing the “Menu” buttons again: “Authors,” “Books into Movies,” “Series,” “Coming Soon,” “Podcasts,” “Search,” and “Features”) These are the authors; these are the movies from books; these are upcoming books; these have sounds; this is for searching. Searching for books like “Nothing’s fair in 5th grade.” This is Feature. (pointing to the “Reviews” button) I don’t know what this is. (clicking the “Reviews” button) These are books, but I don’t know. (Stacy Think-Aloud 4H)

Like Stacy, other ELLs used menus to search for specific information to access. When he accessed the *Hubblesite* website, Kyoung-Min previewed and clicked multi-layered menus. After previewing the menus on the page, Kyoung-Min found that the website offered a quiz game and clicked the link.

### *Previewing Texts*

To facilitate their reading process, all the ELLs previewed the texts. Kyoung-Min accessed the YouTube site and watched the *Pokémon platinum-how to get to and catch heatran* video at <http://www.youtube.com/watch?v=CCO74vEnyPE>. When the video played, Kyoung-Min used a mouse to fast forward and previewed the video. Even though the video was 10 minutes and 56 seconds long, Kyoung-Min could reduce the possibility



of watching an unsatisfactory video resource in this way. This case showed that the ELLs previewed multimedia texts, too.

Stacy accessed a website, *Open Court Resources*, for fun at <http://www.open-courtresources.com> and previewed the text resource. Different from Kyoung-Min's case, Stacy's purpose of previewing was specific; she was looking for information about the content of books. After her previewing process, Stacy decided to leave the website to find information on the content of books at another website because the *Open Court Resources* site was not interesting and informative enough. Jae-Hoon also clarified his previewing strategy when he read computer-based texts in his fourth think-aloud session. He said, "I scan the text first and read the interesting part. . . . If the text is useless, (laughing) I don't read it. I just go to another website" (Jae-Hoon Think-Aloud 4H).

#### *Making a Connection*

As Rumelhart (1980) argues, a schema is a data structure of knowledge, and it contains various knowledge concepts. Schema helps readers understand texts and recall them after reading (Fitzgerald, 1995), and readers interact with texts based on their prior knowledge (Carrell & Eisterhold, 1983; Rumelhart, 1980). In this study, all the ELLs used their schemata and made connections to themselves, texts, and world knowledge when they read computer-based texts.

#### *Connecting Text to Self*

When the ELLs read computer-based texts, they activated their prior knowledge and experience, as a schema, and made connections between the texts and themselves. Jae-Hoon accessed the NBA website at <http://www.nba.com> and looked for information about his favorite basketball player, LeBron James. Jae-Hoon revealed his excitement

while searching for and reading computer-based texts about LeBron James. Jae-Hoon said that he already knew much about LeBron James and that his announcement to leave Cleveland to join the Miami Heat was a popular issue at that time. When Jae-Hoon thought aloud, he shared his prior knowledge about the player:

Do you know LeBron James? He was in Cavaliers, but he is not in Cavaliers anymore. He left for the Heat yesterday. The Miami Heat. The people in Cleveland never like it. LeBron James should be in the Cleveland Cavaliers. If LeBron James is not in the team, Cavaliers will be ruined. Now, Heat will become a great team, and Cavaliers will become bad. (Jae-Hoon Think-Aloud 2H)

In addition to the textual resources, Jae-Hoon made a connection to himself of a video text about LeBron James. Through this connecting process, Jae-Hoon activated his schema to comprehend the computer-based texts.

Stacy and Brian read electronic storybooks at home. Stacy accessed an electronic storybook, *Hannah is My Name*, at <http://www.tumblebooks.com>. The story was about a Chinese girl, Hannah, who came to the U.S. with her family. Since her father began working at a restaurant without a green card, which was illegal in the U.S., Hannah and her parents had a hard time for several years until they finally received their green cards. Even though her family had legal statuses in the U.S., Stacy, as an ELL, was deeply engaged in this reading because she had experienced difficulties similar to those Hannah passed through. In a think-aloud session, Stacy clarified:

(reading and pausing *Hannah is My Name*) This girl is a first grader. She can only say “Hannah is my name” on the first day of school. She is learning English. Like me. When I first learned English in Singapore, I couldn’t understand it. Yes. So I feel this story differently [from what other people do]. (Stacy Think-Aloud 3H)

Another scene also reminded Stacy of a memory when she was in Singapore. When she paused the electronic storybook for a verbal report, Stacy said, “Hannah gives a bracelet with her name to Jenny. I got it as a birthday present from my friend in Singapore” (Stacy

Think-Aloud 3H). Stacy missed her friends in Singapore and spent some time describing her fun experiences with them; she often smiled. When Brian read *Our California* at <http://www.tumblebooks.com>, he also remembered the time when he visited Chinatown in San Francisco. After his thinking aloud, I asked a question to clarify how he knew about Chinatown, and he responded:

Brian: (looking at the image of San Francisco) They have Chinatown there. . . . [T]his is like a great place to go. It's kind of crowded right there. Yeah, it's crowded.

Researcher: How do you know that?

Brian: I went there in a bus. It's like one hundred people in a bus. It's like a long, it's like, I don't know. It's just a lot. (Brian Think-Aloud 2H)

However, Kyoung-Min did not make this connection during his think-aloud sessions.

I identified that Jae-Hoon, Stacy, and Brian connected the computer-based texts to their prior knowledge and experiences. The ELLs' prior knowledge helped them understand a story and the characters in the story, and they became engaged in the reading activities. However, the ELLs had far more prior knowledge than the information that the computer-based texts offered.

#### *Connecting Text to Text*

All the ELLs connected the text that they were reading to another text or multiple texts. This strategy refers to intertextuality. “[I]ntertextuality is defined as the relationship between one literary text . . . and other texts that may also include non-literary elements, such as film, visual arts, biography and music” (Loeb, 2002, p. 44). A reader “transposes texts into other texts, absorbs one text into another, and builds a mosaic of intersecting texts” (Hartman, 1995, p. 524). As both Hartman (1995) and Loeb (2002) argue, the text concept includes multimedia resources too. For the specific categorization, Hartman

(1995) identifies primary endogenous texts (within the passage that they are currently reading), secondary endogenous texts (in passages they had read previously in the study), and exogenous texts (outside the task environments) based on where the connecting texts are. When the ELLs read computer-based texts, they connected various texts to facilitate their meaning-making process.

Stacy read an electronic storybook, *Hannah is My Name*, at <http://www.tumblebooks.com> and used multiple primary endogenous resources. When she opened the storybook, a female narrator began to read aloud the story with background music playing simultaneously. Stacy listened to the audios carefully and rewound the storybook to read the textual resources again. In addition, Stacy referred to the still images and pictures; she believed that the pictures told many things about the story and helped her understand the textual resource. Stacy was excited when she saw the images and described what the characters were doing in each scene. She said, “Her mother points to a package, and Hannah opens it. She sees the green card. The table looks like the one here” (Stacy Think-Aloud 3H). Stacy accessed audio, image, and video resources to facilitate her comprehension of the textual resources and identified more specific details about the story from those primary endogenous resources in the context.

Brian often used the secondary endogenous resources. His goal in reading computer-based texts at that time was to learn how to download a computer game, *World of Warcraft*, for free from the Internet. At first, Brian accessed the official website for the game, but he did not learn what he had to do. He also accessed YouTube to search for video resources to pursue the goal of his self-oriented literacy task. After viewing several videos, Brian came back to the original textual resources to complete his task. During

these processes, he clicked hyperlinks on the websites or searched for computer-based texts on Google and YouTube. In these ways, all the ELLs in this study accessed the secondary endogenous and intertextual resources to make meanings of a variety of texts when they read computer-based texts, and hyperlinks and Internet search engines played important roles.

All the ELLs also used exogenous texts. Kyoung-Min accessed the *Dav Pilkey's Extra-Crunchy Website O'Fun* website at <http://www.pilkey.com>, and the site showed diverse images. Kyoung-Min accessed several images on the page, *The Ole Left Jab*, *George and Harold Save the Day*, and *Wedgie Power vs Potty Power*, and said that the images were in his paper-based book. He also used paper-based books when he had a hard time understanding quiz questions about the Universe from time to time and referred to those books to find relevant URLs, too. Those paper-based resources were out of their self-oriented computer-based reading tasks, but Kyoung-Min used the resources to enhance his computer-based reading processes.

#### *Connecting Text to World*

Jae-Hoon, Kyoung-Min, and Stacy connected computer-based texts to their world knowledge when they read them at home. Their world knowledge was about their cultures and communities but not limited to the topics. The ELLs' connections of texts to the knowledge gave them great strength to comprehend computer-based texts. Kyoung-Min connected a text to his world knowledge when he watched a video about a computer game:

There is like a mansion. And there are mysterious things happen. If you go into that mansion, you will see the whole party ghosts. (pointing to a picture of a ghost) Here, this is a ghost. There are only two ghosts. (pointing to a female

ghost) She is a ghost, and this is scientifically impossible. (Kyoung-Min Think-Aloud 2H)

He connected the video text to his scientific knowledge and identified that the phenomenon in the computer game was not possible in real life. When he explained this, he spoke very clearly and felt proud of his scientific analysis.

Stacy also connected an electronic storybook, *The Best Excuse*, to her world knowledge and said:

The teacher figures out that Jessie is telling a lie and sends him back home. [Jessie's teacher] looks at out of the window and sees the three penguins follow Jessie. This is impossible because Penguins can't be there. Anyway, they followed him from Antarctica. (Stacy Think-Aloud 3H)

Stacy understood that the penguins could not follow Jessie when Jessie's teacher sent him back home; therefore, she assumed that Jessie was lying. She considered the penguins could not appear there in real life. Kyoung-Min and Stacy clarified what the computer-based texts reminded them of in the real world. Moreover, they considered how the texts were similar to or different from what could happen in real life based on their world knowledge. However, Brian did not use this strategy at his think-aloud session at home.

### *Dialoguing*

Dialoguing was one of the critical strategies for all the ELLs when they read computer-based texts, and I included questioning strategy in this criterion. As Bakhtin (1981) identifies in his work, language is speech rather than a system of grammatical categories, and it encompasses both oral and written formats. The utterance, as the basic element of the speech, belongs to a particular speaker or writer, and it gives rise to some kind of responses from other subjects. Bakhtin argues that every utterance has its author, an addressee, and a superaddressee and that it is in a dialogic relation with the other speaking subjects. In this study, the ELLs dialogued with their parents, siblings,

themselves, texts, the authors and creators of the texts, etc. in their home contexts.

Therefore, I assigned their dialogic strategies to (1) dialoguing with others, (2) dialoguing with self, and (3) dialoguing with texts and authors as Park and Kim (2011) did. Even though the researchers used these subcategories to describe adult ELLs' strategy use in a study group, I adopted it for elementary ELLs' reading in home and school contexts.

### *Dialoguing with Others*

All the ELLs dialogued with other persons when they read computer-based texts. As the reading context was the ELLs' home, they mostly dialogued with their mothers and siblings. However, the ELLs dialogued with people who were not their family members, too. They interacted with their friends and me in person or through either synchronous or asynchronous CMC when they read computer-based text.

Kyoung-Min accessed the *Beestar* website at <http://www.beestar.org>, which was an educational website for K-12 students, and took an online test on a computer as a home literacy activity. When he had a problem understanding a word in a question, Kyoung-Min called his older sister to request help to comprehend the textual information. He also dialogued with his mother about what he would do next on the computer and what resources he had to access. Kyoung-Min was not an active computer user compared with the other ELLs. If he had free time at home, Kyoung-Min usually played Nintendo DSi games for fun instead of using a computer. Therefore, Kyoung-Min's mother asked Kyoung-Min to access particular websites to study when he did not have many school projects or when school was not in session, and she allowed Kyoung-Min to play electronic games after studying on the computer. Even though Kyoung-Min did not like to study online, he worked on the educational websites for his mother's reward.

The ELLs also dialogued with their friends, their relatives, and me to learn about computer-based texts at home. Stacy dialogued with her cousin in Las Vegas through Facebook, and the cousin introduced Stacy to several fun websites. Brian visited his friend's house to learn about a computer game, *FusionFall*, and shared information about the game, such as how to complete the mission fast. Jae-Hoon, Stacy, and Brian also identified me as a resource person and initiated dialogues. Jae-Hoon and Brian asked me how to enlarge the view of Internet browser windows, and Stacy asked me how she could delete the music files that she downloaded from the Internet. They mostly asked me about computer literacy, which was about basic computer use. However, Kyoung-Min did not ask me such questions during his think-aloud sessions.

Stacy accessed an online social networking service, Facebook. Facebook provided users a variety of options, such as posting texts (textual information, pictures, audios, videos, and computer games), hyperlinking online resources, communicating with other users synchronously and asynchronously, etc. In this study, Jae-Hoon and Stacy had Facebook accounts, and they dialogued with others by initiating a dialogue or responding to others' utterances. For example, they posted an image as a text to their Facebook page, and this initiated a dialogue. Other Facebook users saw the picture and wrote comments on the picture. In this way, many speaking subjects participated in the dialogues asynchronously. Jae-Hoon and Stacy also synchronously chatted with their friends who were logged in to their Facebook accounts by clicking their names in the bottom right corner of the web page. These ELLs used Facebook as a tool to dialogue with others.

Brian interacted with others while they played computer games. He controlled his online game character to run around the gaming area and asked questions and requested



help from other game players. Brian said, “I participate in live chat with, it’s something like live chat and speaking with them. I am talking to my friend and say, ‘Hi, how are you?’” (Brian Think-Aloud 3H).

All the ELLs in this study actively initiated dialogues with others and reacted to others’ utterances while they read computer-based texts. When they initiated dialogues in home contexts, they shared their knowledge with or asked questions of their family members, friends, relatives, and me. The ELLs frequently generated questions and received answers in order to comprehend the texts. They also monitored their comprehension and engaged in the reading activities by posing questions and responding to them (Rosenshine, Meister, & Chapman, 1996). The ELLs also responded to others’ utterances when someone talked or wrote to them. They dialogued with other speaking subjects in person or through CMCs. As the computer-based text reading contexts were socially and culturally diverse, the ELLs’ dialogic interactions with other people were critical when they learned in the technology-incorporated learning environments.

#### *Dialoguing with Self*

Bakhtin’s (1981) concept of dialogue encompasses both monologue and dialogue. This means a speaking subject interacts with himself or herself as well as with other speaking subject(s), and all the ELLs in this study dialogued with themselves when they read computer-based texts. Kyoung-Min accessed the *Beestar* website at <http://www.bee-star.org> and initiated several utterances while he tried to find answers for an online science test. He evaluated the difficulty level of the question and asked himself several questions to facilitate the problem solving process. In a think-aloud session, Kyoung-Min said:

(reading a question aloud) What's the name of the first explorer to discover a sea route to the New World and named the island he landed on San Salvador? A. Juan Ponce de Leon, B. Jacques Cartier, C. Christopher Newport, D. Christopher Columbus. I don't remember if he was Christopher Newport or Christopher Columbus. Is it Christopher Newport or Christopher Columbus? (Kyoung-Min Think-Aloud 2H)

There was not any person other than me in the living room when Kyoung-Min answered the quiz question, but he uttered while he read the textual information. Moreover, before he asked his older brother about a social study question on the same website, Kyoung-Min also initiated a dialogue and evaluated his comprehension as his reaction to the utterance. He recognized that he talked to himself often and clarified, "I usually talk to myself because it is kind of helps me. It is just kind of help me get into the story" (Kyoung-Min Think-Aloud 3H).

Brian watched a video explaining how to download the *World of Warcraft* game. As he played the video, Brian also began dialogues and responded to his own utterances as follows:

What is this? Is this supposed to be demo? Let's check about the demo. Wow. Look like a free download. Oh, I found it. . . . Looks like a sonic, what is this? Oh, oh, oh, I got it. Down, look. I download it What is this? Download page. No! It's wrong version! I don't like trial version! I don't get it. I don't want trial one. (Brian Think-Aloud 4H)

By dialoguing with himself, Brian paid attention to the video text and tried to follow the instruction on the resource. Stacy also raised several questions and initiated dialogues with herself while she played a computer game, *Tiki Treasure*, for the first time. Even though she read the game instruction carefully and was familiar with that type of computer game, Stacy still experienced difficulty with finding out how to complete the goal because she was new to the game. She asked questions, such as "How do I do this? . . . Ah, how do I find it? . . . Hmm, where do I have to go? Uh, oops, ah, difficult. . . .

Where do I have to go? . . . Where do I have to go? How do I do this?" (Stacy Think-Aloud 4H). By uttering specific statements or questions, Stacy resolved particular issues while she played the computer game and finally learned how to play it. Not only when she played computer games but when she read an electronic storybook, she initiated dialogues. When she read *Hannah is My Name*, she asked "What is a rabbit foot? Ah, does she give it to Hannah? Does Hannah play with it when she is bored?" (Stacy Think-Aloud 3H) to understand why Hannah gave a rabbit foot to her friend from Hong Kong.

In this study, all the ELLs dialogued with themselves. A series of initiative questions enabled the ELLs to make the reading activities more dynamic because they needed to react to those utterances by thinking about the answers or solutions and by verbally responding to the questions. Self-questioning is a procedure to stop periodically while reading in order to ask and answer questions relevant to the text (Taylor, Alber, & Walker, 2002). Students' active questions and responses were effective for monitoring and increasing comprehension of the texts (Chan, 1991; Davey & McBride, 1986).

#### *Dialoguing with Texts and Authors*

In this study, all the ELLs actively dialogued with computer-based texts when they read them. A text in this case also included a writer, a website developer, an audio and video creator, etc. because the text belonged to the individuals. The ELLs read computer-based texts and responded to the text; they reacted to the initial utterances from the authors and creators. The dialogic features contained inner dialogue, which helped readers name the world and played important roles when students transacted with texts (Bakhtin, 1986; Freire, 2000; Rosenblatt, 1978, 1982).

Kyoung-Min searched for information about his *Pokémon* game on YouTube. When the YouTube site opened, Kyoung-Min typed “how to catch pokemon” into the search bar and began dialogic interactions with the YouTube site, the texts on the site, and the web developers. For Kyoung-Min’s search, the site responded by recommending the most-relevant keywords to facilitate his searching process. Then Kyoung-Min had a choice whether to preview and click one set of the keywords from the list. In this way, Kyoung-Min found the most-appropriate computer-based resources for his readings and dialogued with the texts. Furthermore, the website offered relevant information, such as complete keywords and numerous relevant videos, as its dialogic reactions. These new web-searching features were included as an option of search engines in Web 3.0 environments. Green (2011) defines Web 3.0 as follows:

Web 3.0 represents an evolutionary shift in how people interact with the web, and vice versa. For the purposes of this new study, Web 3.0 comprises three basic components: the Semantic Web, the Mobile Web, and the immersive Internet. The Semantic Web refers to technology whereby software can understand the meaning of data and use natural language searches. It creates a customized experience where information is tailored to the users’ needs, location, and identity. The Mobile Web allows users to experience the web seamlessly as they move from one device to another and one location to another. In the immersive Internet, virtual worlds, augmented reality, and 3-D environments are the norm. (Green, 2011, p. 71)

The semantic web and semantic search engines provided more informative results than a regular search engine. Instead of just identifying a useful page, the search system pulled

specific information that users might look at for their reading. In addition, the semantic search helped the users identify further related searches that might be more useful (Hendler, 2010; McEneaney, 2011). Therefore, all the ELLs could interact with texts in the online search processes by using the search tools in the Web 3.0 contexts.

Stacy accessed Facebook at <http://www.facebook.com> and clicked an idol quiz hyperlink. The quiz game asked players questions about a Korean girls group, *So-Nyeo-Si-Dae* (소녀시대; Girls' Generation), and identified which group member was the most similar to the players. Stacy dialogued with the computer-based text, too. Different from Kyoung-Min's case, Stacy dialogued with the main text. As the text was a quiz game, the dialogic features in the reading process were clear. The following was the dialogic interaction between Stacy and the online quiz game. To demonstrate their interactions efficiently, I assigned the textual information as the utterances of the text:

Text: (showing a question, "Would you like to join us your pure idol?")

Stacy: (reading the questions aloud; highlighting the question with her computer mouse) Would you like to join us your pure idol? (clicking her answer) I don't think about it.

Text: (showing a question, "Do you like to hit people?")

Stacy: Do you like to hit people? Never.

Text: (showing a question, "How loud are you going to sing if you want to be a singer?")

Stacy: How loud are you going to sing if you want to be a singer? As loud as I can.

Text: (showing a question, "You are Tae-Yeon.")

Stacy: You are Tae-Yeon. This is fun. (laughing) (Stacy Think-Aloud 3H)

The game offered a series of yes/no questions to Stacy, and she read and responded to the utterances of the text by thinking about the answers and selecting one of the choices.

Jae-Hoon searched for computer-based texts about the apostrophe on Google and dialogued with the website to find appropriate web resources. Moreover, Jae-Hoon and Stacy accessed an educational website, *Study Island* at <http://www.studyisland.com>, and interacted with the questions and their responses. At the *Hubblesite* website, Kyoung-Min read each question silently and actively responded to the questions as in his utterances, such as, “It is kind of a lot of six thousand,” “I think this is Gemini,” “Sun, the Sun. They tell you the information when you get the right one” (Kyoung-Min Think-Aloud 1H).

The ELLs directly responded to authors of computer-based texts too. For example, Kyoung-Min was watching a video, *How To Catch The Three Regi's in Pokémon Platinum* at <http://www.youtube.com/watch?v=g3RcjneDa3w&feature=related>. In the video, the resource creator, as a narrator, explained how to catch three Pokémon characters, and Kyoung-Min verbally responded to his utterances as follows:

Creator: If you want to get the three regis from Pokémon platinum, oops. Uh, so, yeah. You need to get this, you need a Zant.

Kyoung-Min: I have got that already.

Creator: Which didn't come out in March.

Kyoung-Min: Yeah.

Creator: I think this was made in April. Yeah.

Kyoung-Min: Uh-huh.

Creator: And, so, Yeah. I'm gonna catch Registeel, and the Regice, and the Regirock.

Kyoung-Min: OK, this is great. (Kyoung-Min Think-Aloud 3H)

Compared with textual resources, authors appeared in some video texts more explicitly. For example, in the above YouTube video, the author recorded his Nintendo DSI screen and his voice with a video recorder and included textual explanations by adding subtitles

on the video resource. Kyoung-Min recognized the existence of the author and directly responded to his utterances in a dialogic manner. Jae-Hoon and Brian also dialogued with the creators of videos texts, but Stacy did not do this in her think-aloud sessions at home.

One of the prominent ways of initiating and continuing a dialogue was to ask a question. All the ELLs asked questions of others, themselves, and computer-based texts. They asked the questions to learn what they did not understand, as “clarification,” and to monitor whether their understandings were correct, as “verification” (Oxford, 1990, p. 145). When the ELLs read computer-based texts, they asked for clarification and verification regarding vocabulary words and content knowledge (Park & Kim, 2011).

#### *Adjusting the Reading Pattern*

When they read computer-based texts at home, all the ELLs adjusted their reading patterns to facilitate their readings depending on their comprehension and the literacy contexts. The ELLs read the computer-based texts aloud, silently, quickly, or slowly. In addition, they reread the texts from time to time. Since some categories were exclusive, they did not occur simultaneously. For example, the ELLs could not read a sentence aloud and read it silently at the same time. In this case, I assigned the two exclusive strategies to one sub-category as “reading aloud or silently.” However, except for these exclusive categories, each subcategory could occur simultaneously. I describe their reading patterns in each subsection below.

#### *Reading Aloud or Silently*

All the ELLs in this study either read texts aloud or read them silently. Jae-Hoon navigated the *Scholastic* website at <http://www2.scholastic.com> and clicked an airplane

image on the page, which linked to an article, *Success! Sun's Rays Fuel Flight*. He began to read aloud the first three paragraphs but read the fourth paragraph silently.

Brian read aloud particular textual information on the video but read other descriptions or directions silently as follows:

(reading the video description silently) How do you find the download? Hello you tubers I'm here to show you how to get world of Warcraft for free!!! Oh, that's what I'm looking for. That's what I'm looking for. I'm supposed to download *World of Warcraft* first. Impossible you say. nah that's for froobs watch. First go to Google.com. (Brian Think-Aloud 4H)

I underlined what he read aloud, and they showed Brian read aloud texts even when he watched a video text, too. When he read a text aloud, he said, "I read aloud sometimes when I don't get the meaning" (Brian Think-Aloud 1H). Other ELLs in this study also read aloud texts when they could not comprehend computer-based texts. In addition, the ELLs read particular texts aloud when they needed to pay more attention to them. Kyoung-Min accessed the *Hubblesite* website at <http://hubblesite.org> and clicked a quiz, *Way Out! Quiz*, in the website. He read the online quiz questions and the possible answers aloud to comprehend the texts better. In addition, when he answered one question incorrectly, Kyoung-Min read aloud the textual information that the web page provided to explain the question.

#### *Reading Quickly or Slowly*

All the ELLs of this study adjusted their reading speed when they read computer-based texts. The ELLs read the texts fast when the content was easy or when they previewed them. For example, Jae-Hoon accessed the NBA website and read a news article about a professional basketball game faster than he normally did. He simply scanned the textual resource to find out the final game score. In his think-aloud session, Jae-Hoon said, "No, news. A television tells you news. Here, I don't read them here often.



I am not interested in the news, so I just check the scores and watch videos” (Jae-Hoon Think-Aloud 1H). Regarding his reading speed adjustment, Jae-Hoon mentioned, “If [the text] is easy to understand, ‘Ah, this is easy to understand’ and I read it fast. But if it is hard to understand, I go back and read it slowly again. I do” (Jae-Hoon Think-Aloud 4H).

Kyoung-Min previewed the *Dav Pilkey’s Extra-Crunchy Website O’Fun* website at <http://www.pilkey.com> and quickly skimmed through the web pages. He did not access the website seriously but navigated it fast until he found resources attracting his attention. Kyoung-Min also watched the *Pokémon platinum-how to get to and catch heatran* video at <http://www.youtube.com/watch?v=CCO74vEnyPE> faster by clicking the “Fast Forward” button from time to time. Brian also moved forward music videos when he watched them; however, Stacy did not read computer-based texts fast in most cases.

The ELLs read the computer-based texts slowly, too. This usually occurred when the texts were difficult or when they read the texts carefully. As Jae-Hoon mentioned above, if a text was difficult, he reread it slowly to facilitate his comprehension of the computer-based texts. The ELLs also slowed down their reading when they needed to read the texts more carefully. When Kyoung-Min and Stacy accessed online quizzes, especially for efferent purposes, they read the questions slowly. For example, when Kyoung-Min took quizzes at the *Hubblesite* website, he read the questions slowly and carefully. He also reduced the reading speed when he read additional information of the website. Regarding his use of this strategy, Kyoung-Min commented:

I read slowly and carefully sometimes when I read online. Yeah, I do a lot, so I don’t get the answer wrong now. I just don’t like to mess up the questions, so, I won’t be making a big mistake. (Kyoung-Min Think-Aloud 2H)

Stacy normally read textual resources on websites slowly and carefully because she wanted to make sure she understood the resources. She said, “If I read websites fast, I don’t understand it. So I read it slowly” (Stacy Think-Aloud 2H).

Furthermore, the ELLs adjusted the reading speed depending on their prior knowledge and the genre of the texts. Stacy emphasized that she read book content thoroughly and carefully because she did not know what it would be about. However, she read online news articles fast because she could predict the content of the articles based on the title.

### *Rereading*

Rereading was one of the frequently used strategies when Jae-Hoon, Kyoung-Min, and Brian read computer-based texts in this study. They reread a computer-based text when it was hard to understand or when they thought it was important. Moreover, the participants read a text repeatedly when they wanted to find specific information and confirm it or when they just wanted to read a text again. In his think-aloud session, Jae-Hoon said, “[Rereading a text] helps me a lot. If I read text again and again, I can understand it” (Jae-Hoon Think-Aloud 4H). Stacy also read an electronic storybook multiple times because “it was hard to understand” (Stacy Think-Aloud 3H). Both Jae-Hoon and Stacy read the texts again because they did not understand the texts at first. However, Stacy did not think rereading helped her every time. One of the possible reasons was that she usually read English computer-based texts slowly and carefully. Therefore, if she did not understand what a text meant the first time, rereading often did not improve her comprehension, so she just skipped the difficult part of the text.

In addition, the ELLs reread computer-based texts when they believed the resources were good or important. In this case, the ELLs' rereading was associated with their previewing strategy. For example, when Brian searched for information on the *World of Warcraft* game, he accessed a video at <http://www.youtube.com/watch?v=OD-0JKCCgeQ>. After the video played, he pressed the "Fast Forward" button several times to preview the resource. Since he thought the video was good, based on his preview, he played it from the beginning again to watch it carefully. In a think-aloud session, Brian mentioned:

I stop from time to time. Yeah, I check. So I can repeat [the text] again and again. Then I can get, I can understand it or something. . . . Like, so like if it is really important for me to read it, then I go back and forth to read it again. If it is not really important for me, I just read once. (Brian Think-Aloud 3H)

All the ELLs in this study read computer-based texts two or more times if they evaluated that the resources were important for them. However, they also accessed a particular text or a part of a text to read more than one time without previewing. In this study, every ELL accessed the Google website and the YouTube website multiple times in each think-aloud session at home to search for necessary resources. More specifically, Kyoung-Min accessed the "Explore Astronomy" menu of the *Hubblesite* website in two consecutive think-aloud sessions. When he visited the website for the second time, Kyoung-Min said, "I just want to go to *Explore Astronomy* again. . . . Maybe I might find something like some really good information there. Let's see" (Kyoung-Min Think-Aloud 1H). The ELLs also read questions and the possible answers more than one time when they took online quizzes because they assumed that those resources were important for their task completion.

The ELLs also reread the texts to find specific information and confirm it for their comprehension. When Jae-Hoon read an online article about his favorite basketball player, LeBron James, he read particular information, such as LeBron James' pictures and his interviews, more than one time. Stacy read an instruction of an online computer game: *Wild Word West* at <http://funschool.kaboose.com/time-warp/games/game-wild-word-west.html>; however, she missed an important point and had difficulty with completing the mission of the game. To understand and accomplish the goal of the game, she played the game several times and reread the instruction more than four times to learn how to play it. After the rereading processes, she finally found what she missed at first. Brian also read the particular message from a computer game, *FusionFall*, multiple times to check his mission of the game. He clarified, "If I am going to a game, you have to read this [instruction]. If I forgot what it says I can go back and I can read it and repeat it. I can repeat it again" (Brian Think-Aloud 3H).

The ELLs also reread computer-based texts when they simply wanted to read them again. For example, when Brian played a computer game, *FusionFall*, and when he searched for information about how to download a computer game, he played *Black Eyed Peas-I gotta feeling (w/lyrics)* at [http://www.youtube.com/watch?v=eJA8U4ML7\\_0](http://www.youtube.com/watch?v=eJA8U4ML7_0) and *Michael Jackson and Slash Beat it (Live)* at [http://www.youtube.com/watch?v=Mh\\_a5x\\_u2gM](http://www.youtube.com/watch?v=Mh_a5x_u2gM) on YouTube for fun. He said, "This is what I like Mr. Park, see? I like to listen to songs when I play" (Brian Think-Aloud 2H). Even though the main tasks were to play the game and search for information, he watched or listened to the music videos more than once to entertain himself.

The ELLs read the text more than one time when they considered that it was difficult to understand or important to know. They also reread the text when they wanted to find particular information or when they just wanted to read it again. As researchers identified the rereading strategy as useful pedagogical tools and helpful for readers' comprehension (Faust & Glenzer, 2000), the ELLs reread computer-based texts to facilitate their meaning-making processes.

### *Monitoring the Comprehension*

All the ELLs of this study frequently monitored whether they comprehended particular computer-based texts or not. Jae-Hoon accessed the *Sports Illustrated for Kids* website at <http://www.sikids.com>. He previewed an article by looking at the title and the picture on the web page, but he was not sure about the content of the text. Since the title was *Air Jordan 6 Rings 3M*, Jae-Hoon predicted that the article would be about a famous basketball player, Michael Jordan. However, the article was actually about shoes, "Air Jordan," and this caused Jae-Hoon's confusion. But because the basketball issue attracted him, Jae-Hoon decided to read the main text.

Stacy accessed an electronic storybook, *Little Red in Cyber Space*, at <http://www.tumblebooks.com>, but did not understand the story on the page properly. In the page, a wolf, an evil character representing a cheater on the Internet, called Red, a young girl in the story. However, Stacy did not identify the symbolic characters at that time. Instead of spending time comprehending the part, she decided to skip the part and read the next page.

The comprehension checking was one of the important components for readers to become independent and critical, and this strategy normally preceded other strategies,

such as evaluating the computer-based text and deciding what to read, rereading, dialoguing, and using references. For instance, Jae-Hoon decided to read a main text in detail, and Stacy decided not to reread a difficult text for her comprehension after monitoring her comprehension of the text. In any case, the ELLs, as active meaning makers, independently monitored if they understood a particular text correctly and decided on their next steps. As the readers checked their comprehension, they also checked the resources.

### *Inferring the Text*

All the ELLs in this study inferred particular information from computer-based texts. From the definition of Richards and Anderson (2003), inference is “the strategic process of generating assumptions, making predictions, and coming to conclusions based upon given information in text and in illustrations” (p. 290). Oakhill and Cain (2007) argue that readers use information from different parts of the text to establish local coherence; they also use their knowledge from outside the text to fill in gaps in the text throughout the literacy activities. In this category, I focused on the ELLs’ predicting the content and guessing the meanings of computer-based texts because they used these strategies most frequently.

#### *Predicting the Story or the Content*

Jae-Hoon accessed a web page about the American Civil War at <http://www.historyplace.com/civilwar>. He looked at the title and a picture on the page and explained what he could predict from the information:

When I see the title, I can predict or infer. It is about the American Civil War. How did the American Civil War begin and proceed. And, when did it begin and end. Yes. . . . The picture, just, somebody sells black people. I just predict it. (Jae-Hoon Think-Aloud 2H)

In this case, before he actually began to read the computer-based text, Jae-Hoon collected information about the text as much as he could.

When Stacy accessed an electronic storybook, *Little Red in Cyber Space*, at <http://www.tumblebooks.com>, she predicted what would happen next when she read the electronic storybook. After reading several pages of the storybook, she said, “[Red’s grandmother] may think that Red bought some products on the Internet. . . . I think Red will learn what and how she can do with her computer” (Stacy Think-Aloud 2H). The page did not clearly describe that Red would learn how to use a computer safely on the Internet, but Stacy predicted that based on her reading of the computer-based texts.

When Jae-Hoon read an online article about a solar-powered airplane, *Success! Sun’s Rays Fuel Flight*, he also predicted what would happen in a particular situation. Unlike Stacy, Jae-Hoon did not consult the information from the text in this case but activated his prior knowledge. He shared his idea about the airplane in his think-aloud session:

Well, this is just about airplanes are often called "gas guzzlers" because of how much gasoline they use to power a single flight. Well, an airplane uses a lot of gas. However, people in Switzerland developed an airplane. It can fly by using sunlight. I think it will fall down when it suddenly rains. If it suddenly rains when the airplane keeps flying, there is no sunlight. Then it may fall down. (Jae-Hoon Think-Aloud 3H)

The author did not mention a rainy environment in the article, but Jae-Hoon predicted what would happen when the power source of the airplane disappeared. Kyoung-Min and Brian did not use this strategy when they read computer-based texts in their think-aloud sessions at home.

Like the above cases, Jae-Hoon and Stacy predicted while they read computer-based texts. They expected what the texts would be about by previewing the title and

other resources. Moreover, the ELLs in this study predicted what events would occur next based on either the information of the text or their prior knowledge.

### *Guessing the Meaning*

The ELLs also guessed the meaning of the computer-based texts or vocabulary words while they made an inference from the texts. Kyoung-Min took an online science test at the *Beestar* website at <http://www.beestar.org> and used his knowledge when he made the inference from the given information. When he answered a question, “Look at the picture above. Where is the best location to grow crops?” Kyoung-Min explained why he chose “the mountains” as the answer as follows:

(reading questions silently and seeing a picture) [The mountains] might be the answer. Actually the river and the plains might be full of animals, so it might like eat the crops or something. The ocean is also bad because there might be dangerous stuff. So I just [select] C because the mountains are kind of safe for everybody. And they have like a lot of nutrition, so I think it is a safe location. (Kyoung-Min Think-Aloud 2H)

Stacy also made an inference when she played an online quiz game at <http://kids.daum.net/kids/do/fun/quiz/category/6>. One of the questions was, “다음 단어중 반대의 의미를 가진 하나는 무엇인가요?” (“Which word has the opposite meaning from other words?”), and there were multiple choices: (a) calm, (b) serene, (c) noisy, (d) silent, and (e) quiet. She read through the list of possible answers and selected C for her answer. She was not sure of the meaning of “serene,” but she guessed that it had the similar meaning with being quiet. In a think-aloud session, Stacy mentioned, “I try to guess what the content of the online text is about. I try to guess when there is a word that I don’t understand. And, when there is a context clue, I guess what the word means” (Stacy Think-Aloud 2H).



Interestingly, Jae-Hoon, Stacy, and Brian shared their experiences at school; their classroom teachers encouraged them or assigned them activities to make inferences while they read. Jae-Hoon said:

We do writing after we see a picture at school in the morning. What do I imagine? What do I believe? What do I infer? Such things. I learn them at the summer school, so I am telling you. Like this, I infer. What do I believe? What do I imagine? What kind of prediction? (Jae-Hoon Think-Aloud 2H)

Jae-Hoon's teacher showed computer-based images to her students and requested them to make inferences from the pictures at school. In this study, classroom teachers encouraged their students to actively use this strategy to facilitate their literacy competence and activities at school, and the ELLs transferred it to their home context when they read computer-based texts.

#### *Scrolling Up and Down and Getting Back and Forth*

When all the ELLs in this study read computer-based texts, the “scrolling up and down” strategy was critical for intratextual navigations, and the “getting back and forth” strategy was important for their intertextual navigations. When Jae-Hoon opened a website at <http://www2.scholastic.com>, he previewed the menus on the website and scrolled down to access *Scholastic News* page. Jae-Hoon clicked one of the articles listed on the web page, *Success! Sun's Rays Fuel Flight*. He scrolled down and read textual resources and image texts. In each movement, he made his own decisions and actively navigated the computer-based texts. As Jae-Hoon's case demonstrated, all the ELLs scrolled up and down to move the browser viewing window up and down. In this way, they could move to another place on the same web page and read the diverse forms of texts.

In addition to the scrolling up and down on a same page, the ELLs moved to another page of the same resource or to a totally different text. For example, when Kyoung-Min accessed the *Hubblesite* website, he first previewed the menu and clicked the “Newscenter” link. However, since he could not find the information that he wanted, Kyoung-Min read the menus again and accessed another page. The menu option played an important role in this case: it enabled Kyoung-Min to navigate to a totally different text. When the ELLs in this study searched for particular information through Google and previewed a list of search results, they chose to open a resource. After the ELLs read the resource, they moved back to the search results and clicked another resource. In this way, the ELLs got back and forth to access different computer-based texts on the Internet.

#### *Using References*

When all the ELLs in this study read computer-based texts, they referred to a variety of references to facilitate their meaning-making processes. They used both computer-based resources and paper-based resources.

#### *Referring to a Computer-Based Resource*

All the ELLs consulted computer-based resources, such as other websites and online dictionaries, when they read computer-based texts at home. Stacy accessed an electronic storybook, *The Best Excuse*, at <http://www.tumblebooks.com>. She referred to the “Word Help” option to check the word’s meaning. Kyoung-Min often accessed a website, *Hubblesite*, to learn about the universe. Instead of searching for information about the universe by using search engines on the Internet, he accessed the specific website as his reference. Jae-Hoon and Brian consulted additional computer-based texts to comprehend particular online resources.

Another computer-based resource was online dictionaries, and Jae-Hoon, Stacy, and Brian accessed them when they read computer-based texts. Stacy and Brian usually used an online dictionary, *Dictionary.com*, because it was easier for them to look for words there than in a paper-based dictionary. Stacy said, “I use an online dictionary. . . . [A paper-based dictionary] is more difficult to find a word definition” (Stacy Think-Aloud 2H). However, Kyoung-Min did not use an online dictionary although he was reading a computer-based text. The ELLs did not refer to online resources more seriously than paper-based counterparts, but they definitely considered them as their references.

#### *Referring to a Paper-Based Resource*

Kyoung-Min frequently referred to paper-based books in his room when he read computer-based texts. Kyoung-Min accessed the *Beestar* website at <http://www.beestar.org> and took a social studies quiz. When he encountered a difficult question, he went into his room to pick up books to find information about the question. For example, Kyoung-Min read a question about the Colosseum and said, “I don’t really know about this. . . . I don’t know. I will look at the books” (Kyoung-Min Think-Aloud 1H). Kyoung-Min could search for the information from the Internet, but he decided to read paper-based books instead. Actually, he did not consider computer-based texts as his major reading resources and emphasized, “I don’t really read online. I don’t really read here” (Kyoung-Min Think-Aloud 3H). However, Kyoung-Min accessed this academic website and read computer-based texts because he wanted his mother’s reward, playing the *Pokémon* game at home for one hour. In addition to reading the books, Kyoung-Min and Brian referred to paper-based dictionaries when they found difficult words while they read computer-based texts at home.

### *Using Computer Skills and Devices*

When all the ELLs read computer-based texts, they used additional computer skills and devices. They downloaded computer-based content, used a computer mouse, and printed a hardcopy, all in an effort to facilitate their reading of computer-based texts.

#### *Downloading*

All the ELLs downloaded online resources when they read computer-based texts. Downloading is a basic concept when people navigate online. Dillon and Leonard (1998) define downloading as “the copying of information from one computer to another. Traditionally, this term has been viewed as the transfer of documents, database files, or other text-oriented data from a larger system to a smaller one” (p. 80).

Stacy downloaded a Korean song from a website at <http://www.4shared.com> to her computer for entertainment purposes. Jae-Hoon also downloaded songs and computer games to his computer. He accessed the iTunes website at <http://itunes.apple.com>. When I first visited his home setting, Jae-Hoon said:

I just go to YouTube and. (accessing YouTube website) When I access YouTube, I can watch videos. It is interesting. So I watch videos like *Roller Coaster*. (pointing to other videos) I watch these ones. I visit [the *iTunes* website] and download computer games. And I visit here and download music. (Jae-Hoon Think-Aloud 2H)

He clarified that he downloaded computer-based texts from the Internet. Moreover, Brian searched for information to learn how to download a computer game, *World of Warcraft*, from the Internet.

In addition to downloading songs, videos, software applications, and computer games for their entertainment purposes, ELLs accessed the Internet to download textual resources from school websites. Stacy accessed her classroom teacher’s website and

downloaded a handout for her school project. All other ELLs in this study also downloaded school-related computer-based texts from the Internet.

### *Using a Computer Mouse*

Using a computer mouse is one of the skills of computer literacy, and all the ELLs used it when they read computer-based texts. They used a computer mouse when they followed or highlighted a particular area of the texts on the computer screen. In these cases, the mouse pointer was a tool for the ELLs to actively control when they read computer-based texts on the computer screen.

Kyoung-Min accessed the *Hubblesite* website at <http://hubblesite.org> and moved a mouse pointer to the text that he was reading. At that moment, Kyoung-Min was previewing the menus on the website; therefore, he moved the mouse pointer to follow and pay attention to the menu buttons. In addition, Stacy said, “I move the mouse pointer not to be lost when I read online” (Stacy Think-Aloud 2H). Brian also used his mouse to easily find where he was reading:

So I, so I can see like if you are reading this spot, and then you forgot what part you are reading. You can just see, you can just put [the mouse pointer] on it, and like, you can see that, and you can read it back. (Brian Think-Aloud 3H)

Kyoung-Min, Stacy, and Brian clarified that the mouse pointer helped them follow the texts that they were reading.

In other cases, the mouse pointer served a more pivotal role in reading and comprehending computer-based texts. For example, on the *Hubblesite* website, the mouse pointer looked like a telescope lens, and it magnified a particular object when Kyoung-Min moved the mouse pointer onto the target. In addition, all ELLs actively used the mouse pointer when they played computer games because a computer mouse was normally a tool to control the game characters.

The ELLs also used the mouse to highlight certain parts of computer-based texts. They moved the mouse pointer to the beginning of the text block and clicked the left button of the mouse. After that, the ELLs dragged the mouse to the end of the text block to highlight the text. Normally, computer users highlighted text to copy or cut, but the ELLs in this study also used the function to emphasize the computer-based texts while they read them. When Kyoung-Min highlighted a sentence in a think-aloud session, he said:

I just move the cursor if I read a really small word. (pointing to small words) The small words are really hard to read. That's why I use it. . . . I highlight certain parts of the text because if there is more important thing, it may be helpful to do that. (Kyoung-Min Think-Aloud 2H)

Stacy highlighted texts not to be lost, too.

#### *Printing a Hardcopy*

Jae-Hoon and Stacy printed the computer-based texts at home when I visited them for think-aloud sessions. Jae-Hoon opened a website at <http://www2.scholastic.com> and printed an article, *Success! Sun's Rays Fuel Flight*, for his school project. In addition, Jae-Hoon and Stacy printed the homework from their teacher's website at <http://web.me.com>. Jae-Hoon distinguished computer-based text readings from paper-based text readings as follows:

When I read a book, when I read a book, well like this [book] (showing a paper-based book to me), it does not show electronically like a computer. A book just presents text, so I can see it. An iPod shows texts on a white screen like electricity. It occurs because of electricity, so I feel dizzy when I see it for a long time. But, I don't feel dizzy when I read a book, so it is good. (Jae-Hoon Think-Aloud 2H)

He thought that it was hard to read computer-based texts on the screen for a long time, and this was one reason for him to print them. However, Kyoung-Min and Brian did not

print computer-based texts. Printing was a simple computer literacy, but Kyoung-Min did not have the authority to print a paper, and Brian did not have the computer literacy skill.

#### *Confirming a Prediction*

When Jae-Hoon and Stacy read computer-based texts, they confirmed whether their predictions were correct or not. When Stacy read an electronic storybook, *Hannah is My Name*, she thought aloud, “I think some inspectors will come to the place and send the family to Taiwan because they don’t have the green card” (Stacy Think-Aloud 3H). However, when Stacy finished reading this part of the text, she said, “I learn that the man within a uniform helps them. I expected that they would be caught, but they received the green card” (Stacy Think-Aloud 3H).

Jae-Hoon also confirmed his prediction when he read an online article, *Samsung Vibrant Galaxy S Series*, at <http://www.sikids.com/blogs/2010/07/23/samsung-vibrant-galaxy-s-series>. Jae-Hoon predicted the article would be about a cellular phone; after reading the computer-based text, he confirmed, “I can recognize that it is really about the cellular phone. Yes” (Jae-Hoon Think-Aloud 4H).

#### *Sharing an Information Source*

All the ELLs shared the sources of computer-based texts when they found good resources on the Internet. Kyoung-Min shared the sources of online games and stories, such as the *PBS Kids* website at <http://pbskids.org>, with his younger brother. He said that he taught his younger brother how to access computer-based texts when he found them.

Like Kyoung-Min, most of the ELLs in this study learned about good computer-based texts from others. Stacy learned about the *4shared* website at <http://www.4shared.com> from her cousin in Las Vegas and the *Let’s Get Cookin’* game at [192](http://www.shock-</a></p></div><div data-bbox=)

wave.com/gamelanding/letsgetcookin.jsp from her older sister. Jae-Hoon saw his older brother access the *iTunes* site to download songs and games and learned about the site from him. Jae-Hoon also introduced the iTunes site to his friends. Moreover, Brian obtained information about computer games from others, such as his neighbors and friends.

The ELLs shared the computer-based texts with their friends and younger siblings in home contexts. They shared their knowledge about the text sources with people who did not have the knowledge or who were not capable of finding the resources. In this study, only Kyoung-Min had a younger brother; Jae-Hoon, Stacy, and Brian were the youngest son or daughter or the only son. Therefore, they received more help instead of giving help to their siblings. However, they liked to share the information with their friends.

### *3. What Influences These ELLs to Use the Strategies When They Read Computer-Based Texts in Their Home Context?*

In this section, I answer the third research question, “what influences these ELLs to use the strategies when they read computer-based texts in their home context?” and identify what affected fourth- and fifth-grade ELLs’ use of diverse strategies when they read computer-based texts at home. I focus on comprehensive influential factors, which might affect the ELLs’ use of reading strategies when they read computer-based texts at home. Instead of analyzing the ELLs individually, employing a case by case method, I approach the influential factors for ELLs as a whole case.

All the ELLs adopted a series of strategies when they read computer-based texts at home, and four factors influenced their use of strategies at home. The factors were



(1) ELLs' electronic literacy knowledge and experiences, (2) parents' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, and (4) the language of computer-based texts.

### *ELLs' Electronic Literacy Knowledge and Experiences*

The ELLs' choices of computer-based texts and the use of strategies were relevant to their knowledge and experiences of electronic literacies. As electronic literacies consist of computer literacy, CMC literacy, multimedia literacy, and information literacy (Warschauer, 2002), students' capacities to perform each component determined what strategies they could use when they read diverse computer-based texts.

#### *Computer Literacy*

As computer literacy means knowledge and competence of how to use a computer in general (Topping, 1997), it was basic literacy when ELLs used a computer. Although a computer did not enhance literacy skills without other meaningful content, goals, purposes, and tasks (Warschauer, 1999), all the ELLs in this study still paid attention to their computer literacy, such as typing and operating basic computer programs, when they read computer-based texts at home. As Jae-Hoon said, "By the way, I want to type faster, but I can't" (Jae-Hoon Think-Aloud 1H). Kyoung-Min and Brian were not satisfied with their typing skills when they typed keywords into a search bar. This typing skill was important when the ELLs searched for computer-based texts and when they dialogued with others and texts. For example, since Jae-Hoon could not type without seeing the keyboard, he paid attention to the keyboard when he searched for information online. Therefore, he oftentimes could not refer to the recommendations of the search engines. In addition, when Jae-Hoon used his iPod Touch, he optimized the screen and

text size to read computer-based text more easily and efficiently. However, Kyoung-Min rarely changed the appearance of a website because he did not know how to modify the settings.

### *CMC Literacy*

As one of the prevalent technological methods in education, CMC literacy played an important role in communicative interactions. Through the interactions, individuals built their communities and recognized their identities (Lam, 2000; Swan, 2002). In these ways, CMC literacy also influenced the ELLs' reactions and their use of strategies when they read computer-based texts. One of the ELLs' favorite social networking sites was Facebook, and it was their resource to dialogue with others and to find computer-based texts. Stacy accessed it as follows:

(accessing the Facebook website) I access the websites like this. (pointing to the Facebook website) Here, I chat with my friends. I read what they write, but I don't spend much time here. I just read the postings. I don't stay long here. I just take quizzes and do something like that. (Stacy Think-Aloud 3H)

As Stacy clarified, she dialogued with her friends and accessed computer-based texts through Facebook. Jae-Hoon and Brian also had accounts with Facebook and used them for both purposes. They synchronously chatted with their friends who were online, or they asynchronously read to respond to others' postings. Jae-Hoon and Stacy dialogued with their friends and teachers through email, too. When Jae-Hoon experienced difficulty with finding web resources for a school project on the Internet, he asked for help from Mr. Hill through email. In these ways, the ELLs dialogued with others to share information. However, Kyoung-Min did not have an account on Facebook or other social networking sites, nor email to dialogue with others, and he did not know how to use them. Kyoung-Min's CMC literacy level was lower than that of the other ELLs in this study.

### *Multimedia Literacy*

Multimedia literacy refers to creating and interpreting complex documents containing images, audios, and videos as well as textual resources, and all literacy is multimedia literacy (Lemke, 1998; Warschauer, 2002). Therefore, ELLs' use of strategies in computer-based reading environments was relevant to their multimedia literacy, too. In other words, how much the ELLs could produce and understand diverse computer-based texts influenced how they used particular strategies in computer-based text reading contexts.

One of the remarkable features of computer-based texts was hypermedia, which created links between words and multimedia resources in nonlinear manners (Kommers, Grabinger, & Dunlap, 1996). All the ELLs in this study accessed hypermedia to find and make meanings of more computer-based texts in their home contexts; however, they oftentimes did not create the texts unless they had school projects. As Table 5 showed, in home contexts the ELLs accessed textual resources most frequently (41.4%), and video texts (27.6%) and computer games (18.1%) followed the textual information. On the contrary, they referred to images (8.7%) and audios (4.2%) the least. The ELLs preferred different text types when they read computer-based texts. For example, Jae-Hoon did not think an image was helpful for him. In a think-aloud session, he said:

When I see pictures, they are not moving. They don't move like the *Harry Potter* book. I don't know what happens before and next if there is one picture. If there are two pictures, it will be better. If there is one picture, I don't know anything. . . . It is good for prediction though. (Jae-Hoon Think-Aloud 2H)

However, he thought videos were the most helpful for him and commented, "Videos show the information, they also tell, so. For texts, I need to read them, but videos show everything, tell everything, and explain everything. So, I think it is the best

resource” (Jae-Hoon Think-Aloud 2H). Compared with Jae-Hoon, Stacy had different opinions regarding those text types. Stacy believed that images were helpful for her reading and that they told many things. She said, “When I don’t understand the text, the picture explains the text, so I can understand it” (Stacy Think-Aloud 1H). However, she did not like videos because she believed that videos mostly did not have detailed information. As Jae-Hoon and Stacy had different ideas about a same type of text, they could extract different information from a computer-based text and understand it. For example, Stacy could extract more information from an image than Jae-Hoon could, but Jae-Hoon could use video texts more effectively than Stacy for both efferent and entertainment purposes.

#### *Information Literacy*

The focuses of information literacy in this study were how the ELLs searched for computer-based texts online and evaluated them depending on their purposes. Therefore, information literacy influenced the ELLs’ uses of strategies when they read computer-based texts, such as accessing web pages, accessing hypermedia, and evaluating the computer-based text and deciding what to read.

All the ELLs in this study accessed the Google website and the YouTube website to search for their computer-based texts, but they adopted diverse search strategies to access computer-based texts. They directly typed a web address into an address bar, inserted keywords into a search bar, clicked a hyperlink on an open web page, clicked a bookmark, and modified an existing web address. In addition, the ELLs dialogued with the computer-based texts by referring to the suggestions of search engines in the Web 3.0 environments and revised their keywords to have better search results online. In these

ways, the ELLs' knowledge and performances of information literacy influenced their choice and use of strategies when they read computer-based texts at home.

### *Parents' Guidance and Interest for Computer-Based Text Reading*

In home contexts, parents played important and authoritative roles in their children's use of computers. As Bakhtin (1981) argues, parents had authoritative discourses, and all the ELLs had their internally persuasive discourses. Parents made a decision on how many hours their children could use a computer per day and forbade them from accessing certain genres of websites (Lee & Chae, 2007; Van den Bulck & Van den Bergh, 2000); these became the rules in home contexts. In this way, parental guidance and interest for computer-based texts influenced the ELLs' strategy for using computers at home.

According to the interviews with the ELLs' mothers, parents thought that using a computer at home had both positive and negative effects on their children. Jae-Hoon's mother said:

If students actively search for information to have more knowledge, it must be good. However, if students use it only for curiosity and waste too much time, I don't think it is helpful. . . . [Jae-Hoon] loves playing computer games. If I don't limit his playing time, he will play them too long time. So we restrain him. In addition, if he stays at home, he may spend too much time playing games, so I take him to a local library and stay with him for a couple of hours. (Interview with Jae-Hoon's mother)

As Jae-Hoon's mother commented, she admitted that computers could be both advantageous and disadvantageous to students. However, she was more concerned with the negative influences, thus limiting how many hours Jae-Hoon could use his computer or iPod Touch for any purpose. Brian's mother was specifically concerned with her son's playing violent computer games. All the other ELLs' parents also guided their children

by limiting the hours of using a computer to between one and two hours per day with the same reason, but it was not always easy.

Parents admitted that playing computer games too many hours and accessing inappropriate websites were disadvantageous to their children when they used a computer. Thus, parents guided their children not to access inappropriate computer-based texts for their ages, but not all parents could monitor their children's use of a computer unless they saw the children accessing a certain website. Stacy's father monitored his daughter's use of a computer by viewing a list of recently visited websites, but other parents did not know how to check what resources their children had visited on the computer.

All the mothers in this study allowed their children to use a computer as a reward for their children's hard work, and the ELLs also assumed that they could use a computer or play computer games after they completed their schoolwork. Stacy's mother shared her opinion, "Of course, I don't like them to play computer games. However, they work hard at school during the weekdays, so it is OK for them to play games for a while during weekends" (Interview with Stacy's mother).

Parents imposed the limitations and regulations on their children's computer use, and this eventually encouraged the ELLs to access computer-based texts for more entertainment purposes to some extent. All the ELLs decided more often to play computer games, watch videos, listen to or download music, and read interesting articles than to read plain and boring textual resources when their parents allowed them to use a computer.

Some parents actively encouraged their children to access particular websites when they used a computer. For example, Kyoung-Min's mother reviewed handouts from

his classroom teacher and recommended her son to access several educational websites, such as the *Beestar* website. Moreover, since Stacy's mother emphasized the importance of vocabulary words and encouraged her daughter to access relevant web resources, Stacy frequently accessed word-related computer games, such as *Wild Word West* and *English Quiz*.

Even though all the ELLs played active roles when they read computer-based texts at home, their internally persuasive discourses were hierarchically lower than their parents' authoritative discourses. Therefore, ELLs appropriated their voices and followed the rules and guidance of their parents, which influenced their use of strategies when they read computer-based texts at home.

#### *ELLs' Purposes for Reading Computer-Based Texts*

As I discussed in the "setting up the purpose" section, all the ELLs read computer-based texts at home either for information or for fun. Moreover, even though they did not have any purpose at first, they fundamentally set up a purpose when they read computer-based texts. The ELLs' purposes for reading the texts influenced their use of strategies.

#### *Reading Computer-Based Texts for Information*

All the ELLs in this study often read computer-based texts and searched for general or specific information at home. The search topics were diverse—sports, books, the solar system, computer games, etc. The efferent purpose was relevant to the ELLs' use of strategies—accessing a web page, evaluating the computer-based text and deciding what to read, adjusting the reading pattern, using reference, and using computer skills and devices.

When the ELLs found computer-based texts to be used for the acquisition of information, they typed keywords into search engines and referred to the recommended key words or websites more often than they entered URLs or clicked a bookmark. They also clicked hyperlinks when they found a good website. Since the ELLs basically looked for the information that they did not know well or wanted to know better, they mostly used search engines to find the information and navigated websites on the Internet. In this way, the ELLs could access a variety of informative computer-based resources. Even though Kuiper, Volmam, and Terwel (2005) found that students used keywords searching for more specific information but browsed websites to search for more general information about a broad subject, the ELLs in this study mixed both strategies. In other words, the students used keywords to search for specific information and browsed for more general information as Kuiper, Volmam, and Terwel (2005) argued. However, the ELLs also navigated a website to search for more-specific information in the computer-based texts. In any case, the ELLs considered the informativeness and the relevance when they decided what texts to read and evaluate.

When the ELLs read computer-based texts for information, they also modified their reading patterns. They read those texts slowly and in detail to have a better understanding of them; they often reread the informative texts. In addition to adjusting their reading patterns, the ELLs referred to paper-based resources and printed computer-based texts more often when they read informative texts than when they read fun texts. As I discussed in the “using references” section, Kyoung-Min frequently referred to paper-based books to support his computer-based text reading. Kyoung-Min did not



consider computer-based texts as his reading resources, even though he trusted the content of computer-based texts on the Internet.

### *Reading Computer-Based Texts for Fun*

At home the ELLs often read computer-based texts to search for fun resources. For entertainment purposes, they searched for diverse topics, such as athletes, celebrities, computer games, music videos, etc., and the purpose for reading influenced their use of strategies: accessing a web page, evaluating the computer-based text and deciding what to read, and adjusting the reading pattern.

When the ELLs read computer-based texts at home for fun, they either directly entered URLs into the address bar or clicked a bookmark more often than they typed keywords into search engines. All the ELLs usually accessed websites that they had already known and accessed; they followed their routines when they navigated on the Internet for fun. In this way, the ELLs could access both their favorite and new entertaining, computer-based resources on the same websites. Furthermore, the ELLs considered the appropriateness and the interestingness when they decided what fun texts to read and evaluate.

When the ELLs read computer-based texts for fun, they modified their reading patterns, too. The ELLs usually scanned the texts quickly to have a general idea about them. As I mentioned in the previous section, most of the ELLs read computer-based texts for information slowly and carefully, but they changed their reading patterns to obtain overall ideas about the texts they read for fun. However, this was also dependent upon the genre of the texts. The ELLs read fun textual resources quickly, but they spent much time when they played computer games. Compared to the reading of computer-

based texts for information, the ELLs did not refer to additional paper-based resources when they read computer-based texts for entertainment purposes, and they rarely printed texts in this case.

All the ELLs adopted particular strategies more often when they read computer-based texts for fun, and the choice of strategies changed according to their purposes for reading. Since they paid more attention to entertaining themselves when they read computer-based texts at home, they did not feel any pressure to collect informative and relevant resources for their school projects.

### *The Language of Computer-Based Texts*

The ELLs' language diversity was also a factor influencing their choice of computer-based texts and the use of strategies to read them. In the majority of cases, the ELLs accessed computer-based texts in their L1 and L2. The ELLs mostly accessed websites in their L1 to read them for fun; however, they accessed computer-based texts in English both for information and for fun. As shown in Table 6, the ELLs accessed *Drama Style* at <http://dramastyle.com>, *Daum Kids JJang* at <http://kids.daum.net>, *Joon Media* at <http://joonmedia.net>, *Junior Naver* at <http://jr.naver.com>, and YouTube at <http://www.youtube.com> to access their L1 resources, and all the sites were for TV programs, movies, videos, computer games, and stories about celebrities in their L1. In a conversational interview with Stacy, she responded:

Stacy: I am a curious person, so I search for information about Korean singers on the website. I just find how old they are when I am bored.

Researcher: Do you look for the information in English, too?

Stacy: (thinking carefully) No, I don't search for information about celebrities in English.

Researcher: Why not?

Stacy: If I play with my computer, I don't use it in English. I only play with it only in Korean. (Stacy Think-Aloud 2H)

Stacy often searched for computer-based texts about Korean singers and watched Korean TV programs with her family. While Stacy accessed and read the computer-based texts, she differentiated websites according to the language; she usually accessed Korean resources for entertainment purposes and English resources for efferent and academic purposes. One of the reasons was that she had already begun to feel difficulties with understanding her L1; it was hard for her to use the L1 computer-based texts for academic or efferent purposes.

Compared to reading computer-based texts in their L1 mostly for entertainment purposes, the ELLs accessed texts in English both for information and for fun. Table 6 shows that the ELLs in this study accessed the *Elementary Reading* website at <http://www.alline.org/euro/ereading.html>, *Sports Illustrated for Kids* at <http://www.sikids.com>, *Beestar* at <http://www.beestar.org>, *Online Dictionary* at <http://dictionary-reference.com>, *Study Island* at <http://www.studyisland.com>, YouTube at <http://www.youtube.com> etc. for efferent and academic purposes. However, they accessed *Brothers in Arms* at <http://brothersinarmsgame.us.ubi.com>, *PBS Kids* at <http://pbskids.org>, *All Kpop* at [www.allkpop.com](http://www.allkpop.com), *Funschool Game* at <http://funschool.kaboose.com>, *FusionFall* at <http://fusionfall.cartoonnetwork.com>, YouTube at <http://www.youtube.com> for entertainment purposes. The ELLs accessed several websites, such as Google and YouTube for both purposes, but they usually accessed particular computer-based texts for either information or fun.

4. *What Strategies Do These Elementary ELLs Use When They Read Computer-Based Texts in Their School Context?*

5. *In What Ways Do These Elementary ELLs Describe Their Use of These Strategies in Their School Context?*

The ELLs' use of strategies when they read computer-based texts in their school settings was also one of my main foci in this study. In the data analysis process, 15 main categories emerged to describe the ELLs' use of strategies, and I also included subcategories of each category when applicable and provided participants' emic voices. In order to avoid unnecessary repetitions, I reduced the explanations of similar or identical strategies that participants used in home contexts.

The emerged reading strategies consisted of (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) inferring the text, (11) scrolling up and down and getting back and forth, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source. The list of the strategy categorizations is in Table 8.

*Accessing a Web Page*

All the ELLs in this study searched for a whole website or a single web page prior to their reading computer-based texts at school. This strategy included the ELLs' reactions to navigating to search for the computer-based texts before they actually read them. During the analysis process, I identify four sub-strategies for finding and accessing a website or a web page.

Table 8

*Reading Strategy Categorization at School*

Number	Category	Sub-Category
1	Accessing a Web Page	<ul style="list-style-type: none"> <li>• Typing Keywords into a Search Engine</li> <li>• Clicking a Bookmark</li> <li>• Typing a Web Address into the Address Bar</li> <li>• Clicking a Hyperlink of an Open Website</li> </ul>
2	Accessing Hypermedia	<ul style="list-style-type: none"> <li>• Accessing an Image</li> <li>• Accessing a Video</li> <li>• Accessing a Textual Resource</li> <li>• Accessing an Audio</li> <li>• Accessing a Computer Game</li> </ul>
3	Evaluating the Computer-Based Text and Deciding What to Read	<ul style="list-style-type: none"> <li>• Considering if the Text is Informative</li> <li>• Considering if the Text is Appropriate</li> <li>• Considering if the Text is Interesting</li> <li>• Considering if the Text is Relevant</li> </ul>
4	Setting up the Purpose	
5	Previewing	<ul style="list-style-type: none"> <li>• Previewing Titles</li> <li>• Previewing and Clicking Menu Buttons</li> <li>• Previewing Texts</li> </ul>
6	Making a Connection	<ul style="list-style-type: none"> <li>• Connecting Text to Self</li> <li>• Connecting Text to Text</li> <li>• Connecting Text to World</li> </ul>
7	Dialoguing	<ul style="list-style-type: none"> <li>• Dialoguing with Others</li> <li>• Dialoguing with Self</li> <li>• Dialoguing with Texts and Authors</li> </ul>
8	Adjusting the Reading Pattern	<ul style="list-style-type: none"> <li>• Reading Aloud or Silently</li> <li>• Rereading</li> </ul>
9	Monitoring the Comprehension	
10	Inferring the Text	<ul style="list-style-type: none"> <li>• Predicting the Story or the Content</li> <li>• Guessing the Meaning</li> </ul>
11	Scrolling Up and Down and Getting Back and Forth	
12	Using References	<ul style="list-style-type: none"> <li>• Referring to a Computer-Based Resource</li> <li>• Referring to a Paper-Based Resource</li> <li>• Referring to Another Resource</li> </ul>
13	Using Computer Skills and Devices	<ul style="list-style-type: none"> <li>• Using a Computer Mouse</li> <li>• Printing a Hardcopy</li> </ul>
14	Confirming a Prediction	
15	Sharing an Information Source	

The sub-strategies were (1) typing keywords into a search engine, (2) clicking a bookmark, (3) typing a web address into the address bar, and (4) clicking a hyperlink of an open website.

*Typing Keywords into a Search Engine*

“Typing keywords into a search engine” was the most-frequently used strategy when the ELLs in this study searched for computer-based texts in school contexts. Jae-Hoon used the Google website and typed keywords, “Southwestern Native American Customs,” into the search bar in order to complete his social studies project. Before students worked on the computer-based project, Mr. Hill taught them about Native Americans. Mr. Hill’s students read the paper-based textbook. In compliance, Jae-Hoon also referred to his textbook first; but then he searched for the information on the Internet because he could not find the detailed information in the book. When he worked on another social studies project at school, Jae-Hoon commented:

[I] go to Safari and Google. (typing “Californian Gold Rush” into the search bar) Google, Google. The most convenient one is to access Google and type the words. Google is really good, and it has images. If I type “Californian Gold Rush”, everything comes up. (Jae-Hoon Think-Aloud 1S)

In Kyoung-Min’s case, Mrs. Davis taught the overall organization of the U.S. and instructed her students to access the Google website and search for information about a country. Based on Mrs. Davis’ instruction, Kyoung-Min accessed Google and searched for information about Israel, including information about its politics, economy, demographics, culture, etc. Even though Kyoung-Min did not frequently respond to Mrs. Davis during class about the organization of the U.S., he was very active when he searched for and read the information about Israel on the Internet.

Jae-Hoon and Kyoung-Min searched for information for their school projects by using search engines. Their classroom teachers gave them the search topics, or the ELLs chose them to some extent. Mr. Hill assigned “Southwestern Native American Indian” as a topic to Jae-Hoon’s group, and Jae-Hoon selected one of the relevant topics, “Southwestern Native American Customs.” In addition, Mrs. Davis assigned her students to look for “A country that they want to learn more,” and Kyoung-Min selected “Israel” for his search. These searching processes included the ELLs’ partial authority under their teachers’ guidance. However, Stacy and Brian did not have a chance to use a search engine during their computer sessions at school.

#### *Clicking a Bookmark*

“Clicking a bookmark” was the second most-frequently used strategy for the ELLs to find and access a website at school. To make students’ search processes convenient, computer specialists at the schools bookmarked several websites, such as Google, *Study Island*, and *Pearson Success Net* websites, to desktop and laptop computers at school. In Kyoung-Min’s case, Mrs. Davis verbally requested every student to click the Google bookmark on the school website and to find a word list about Halloween, and Kyoung-Min clicked the bookmark to access the Google website. Furthermore, all the teachers in this study personally bookmarked frequently accessed web resources on their computers and accessed them when they needed the resources in class.

#### *Typing a Web Address into the Address Bar*

All the ELLs directly typed the web address into the address bar to access computer-based texts in school contexts, and this was the third most-frequently used

strategy to access a web page, as shown in Table 9. To do so, the ELLs referred to texts on a paper, a computer screen, and a whiteboard. When they referred to paper-based texts, the ELLs usually checked the handouts from their classroom teachers. For example, Mrs. Davis offered handouts to her students before they went to a computer lab; these handouts provided several website URLs and basic instructions to use the facilities at the computer lab. When Kyoung-Min read the handout and accessed the *Study Island* website, he said:

Kyoung-Min: (reviewing the *Study Island* website)

Researcher: How did you know how to use this website?

Kyoung-Min: (showing a handout from Mrs. Davis) Oh, it really tells the stuff here. The extra stuff.

Researcher: Oh, I see. Did you get this instruction from your teacher?

Kyoung-Min: Yeah. (Kyoung-Min Think-Aloud 2S)

Table 9

*Frequency of Strategies of Accessing a Web Page at School*

	Sub-Category	Frequency (%)
1	Typing Keywords into a Search Engine	45.8
2	Clicking a Bookmark	26.5
3	Typing a Web Address into the Address Bar	14.5
4	Clicking Hyperlink of an Open Website	13.2
	Total	100

Instead of giving handouts to students, Mrs. Bryant posted a list of URLs on her personal website (see Figure 1), so her students could access the websites by clicking hyperlinks. In the school contexts, this strategy was common because teachers planned their lessons ahead of time, and they also shared those resources with their students.



All the ELLs also referred to the whiteboard to find URLs. Mrs. White wrote down four web addresses on the whiteboard at her computer lab period: <http://www.thekidzpage.com/halloween-games>, <http://pbskids.org/license>, <http://www2.scholastic.com/browse/scholasticNews.jsp?>, and [www.sadlier-oxford.com/vocabulary](http://www.sadlier-oxford.com/vocabulary). Stacy directly typed the web address into the address bar to access those websites and read the computer-based texts. This was a common scene that I could observe in school contexts. Every teacher in this study wrote down the web addresses on the whiteboard, and the ELLs copied the web addresses on the board to their computers to access the websites.

#### *Clicking a Hyperlink of an Open Website*

All the ELLs in this study clicked hypertexts and hypermedia to search for and read computer-based texts in school contexts, but this was the fourth-frequently used strategy. Jae-Hoon, Stacy, and Brian followed how their teachers clicked a hyperlink of an open website. Mrs. Chang taught Jae-Hoon and Stacy how to search for both paper-based and computer-based reading materials located in the library database. Mrs. Chang clicked each hyperlink and menu step by step, and students clicked the same link immediately after she did. Jae-Hoon and Stacy followed the teacher's instructions and clicked each menu item, as hyperlinks. Through this step-by-step visual demonstration, Jae-Hoon and Stacy learned how to find resources from the library and access computer-based texts at school.

Mrs. Bryant also taught Brian how to navigate websites. Mrs. Bryant accessed the *Mojave Indian Culture and History* website at [http://www.nativelanguages.org/mojave\\_culture.htm](http://www.nativelanguages.org/mojave_culture.htm) and previewed the list of relevant websites. She shared her computer screen

by projecting it onto a ceiling-recessed projector screen so that students could see the websites and the hyperlinks. Mrs. Bryant previewed the *Mojave Indian Culture and History* website with her students and clicked the *Mojave Native Americans* link at <http://www.nps.gov/moja/mojahtna.htm>. These hypertext and hypermedia offered intra-textual and inter-textual links to other relevant computer-based texts.

### *Accessing Hypermedia*

In the school contexts, both ELLs and their teachers accessed computer-based texts with diverse formats by clicking the hypermedia. Five subcategories emerged in this category: (1) accessing an image, (2) accessing a video, (3) accessing a textual resource, (4) accessing an audio, and (5) accessing a computer game.

#### *Accessing an Image*

All the ELLs and their classroom teachers accessed image resources frequently when they read computer-based texts. Table 11 shows that the ELLs accessed image resources as often as 33.4%, thus indicating that images were the most-frequently used materials for their reading computer-based texts at school. I did not consider the frequency of strategies of accessing hypermedia for each ELL at school because the number of my school visits for each ELL was not equal.

Kyoung-Min accessed a website about Israel at <http://en.wikipedia.org/wiki/-Israel> for his school project. When he scrolled down to preview the web page, Kyoung-Min looked at an image and said, “Oh, it is cool! This is the national flag of Israel” (Kyoung-Min Think-Aloud 3S). He also looked at the images of “the Sea of Galilee,” “the Knesset building,” “Israeli tanks,” etc. and read the textual resources for each image.

However, Kyoung-Min did not participate in the class discussion about the topic when he read his textbook. He mostly listened to his teacher and other classmates.

Stacy and Brian requested help from their teachers about the images. For her science project, Stacy decided to do research on white Bengal tigers, and she came to Mrs. White and asked her to find and print the images of white Bengal tigers. Brian also asked for help from Mrs. Bryant, and she searched for computer-based texts, including textual resources and images, for Brian.

In Jae-Hoon's case, Mr. Hill gave students time to complete their writing project, and the task was to write a personal narrative about the most exciting moment during summer. Jae-Hoon's topic was "Riding a Rollercoaster," and he accessed the Disneyland website to see images of it and inserted them in his personal narrative. Moreover, Jae-Hoon accessed the Google Maps page to see the street view of Disneyland.

#### *Accessing a Video*

All the ELLs used computer-based video resources at school. "Accessing a Video" (30.4%) was the second frequently used strategy following "Accessing an Image" (33.4%) when they accessed hypermedia at school. In Jae-Hoon's case, Mr. Hill asked his students to access the *enVisionMath* website at <https://www.pearsonsuccessnet.com> and take a quiz as a school assignment. Jae-Hoon selectively watched an instructional video explaining division of whole numbers and decided to replay certain instructions multiple times. Mr. Hill's students loved to watch the video texts and read the computer-based instructions. Mrs. Bryant also showed videos to facilitate students' understanding of volcanoes and discussed the volcano topic with students. Her students expressed their excitement, which reflected their preference for video texts.

However, teachers used the video texts not only for their academic curriculum but for students' world lives and school lives. On October 26, Mr. Hill played *UNICEF video: Trick-or-Treat for UNICEF-2009 Elementary School Kit Video* at [http://www.youtube.com/watch?v=0FS\\_6svNzNo](http://www.youtube.com/watch?v=0FS_6svNzNo). At that time, Mr. Hill's students were not solely entertained but more serious and deliberate. They learned how the United Nations Children's Fund (UNICEF) saved and improved the lives of children in other countries. When the video ended, the students even applauded the video. Mr. Hill also played the *Prevent Protect Elementary School Version* video at <http://www.youtube.com/watch?v=HdXsi452QY4>. The content of that video text was how to treat everyone equally regardless of how they look, what they wear, and how they speak in school settings. The video texts could be the sources of the ELLs' learning and knowledge of school lives and the world.

In the school contexts, Mrs. Chang, Mr. Hill, Mrs. Davis, and Mrs. Bryant actively used video texts. They did not just play the videos from beginning to end; instead, they paused the videos and discussed the topic with students. For example, when Mr. Hill and Mrs. Bryant showed videos on the *enVisionMath* website, they monitored whether students concentrated on the video, and they asked several questions to facilitate the students' critical thinking process. Moreover, the teachers checked if the students comprehended the video texts.

#### *Accessing a Textual Resource*

All the ELLs accessed textual resources when they used a computer in a classroom or in a computer lab at school, as shown in Table 10. Textual information was the third most-frequently used resource, with a 24.7% frequency level, as shown in Table

11. This table shows the frequency of use of strategies for accessing hypermedia in school contexts. Images (33.4%) and videos (30.4%) were more frequently used than textual information.

Jae-Hoon accessed the *Study Island* website and took a language arts quiz in class. He read questions linearly and selected an answer for each question. Jae-Hoon did not access the *Study Island* website at school with a serious purpose; therefore, he chose hyperlinks to access easy content, apostrophes. Jae-Hoon said, “Yes, apostrophes are easy, so I will start from easy one” (Jae-Hoon Think-Aloud 1S).

Kyoung-Min accessed a textual resource to complete a school project, for which he was supposed to choose one country and search for information. He clicked the Google bookmark on the computer and typed “isr” into the search bar, and the Google site suggested 10 relevant keywords. Kyoung-Min selected “Israel” for the search process. However, Stacy and Brian did not often have opportunities to individually search for textual resources for their school projects because their teachers did not assign them those tasks.

Students, including ELLs, also observed their teachers accessing textual resources to facilitate their lectures. During her science class, Mrs. Chang typed “volcanoes” into the Google search bar and showed the students several articles and their images. In addition, when Brian asked Mrs. Bryant about synonyms of *say*, Mrs. Bryant typed a URL to the address bar to access the *Over 100 Ways to Say Said* website at <http://www.msgarrettonline.com/100ways.html>. She introduced several synonyms of the word and printed the web page for Brian.

Table 10

*Website List that ELLs Accessed in the Study at School*

ELL's Name	Name of Website (URL)/Topic	What the ELL Does
1 Jae-Hoon	<ul style="list-style-type: none"> <li>• Annenberg Learner website (<a href="http://www.learner.org">www.learner.org</a>)/Education</li> <li>• Arlington Heights website (<a href="http://www.ahsd25.k12.il.us">http://www.ahsd25.k12.il.us</a>)/Education</li> <li>• eHow website (<a href="http://www.ehow.com">http://www.ehow.com</a>)/Education</li> <li>• enVisionMath website (<a href="http://www.pearonsuccessnet.com">http://www.pearonsuccessnet.com</a>)/Education</li> <li>• Google website (<a href="http://www.google.com">http://www.google.com</a>)/Portal site</li> <li>• Native American Language Net website (<a href="http://www.native-languages.org">http://www.native-languages.org</a>)/Education</li> <li>• Online dictionary (<a href="http://dictionary.reference.com">http://dictionary.reference.com</a>)/Online dictionary</li> <li>• Study Island (<a href="http://www.studyisland.com">http://www.studyisland.com</a>)/Education</li> <li>• Teacher's website (<a href="http://web.me.com">http://web.me.com</a>)/Education</li> <li>• The Encyclopedia of Earth (<a href="http://www.eoearth.org">http://www.eoearth.org</a>)/Education</li> <li>• Wall Wisher (<a href="http://www.wallwisher.com">http://www.wallwisher.com</a>/wall/watercycleF-6)/Social networking</li> </ul>	<ul style="list-style-type: none"> <li>• Accesses websites: see the left column</li> <li>• Checks and completes the homework at the teacher's website</li> <li>• Refers to an online dictionary</li> <li>• Searches for and reads textual information: Ghost town, Gold Rush, apostrophes, fractions, etc.</li> <li>• Take computer-based quizzes: <i>enVisionMath</i> and <i>Study Island</i></li> <li>• Watches videos played by his teachers</li> <li>• Types his school project using OpenOffice</li> </ul>
2 Kyoung-Min	<ul style="list-style-type: none"> <li>• About.com (<a href="http://k6educators.about.com">http://k6educators.about.com</a>)/Education</li> <li>• Google Site (<a href="http://www.google.com">http://www.google.com</a>)/Portal site</li> <li>• Halloween Word List (<a href="http://www.carlscorner.us.com/Writing/Halloweenposter.pdf">http://www.carlscorner.us.com/Writing/Halloweenposter.pdf</a>)/Education</li> </ul>	<ul style="list-style-type: none"> <li>• Accesses websites: see the left column</li> <li>• Searches for and reads textual information: Halloween Word list, Jerusalem, Israel, etc.</li> <li>• Takes quiz online: <i>Study Island</i></li> </ul>

Table 10 (continued).

ELL's Name	Name of Website (URL)/Topic	What the ELL Does
2	<ul style="list-style-type: none"> <li>• Study Island (<a href="http://www.studyisland.com/">http://www.studyisland.com/</a>)Education</li> <li>• Wikipedia (<a href="http://www.wikipedia.com/">http://www.wikipedia.com/</a>)Education</li> <li>• ABCYa.com (<a href="http://www.abcya.com/fourth_grade_computers.htm">http://www.abcya.com/fourth_grade_computers.htm</a>)Education</li> <li>• Google Site (<a href="http://www.google.com/">http://www.google.com/</a>)Portal site</li> <li>• Online dictionary (<a href="http://dictionary.reference.com/">http://dictionary.reference.com/</a>)Online dictionary</li> <li>• Oxford website (<a href="http://www.sadlier-oxford.com/vocabulary/">http://www.sadlier-oxford.com/vocabulary/</a>)Education</li> <li>• Scholastic News (<a href="http://www2.scholastic.com/">http://www2.scholastic.com/</a>)Education</li> <li>• School website (not listed for credential issue)/Education</li> <li>• State Symbol website (<a href="http://www.statesymbolusa.org/">http://www.statesymbolusa.org/</a>)Education</li> <li>• Study Island (<a href="http://www.studyisland.com/">http://www.studyisland.com/</a>)Education</li> <li>• Teacher's website (<a href="http://web.me.com/">http://web.me.com/</a>)Education</li> <li>• The Kidz Page (<a href="http://www.thekidzpage.com/halloween-games/">http://www.thekidzpage.com/halloween-games/</a>)Game</li> </ul>	<ul style="list-style-type: none"> <li>• Types his school project using OpenOffice</li> <li>• Creates documents using iPhoto</li> <li>• Accesses websites: see the left column</li> <li>• Checks and completes the homework at the teacher's website</li> <li>• Plays typing computer games</li> <li>• Refers to an online dictionary</li> <li>• Types her school project using Office 2007</li> </ul>
4	<ul style="list-style-type: none"> <li>• Teacher's website (<a href="http://teacherweb.com/">http://teacherweb.com/</a>)Education</li> <li>• Google Site (<a href="http://www.google.com/">http://www.google.com/</a>)Portal site</li> <li>• Kids' Zone (<a href="http://nces.ed.gov/nceskids/createagraph/">http://nces.ed.gov/nceskids/createagraph/</a>)Education</li> <li>• TumbleBook Library (<a href="http://www.tumblebooks.com/">http://www.tumblebooks.com/</a>)Education (reading)</li> <li>• Britannica (<a href="http://www.britannica.com/">http://www.britannica.com/</a>)Encyclopedia</li> </ul>	<ul style="list-style-type: none"> <li>• Accesses electronic storybooks: <i>Big or Little and Our California</i></li> <li>• Accesses websites see the left column</li> <li>• Refers to an online dictionary</li> <li>• Watches videos played by his teachers</li> </ul>

Table 11

*Frequency of Strategies of Accessing Hypermedia at School*

	Sub-Category	Frequency (%) for ELLs and Teachers	Frequency (%) for ELLs
1	Accessing an Image	33.4	36.4
2	Accessing a Video	30.4	12.1
3	Accessing a Textual Resource	24.7	42.4
4	Accessing an Audio	7.2	0.0
5	Accessing a Computer Game	4.3	9.1
	Total	100	100

Mrs. Chang and Mrs. Bryant accessed computer-based textual resources to facilitate students' understanding of particular concepts and phenomena, which were not in their textbooks. Mr. Hill and Mrs. Davis also frequently accessed computer-based textual resources for their students. However, Mrs. White did not often share those resources with her students in class; she used more paper-based resources and verbal interactions during her classes.

*Accessing an Audio*

Neither the ELLs nor their classroom teachers accessed audio resources frequently in this study. The frequency rate of accessing audio resources in school settings was only 7.2%. Mrs. Bryant turned on Native American flute music on her computer when students worked on the Rock Art project to understand American Indians' buffalo hide arts. She turned on the music for her students because the theme of the music matched the class activity on that day. Mr. Hill also turned on classical music while his students wrote an essay, but it was not relevant to the project; other teachers did not access just audio texts. One possible reason for the low frequency level of accessing audio resources was that computer-based audio texts were not often used in an isolated



context at school. In other words, all the ELLs and their teachers used video texts, containing textual resources, images, and audios, for their school activities instead of accessing only audio texts.

Furthermore, Jae-Hoon, Stacy, and Brian showed their preferences for video texts over audio texts. In his think-aloud session, Jae-Hoon said:

I don't listen to sounds. No, it's not good. It does not say many things. I think videos are really good. If there is a movie and if there is a book version of the movie, I think seeing a movie is even much better than reading a book. (Jae-Hoon Think-Aloud 2S)

Stacy and Brian considered audio texts as less helpful resources, too. Kyoung-Min liked textual resources and did not have a preference to specific multimedia texts, so no ELL in this study liked audio resources.

#### *Accessing a Computer Game*

Jae-Hoon and Stacy had opportunities to access and play computer games at school; however, the chances were limited. Even though the students could play a variety of computer games at school, whether they could play them or not depended on their classroom teachers' decisions. For example, in Stacy's case, Mrs. White allowed her students to play typing games or vocabulary games after they completed a writing project. Stacy finished her writing earlier than others and clicked the typing software shortcut on the desktop to practice typing. She also selected the *Dance Mat Typing* page at <http://www.bbc.co.uk/schools/typing> and practiced keyboarding skills. In Jae-Hoon's case, Mr. Hill allowed his students to play games in the *Study Island* website; the games were designed for learning. For example, Jae-Hoon played the *Synonym and Antonym* game and *Math* games in company with his classroom partner.

Mr. Hill and Mrs. White allowed students to play computer games in school contexts, but they offered specific websites that the students could access; therefore, the students' choices were limited. Other teachers did not give their students opportunities to play computer games at school due to the limited time for computer sessions or because they did not appreciate the educational features of computer games. Kyoung-Min and Brian did not have opportunities to play computer games at school.

When all the ELLs accessed hypermedia, they searched for and accessed computer-based texts at school, but the classroom teachers had the authority to determine whether they would have computer sessions or not. The teachers' decisions influenced the ELLs' choice and use of the computer-based texts in school contexts.

#### *Evaluating the Computer-Based Text and Deciding What to Read*

Jae-Hoon used a laptop computer and accessed the *Study Island* website. He previewed the menu and selected the "Rounding Numbers" section of the fourth-grade math link. When the website opened, he previewed the questions and closed the section. He also selected the "Apostrophes" section, carefully read aloud the questions, and selected an answer for each question. Jae-Hoon did not have a specific reason for choosing the section. He accessed it because the content was easy for him.

Kyoung-Min searched Google for information on Israel and accessed a website at <http://en.wikipedia.org/wiki/Israel>. After reviewing the web page, he decided to read the main textual resource due to the rich information. Kyoung-Min also accessed other websites, including the *Background Note: Israel* website at <http://www.state.gov/r/pa/ei/bgn/3581.htm> and the *Israel: History, Geography, Government, and Culture* website at <http://www.infoplease.com/ipa/A0107652.html>. He briefly previewed the

content of both websites but decided not to read them. Stacy also accessed a game and decided to play it because it looked fun, but Brian did not have a chance to search for information online because the computer lab was not ready yet.

All the ELLs evaluated computer-based texts and decided on what texts to read or not to read based on four factors. The factors included if the texts were (1) informative, (2) appropriate, (3) interesting, and (4) relevant.

*Considering if the Text is Informative*

When all the ELLs decided to read a particular computer-based text at school, they considered whether the resource had enough information. If it was informative enough, the ELLs stayed at the site and read the texts; however, they shortly left a selected resource if it did not offer enough information. Since students usually read computer-based texts at school for efferent purposes, this component was critical.

When she was reading computer-based resources in Mrs. Chang's class, Stacy accessed but shortly left a website because she thought that the information on the site was not good enough for her topic. Jae-Hoon also concentrated on whether a website had good and enough information when he searched for resources for his school project.

When he could not find them, Jae-Hoon was very frustrated:

Jae-Hoon: (searching for information) Oh, my god. There isn't anything.

Student A: (looking at Jae-Hoon) What do you mean?

Jae-Hoon: There is not any information!

Student A: (trying to search for good information for Jae-Hoon but failing)

Jae-Hoon: Oh, there is nothing! (Jae-Hoon Think-Aloud 3S)

Since the ELLs' information searches were relevant to their school projects and there was a time limit due to the class schedule at school, the informativeness of a computer-based text influenced their decision-making process.

In addition to the ELLs, teachers focused on the informativeness when they read computer-based texts at school. When Mrs. Bryant searched for websites for her students' projects, she evaluated the resources based on whether they contained appropriate information. During the search process, Mrs. Bryant read the text aloud and said, "That's good information for your topic" (Brian Observation 9S). Both the ELLs and their teachers considered the informativeness as one of the important factors when they evaluated computer-based texts.

#### *Considering if the Text is Appropriate*

All the ELLs also considered the appropriateness as a factor when they decided to read a particular computer-based text, especially for their capabilities. However, I did not observe them considering if the text was appropriate regarding their ages for their computer-based readings at school. When Jae-Hoon searched for resources about prepositions on the Internet, he accessed Google and typed "prepositions" into the search bar to find a website. He read the first two paragraphs of a website and said that it was too difficult for him. Even though he thought that the resource was helpful, the website was not what he wanted for his search. Stacy also considered whether a resource was difficult or not before she actually read computer-based texts. When she communicated with one of her classmates, Stacy asked about the difficulty level of a typing game. She also asked how her classmate accessed a typing game and tried it. To avoid accessing too

difficult or too easy resources, the ELLs selected resources that were good for their grade levels.

*Considering if the Text is Interesting*

The interestingness of a text was another factor that Jae-Hoon, Stacy, and their teachers considered when they read or decided to read a computer-based text. In Jae-Hoon's case, Mr. Hill showed a computer-based video text to his students and asked if it was helpful for them. Some students liked the video text because it was interesting, but other students did not like it because they thought it was boring. Stacy also identified whether computer-based texts were interesting when she played typing games and vocabulary games at the school computer lab. These cases showed that students judged the same text differently depending on their preferences and standards, and that students paid attention to the interestingness when they evaluated a computer-based text.

However, Kyoung-Min and Brian did not show their preferences for interesting resources in school contexts. Instead, their main purposes of accessing and reading computer-based texts at school were related more to searching for information than entertaining themselves. Therefore, even though the computer-based texts were not interesting, Kyoung-Min and Brian still read the texts if the resources were informative enough to help their school projects.

*Considering if the Text is Relevant*

Whether a resource was relevant to the ELLs' search topics was the last factor influencing their decision of what to read. In most cases, the ELLs navigated websites according to their goals and their teachers' guidance, and they previewed whether the resource was relevant (1) to their search topic in general and (2) to their specific purposes.

For example, Kyoung-Min searched for computer-based resources about “Jerusalem” and “Israel” when he worked on a school project, “A country that they want to learn more.” He typed the keywords into the Google search bar and previewed titles and short descriptions to check if the resources were related to what he wanted to read in general. When Jae-Hoon searched for computer-based texts for a general topic, “California Gold Rush,” he also previewed titles and short descriptions of five websites and selected the third website as the best:

Jae-Hoon: (pointing to the third website from the top) This is the best.

Researcher: Why do you choose it?

Jae-Hoon: Well, it tells where James found, where, what lake, what river. Each paragraph has the information. Very useful and nice. By 1864, California's gold rush had ended. The rich surface and river placers were largely exhausted. (Jae-Hoon Think-Aloud 2S)

In another case, Jae-Hoon’s topic was more specific when he searched for information about “Southwestern Native American Customs”; therefore, he spent more time navigating the Internet and narrowing down his search scope. Consequently, Jae-Hoon previewed websites about Native American costumes and identified whether each resource was relevant to his specific topic. However, Brian did not have a chance to search for information at school; instead, Mrs. Bryant checked if certain computer-based texts were relevant to Brian’s school project topic because her students did not have access to personal computers at that time.

### *Setting up the Purpose*

When they read computer-based texts at school, all the ELLs set up their purposes: reading for information and reading for fun. Kyoung-Min accessed the *Study Island* website at <http://www.studyisland.com> as reading for information. Jae-Hoon and

Stacy accessed the same website with a similar goal. Kyoung-Min searched for information on “Halloween Word List” and accessed a computer-based text at <http://www.carlscorner.us.com/Writing/Halloween-poster.pdf> for a Halloween school project. In the above cases, the classroom teachers assigned the tasks, and students read the computer-based texts for information.

In addition to assigning the reading tasks for information, teachers assigned activities for fun. For example, Mrs. White requested her students to access either the *Dance Mat Typing* website at <http://www.bbc.co.uk/schools/typing> or the *Sadlier-Oxford* website at <http://www.sadlier-oxford.com/vocabulary> to practice typing after they completed their writing projects at the computer lab. Mrs. White assigned the activities to develop students’ computer literacy. The texts were in computer game format; the purposes of the activities were for both information and fun.

### *Previewing*

Even though the school’s filtering software blocked a large number of Internet resources and teachers limited the potential scope of students’ information search depending on school projects, there were still numerous texts accessible to the ELLs. All the ELLs previewed the resources before they fully began to read them to make the meaning-making process efficient and effective. For this previewing process, the ELLs previewed titles, menus, and texts.

### *Previewing Titles*

Jae-Hoon selected his own topic for a social studies project in Mr. Hill’s class and looked for “California Gold Rush” on Google. Instead of clicking several websites to

understand the content of each site, he scrolled down to preview the titles as well as the short website descriptions. In response to the previewing of titles, Jae-Hoon commented:

When I see the title, I can predict or infer. (reading a website title) It is about the California Gold Rush. How did Gold Rush proceed in California? Some people found gold, and who found it and where they found it? And, when did it begin and end? (Jae-Hoon Think-Aloud 2H)

All the ELLs observed that their teachers also previewed a list of titles and the short website descriptions before they actually accessed a website. When Mrs. Bryant helped her students with their school projects, she searched for computer-based texts for them. She accessed the *Mojave Indian Culture and History* website at [http://www.native-languages.org/mojave\\_culture.htm](http://www.native-languages.org/mojave_culture.htm) and previewed titles of each hyperlinked website to determine which website to access. As she shared her view of the computer screen by projecting it onto a ceiling-recessed projector screen, students could observe Mrs. Bryant's previewing the titles and website description. All the ELLs in this study either previewed titles when they needed to search for computer-based information on the Internet or observed their teachers previewing the titles.

#### *Previewing and Clicking Menu Buttons*

All the ELLs previewed and clicked menu buttons when they read computer-based texts at school. For example, when Kyoung-Min accessed the *Study Island* website, he previewed the menus and learned where he could find each subject material of his grade level. The ELLs also learned how to preview menus from their teachers. When Mr. Hill accessed the *Macmillan/McGraw-Hill* website at <http://activities.macmillanmh.com/science/ca>, he showed his students how he previewed the menus to access Grade 5 materials and "Chapter 4 Earth's Water." In this way, Jae-Hoon observed how his teacher previewed the menus when he read a computer-based resource.



### *Previewing Texts*

All the ELLs previewed texts to determine whether they would read them or not. For example, Kyoung-Min searched for information about “Jerusalem” for his school project and previewed the Google map of the city. He moved the mouse pointer on the map and read several names of locations briefly. Kyoung-Min also accessed the *Wikipedia* web resource at <http://en.wikipedia.org/wiki/Jerusalem> and previewed the text before he actually began to read the whole page. He scrolled up to move back to the beginning of the textual resources and read the computer-based textual resource linearly from the beginning.

Mrs. Bryant showed her students how to search for information about “Mojave Native American” and accessed the *Mojave People* web page at <http://www.britannica.com/EBchecked/topic/387800/Mojave>. She previewed textual resources and images on the site and checked whether the computer-based texts were meaningful for her students. As other teachers usually did, Mrs. Bryant accessed the site before previewing it to check if the web resource was appropriate for her students. She emphasized the previewing process in her interview:

I think there are many online resources. Yeah. You just have to, the problem is you just have to preview them. You can like YouTube, you might have a good video, but then it will pop up with some inappropriate advertisement or something, so uh, you just really have to screen them. You can't just let them loose on the Internet. (Interview with Mrs. Bryant)

As Mrs. Bryant mentioned, the previewing strategy was important to teachers to offer appropriate, harmless, and meaningful computer-based texts to their students.

### *Making a Connection*

In this study, all the ELLs used their schemata and made connections to themselves, texts, and world knowledge when they read computer-based texts in their reading processes at school.

### *Connecting Text to Self*

When all the ELLs read computer-based texts, they activated their prior knowledge and experiences. They made connections between the computer-based texts and themselves to facilitate their comprehension of the texts. Classroom teachers also asked questions to activate students' schema and shared their own prior knowledge and experiences with their students at school.

In Jae-Hoon's case, Mr. Hill accessed a science video, *How a Thunderstorm Forms*, at <http://activities.macmillanmh.com/science/ca/scienceinmotion/Common/SIM.html?Module=../Grade5/Chapter5-HowAThunderStormForms>. A narrator explained how a thunderstorm formed, and Mr. Hill frequently paused the video and added his comments about the content. He also asked if anyone already knew about the formation process of a thunderstorm in nature. Jae-Hoon responded to Mr. Hill's invitation:

Mr. Hill: (pausing the video) Who has heard about that before?

Jae-Hoon: We learned this last week from the book.

Mr. Hill: Right! Do you still remember that?

Students: Yeah!

Mr. Hill: (resuming the video)

Narrator: The warm air rises further forming a thunderhead. This rising air isn't updraft. When the cloud hits the stratosphere, it flattens out. The water droplets combine and grow until they fall as rain or hail.

Jae-Hoon: I saw a thunderstorm when I was in Korea.

Mr. Hill: How was it?

Jae-Hoon: It was scary. (Jae-Hoon Class Observation 13S)

Mr. Hill's students shouted for joy and pounded on the desk with excitement during this dialogue, and they became more engaged in the reading activities. As this dialogue among Mr. Hill, the video text, and Jae-Hoon had shown, the classroom teacher initiated an interaction with his students. To Mr. Hill's question about students' prior knowledge, Jae-Hoon connected the video text to his textbook and to his personal experience in his country of origin and shared the scary memory of seeing a thunderstorm.

Even though it was not in the context of reading computer-based texts, Mrs. White emphasized the use of "connecting text to self" strategy in class. Mrs. White posted students' writing samples to use the strategy on the wall. One of the samples was:

In the book, *The Westing Game*, everyone is going against each other just for the \$. On my friend's birthday, we were doing a scavenger hunt and all of us friends went against each other just so we could find more objects and win the prize. This shows me that money & property & winning is so important to us humans that we go against the people we love for it. (Stacy Fieldnote 3S)

Therefore, students learned the importance of the strategy from their teachers.

#### *Connecting Text to Text*

All the ELLs also connected a text to another text when they read or used computer-based texts. In the case of Jae-Hoon and Stacy, Mrs. Chang used a document camera to show Google images and other websites to show real gold mining tools from the past. When Mrs. Chang explained how gold miners found gold, Jae-Hoon commented that he had seen information about gold miners in the bi-annual state test. In this way, Jae-Hoon connected the texts to another text. Mrs. Chang's use of the computer-based texts was a typical way to facilitate students' learning, and other teachers used them, too.

For example, Mr. Hill and Mrs. Bryant used many images and video texts to show more about what they explained at school.

All the ELLs made these connections when they learned at school. To enhance their learning, the ELLs connected a text to other texts with a variety of presentation formats, and teachers tried to facilitate this process. The students and teachers made the intra- and intertextual connections to make effective their meaning-making processes in the learning environments of multiliteracies.

#### *Connecting Text to World*

All the ELLs connected texts to their world knowledge when they read computer-based texts at school, and their teachers also encouraged them to use this strategy. Their world knowledge was about real-life events and their communities. The ways the ELLs connected texts to their knowledge enabled them to comprehend computer-based texts better by considering how the texts were similar to or different from real life.

In the case of Jae-Hoon and Stacy, Mrs. Chang explained the features of volcanoes during a science class. After the explanations, Mrs. Chang accessed Google and searched for computer-based images about volcanoes. Even before she showed the images, Jae-Hoon' facial expression showed me his enthusiasm and his sense of expectancy in reading the images. He prepared to write about what he could find from the images. Mrs. Chang shared her view of the computer screen by projecting it onto a ceiling-recessed projector screen. The pictures could remind Jae-Hoon and Stacy of current news about volcanoes as real life events. Since classroom teachers showed computer-based texts and helped their students connect the texts to their world knowledge, Jae-Hoon, Kyoung-Min, Stacy, and Brian related the computer-based texts

with what they already knew about the world. This activity encouraged the ELLs to be more engaged in the reading.

### *Dialoguing*

In this study, all the ELLs dialogued with their teachers, other students, themselves, and texts, including the authors and creators of the texts, in school contexts. I assigned “dialoguing with others,” “dialoguing with self,” and “dialoguing with texts and authors” as the subsections of the “dialoguing” category.

#### *Dialoguing with Others*

All the ELLs in this study dialogued with other people when they read computer-based texts. The ELLs dialogued with their classroom teachers and classmates; classroom teachers dialogued with their students and other teachers or school staff. As the reading context at school was the classroom or the computer lab, most of the dialogues occurred between students and teachers and between students and students in person. However, the ELLs also interacted with each other through asynchronous CMC when they read computer-based text at school. The following paragraphs describe student-to-teacher and student-to-student dialogues.

Jae-Hoon searched for information on Southwestern Native American customs on the Internet, but he could not find appropriate computer-based texts for the project. He was frustrated and went to his teacher and initiated a dialogue with him as follows:

Jae-Hoon: There is no good information for my topic.

Mr. Hill: What did you type to find? Type “desert southwest.”

Jae-Hoon: (accessing Google; typing “desert southwest” into the search bar)

Mr. Hill: (previewing the list of search results) And [type] Native Americans.

Jae-Hoon: (typing “native Americans” into the search bar)

Mr. Hill: (previewing the list of search results) And [type] customs.

Jae-Hoon: (typing “costumes” into the search bar)

Mr. Hill: No O.

Jae-Hoon: (typing “customes” into the search bar)

Mr. Hill: No E.

Jae-Hoon: Oh. (typing “customs”)

Mr. Hill: (searching for a website about “South American Folklore”; searching for another website about “South American Culture”) Something is user friendly. This will be good. (searching for a website about “South American Desert People”) This is good.

Jae-Hoon: If you find anything else. Can you email me?

Mr. Hill: Sure, I will. (reviewing the title of each website from the search results; discussing the title with Jae-Hoon) This may work for you, too.

Jae-Hoon: (smiling) This is easy! (Jae-Hoon Observation 17S)

During this dialogue, Mr. Hill guided Jae-Hoon in how to revise and narrow down the scope of keywords, and Jae-Hoon became relaxed and self-confident regarding the information searching process. Moreover, since Jae-Hoon had not had a chance to learn how to search for information online efficiently, this dialogue was a learning experience for him.

It was not difficult to see teachers helping their students through dialogic interactions in other cases at school. When Kyoung-Min misunderstood a social studies project, “A country that they want to learn more,” Mrs. Davis recognized that Kyoung-Min accessed a website about the city. She initiated a dialogue by asking him whether Jerusalem was a city or a country. Through this dialogue, Jae-Hoon discovered what was wrong with his search process and finally typed the right keyword to complete his project

correctly. Stacy and Brian also interacted with their teachers while they read computer-based texts and requested help from the teachers.

However, scaffolding did not occur in one direction in the learning contexts of multiliteracies. The ELLs also helped their teachers with diverse issues while they dialogued with their teachers. When Mrs. Bryant accessed the *Kids Zone Learning with NCES* website at <http://nces.ed.gov/nceskids/createagraph> to create a graph for her class, she did not know how to submit the data to the website. While Mrs. Bryant had a hard time finding out how to submit her data to get the graph, Brian found the “Update” button on the web page to submit the data. This helped Mrs. Bryant create a graph and share the resource for the class, and she appreciated Brian’s help. In addition, Jae-Hoon activated his schema and assisted Mr. Hill to remember the name of a word processing program, *Open Office*, and Mr. Hill said that he was proud of Jae-Hoon. In technology-assisted learning environments, classroom teachers often learned from their students and considered that students were more knowledgeable than they were regarding the use of computers. In an interview, Mrs. White recognized her students’ computer literacies and said:

These kids are actually very competent and very computer literate. They can pick things up very easily. At high classes, typing was not a real skill, so they do something like what we just did today. . . . These kids actually get a lot of work done, so they’re pretty proficient and they can go home and also use their technology at home to find things and come to class next day. (Interview with Mrs. White)

She also mentioned students’ capabilities to work on computers:

Mrs. White: These kids bring more from home.

Researcher: What do you mean?

Mrs. White: These kids know more than we teach 30 minutes per week at school.

Researcher: Oh, really? What do you teach about technology?

Mrs. White: Not much. They all work at home about that. We only have 30 minutes per week. It's nothing. I don't know if they all have computers at home, but I think they all have them. All my students print their homework at home. (Interview with Mrs. White)

Mrs. Bryant also said, "I'm still learning. Students know more about [computer technology] than me. . . . I am new to this [Mac], but students already know how to do" (Brian Observation 10S).

All the ELLs also dialogued with other students when they read computer-based texts. In Brian's case, the school finally opened a Mac computer lab at the end of fall semester, and Mrs. Bryant had a computer session at the lab. For the computer session, students typed an essay about their friends on personal laptop computers. Mrs. Bryant and the computer specialist assisted students, but they could not help every student at the same time. Therefore, students frequently dialogued with each other, and Mrs. Bryant allowed them to discuss project-related issues to some extent. For example, Brian asked his classmate how he changed the font size in the *Microsoft Word* document. Even though they talked to each other, Mrs. Bryant did not stop them; instead, she encouraged the student to verbally explain to Brian how to change the font size. After the dialogue with his classmate, Brian told Mrs. Bryant that he learned how to change the font on the computer.

Kyoung-Min also dialogued with his classmates when he searched for the list of Halloween words. In this case, Kyoung-Min helped other students find the targeted web page. Even though he said it was bothersome to help the classmates, he smiled when he walked to the classmates and helped them. Since each student's individual information



literacy was different, Kyoung-Min became a capable peer to help struggling students regarding the search processes during the computer session.

In addition to the above face-to-face dialogues of students and teachers, both groups also used CMCs to interact with each other. Mr. Hill used the *WallWisher* website at <http://www.wallwisher.com> to facilitate the dialogues in class; see Figure 7. Mr. Hill initiated a computer-assisted dialogue with his students through asynchronous CMC. He posted a question, “What do you know about the Water Cycle??? Add key vocabulary when you can!” to the *WallWisher* page. Students read the question and responded to it by posting their knowledge about the water cycle to the same web page.



Figure 7. A screenshot of Mr. Hill’s *WallWisher* page

Jae-Hoon also dialogued with his teachers through email. He frequently requested help from Mrs. Chang and Mr. Hill through email and received extra help from these teachers regarding schoolwork. However, Stacy did not interact with her teacher through email because she was an introvert, and Kyoung-Min and Brian did not interact with their teachers through email because they did not have email accounts.

Throughout these face-to-face dialogues and CMCs, students and teachers actively interacted with each other. In addition, both students and teachers played roles as more knowledgeable and capable persons or received others' help dynamically when they read computer-based texts at school.

### *Dialoguing with Self*

Kyoung-Min and Jae-Hoon dialogued with themselves when they read computer-based texts; however, I could not often observe them to do this at school. Kyoung-Min accessed the *Study Island* website to take a math quiz, and he talked to himself while he read and thought about the questions:

Seven. (reading the Math question aloud) Each of the rectangles below has an area of 48 square inches. Which rectangle has the greatest perimeter? (reading the Math question aloud again indistinctly) 48! I think this is 48. (counting numbers to calculate the questions again) 34, 36, 38, 44, 48. Yeah. I think C is going to look like B. So I think, I just. Darn. What's wrong? I counted them in a wrong way. (reading the Math question aloud indistinctly again) B looks right and D looks the same. This is really tricky. (Kyoung-Min Think-Aloud 1S)

Kyoung-Min frequently asked himself questions when he had difficulty finding a correct answer and stated what he did right or wrong. Kyoung-Min also responded to the questions and statements by changing his reactions. For example, after each question or statement, Kyoung-Min read the math question repeatedly or thought about it carefully again. When I asked why he talked to himself during the problem-solving process, Kyoung-Min responded, "Because it's kind of focused when I think about it" (Kyoung-Min Think-Aloud 1S).

Jae-Hoon also dialogued with himself when he searched for information about the "Southwestern Native American Customs." When he had a hard time finding appropriate resources, Jae-Hoon said, "Oh, my god. There isn't anything" (Jae-Hoon Fieldnote 1S). After this utterance, Jae-Hoon went to his teacher to initiate another dialogue to request

help from him. The utterances in these cases preceded another utterance or reaction; therefore, they were basically dialogic in nature. I could not observe Stacy and Brian dialogue with themselves.

### *Dialoguing with Texts and Authors*

All the ELLs dialogued with computer-based texts when they read them. In Jae-Hoon's case, Mr. Hill accessed the *enVisionMath* website at [www.pearsonsuccessnet.com](http://www.pearsonsuccessnet.com) and played an instructional video on the site, and the narrator of the video explained the concept of estimation and frequently asked students questions. In this case, Jae-Hoon dialogued with the narrator of the video text and responded to her explanations and questions:

Narrator: What does the small one over the nine stand for?

Mr. Hill: Stands for what?

Student A: A thousand.

Jae-Hoon: 10 thousand.

Narrator: The small one over the nine stands for one hundred thousand.

Students: Wow! (Jae-Hoon Observation 11S)

In this dialogue, Jae-Hoon and his classmates actively responded to the texts. They liked to interact with the narrator and their teacher and looked very happy. However, Mr. Hill also played an important role in the dialogue. If the narrator's utterance did not gain students' attentions or if the students were not willing to participate in the dialogic interactions, Mr. Hill repeated or paraphrased the narrator's question to enhance the dialogues. In other words, Mr. Hill played a role as a moderator to facilitate the dialogues between his students and the computer-based text and encouraged the students to

collaborate with each other. His role as a moderator was important for students' meaning-making processes.

### *Adjusting the Reading Pattern*

When all the ELLs read computer-based texts, they adjusted their reading patterns. The ELLs read the computer-based texts silently in class, but teachers read them aloud for their students. In addition, they read the texts more than once. I assigned each strategy to one subcategory: (1) reading aloud or silently and (2) rereading.

#### *Reading Aloud or Silently*

All the ELLs either read computer-based texts aloud or silently in this study. Kyoung-Min took a quiz on the *Study Island* website and read several questions and answers aloud. He read the questions silently most of the time, but he vocalized them when they were hard to understand or when he wanted to focus on them. However, it was hard to hear his reading-aloud in the school contexts because his teacher did not want students to bother other students by reading aloud at the computer lab or in class. Jae-Hoon, Stacy, and Brian were in similar situations at school; they mostly read both paper-based and computer-based texts quietly unless their teachers requested them to read the texts aloud for the whole class.

#### *Rereading*

All the ELLs reread computer-based texts at school. In Jae-Hoon's case, Mr. Hill asked the students to access the *enVisionMath* website at <https://www.pearsonsuccessnet.com> and to watch an instructional video for a quiz as a school assignment. When Jae-Hoon watched the video, he replayed particular parts of the video by clicking the "Rewind" button if he did not understand the content. In addition, the ELLs reread

computer-based texts when they wanted to focus on certain information. For example, Jae-Hoon and Kyoung-Min took online quizzes at the *enVisionMath* and *Study Island* websites respectively, and they reread several questions and possible answers to have a better understanding of them and focus on them. In a think-aloud session at school, Jae-Hoon thought aloud:

What is the proper form of contraction of “I am”? What is the proper form of contraction of “I am”? The answer is “I’m,” so this one. (clicking a correct answer) And, What is the proper form of contraction of “He is”? Contraction of “He is”? This should be “He’s.” (clicking a correct answer) (Jae-Hoon Think-Aloud 1S)

He read several questions or a part of them multiple times. Brian also read several words two times when he accessed an electronic storybook at school.

In addition to the ELLs, teachers reread computer-based texts when they showed them to students. When Mr. Hill accessed the *enVisionMath* website for his math class, he showed an instructional video to his students. He repeated certain instructions as they were but paraphrased them to facilitate students’ dialogues and comprehension. Mr. Hill repeated certain expressions to cheer his students up and encouraged them to concentrate on the material. He also read certain expressions aloud again to elicit students’ responses and to facilitate their dialogues with the text.

Mrs. White also showed a series of images to her students for an inference activity. She showed images from a book, *Harris Burdick*, on her computer and requested her students to infer any information from the pictures. She showed the images multiple times so that her students could make inferences from the texts.

### *Monitoring the Comprehension*

All the ELLs checked whether they understood computer-based texts, and their teachers monitored the ELLs’ comprehensions by observing their reactions and asking

them questions. Stacy accessed the *Sadlier-Oxford* website at <http://www.sadlier-oxford.com> to play a word game; however, she could not understand how to play the game. She said, “I don’t know how to play this. It is very difficult. I don’t know what it tells” (Stacy Think-Aloud 1S). After she checked her comprehension of the game, Stacy decided to leave the text and access another one.

Mrs. Davis taught her students how to use *Open Office* and *iPhoto* and asked them to select pictures to include in their *iPhoto* projects. From time to time, she asked the students if they understood her instructions. Mrs. Bryant also dialogued with students to monitor their comprehension and facilitate their responses while showing an instructional video from the *enVisionMath* website:

Narrator: Please listen to the expression during the lesson. The bus is carrying 18 people. When the bus stops, people get on and off the bus. The expression for the number of people on the bus now is 18 plus or minus the number.

Mrs. Bryant: Minus means when people got off, right?

Students: Yes.

Narrator: How does the expression  $18+12-x$  represent the problem?

Mrs. Bryant: Can I use a different letter here? Can I use “p” of people or “n” of number?

Students: Yes.

Mrs. Bryant: Yes, we can pick the letter. (repeating the video) (Brian Observation 2S)

This dialogic interaction showed that Mrs. Bryant repeated the narrator’s questions or asked relevant questions. By asking those questions, Mrs. Bryant intrigued students’ responses and monitored their comprehension of the content. All other teacher participants dialogued with their students to monitor their comprehension, too.

### *Inferring the Text*

In school contexts, I observed Jae-Hoon, Kyoung-Min, and Stacy use the inferring strategy. Classroom teachers assigned inference tasks to their students, and the students predicted stories and guessed meanings from time to time. The following subsections describe how the ELLs predicted the story or the content and guessed the meanings when they read computer-based texts.

#### *Predicting the Story or the Content*

In Stacy's case, Mrs. White showed both computer-based and paper-based image texts of *The Mysteries of Harris Burdick* to students, and the students made inferences from those images. Students shared their inferences with their classmates, and Mrs. White discussed the students' predictions and checked whether they were correct or not. Stacy shared her inference with her teacher and classmates:

Stacy: The guy in the picture doesn't look good. Maybe he did something wrong.

Mrs. White: (showing an image through her computer) OK, this is great difference. So she just said, "I think maybe he did something wrong." OK, that's a good start for the inference, for the evidence. This picture makes it possible to infer. Cause this is a great picture for examining those clues. What's your evidence?

Stacy: Because the boy looks sad.

Mrs. White: Now we look at the facial expression. Does the boy look happy?

Students: No. (Stacy Observation 8S)

Stacy saw the computer-based images and made an inference based on the information of the text. She paid attention to the image and found that the character of the image looked sad. Stacy also connected the information to other images and inferred that the boy did something wrong in the story.

Mrs. Chang also showed her students a computer-based picture of three emperor penguins standing on a snowy glacier. Jae-Hoon inferred that it would be very cold because there was snow, and Stacy predicted that the penguins would fall down because the snow was slippery. To facilitate students' inferring processes, Mrs. Chang provided several prompts, such as "I wonder . . .," "I believe . . .," and "Based on . . ., I infer . . .," and students used the prompts when they made and shared their inferences.

### *Guessing the Meaning*

Jae-Hoon, Kyoung-Min, and Stacy guessed the meanings of words when they read computer-based texts, and classroom teachers also encouraged their students to guess the meanings before they looked up the words in a dictionary. During a computer session, Mrs. Davis said, "When you see words that you don't know what they mean, write them down and look for the meaning. Before you use a dictionary, guess the meaning first" (Kyoung-Min Observation 11S). Mr. Hill also let Jae-Hoon guess the meaning of a word, customs, before he told Jae-Hoon the definition of the word:

Jae-Hoon: What is customs?

Mr. Hill: What do you think?

Jae-Hoon: It is like cloth.

Mr. Hill: No, it's customs, not costumes.

Jae-Hoon: Oh, then is it culture?

Mr. Hill: Possibly. It is like tradition, (giving a dictionary to Jae-Hoon) Find it here. (Jae-Hoon Observation 17S)

Jae-Hoon confused "customs" with "costumes," and Mr. Hill encouraged Jae-Hoon to guess the meaning and to look up the word in a paper-based dictionary instead of giving



him the word's definition. Jae-Hoon also checked the word meaning in an online dictionary at <http://dictionary.reference.com> again to make sure of the meaning.

For those inferring processes, students used or teachers encouraged the students to use context clues. For example, Mrs. White and Mrs. Chang showed computer-based image texts to students, and their students found context clues to make inferences from those images. Mrs. Davis also emphasized using the context clues when students read texts. While Kyoung-Min read websites for his online math quiz at the computer lab, I asked if he used context clues for the reading. He said, "I usually do this, but I don't know about the reason" (Kyoung-Min Think-Aloud 2S).

*Scrolling Up and Down and Getting Back and Forth*

Stacy accessed a website at [http://en.wikipedia.org/wiki/California\\_Gold\\_Rush](http://en.wikipedia.org/wiki/California_Gold_Rush) to complete her social study project at school; she scrolled down by moving the scroll bar and read through the text. While she read the text, Stacy also clicked several hypertexts, such as "gold" and "chemical element," to access different web pages. For each movement and selection, she played a role as an active decision-maker to choose which hypertext and hypermedia to click and navigated the computer-based texts as her teacher allowed.

Jae-Hoon, Kyoung-Min, and Brian also scrolled up and down and clicked hyperlinks to navigate back and forth on the Internet when they individually read computer-based texts. In these ways, they could access internal resources on the same web page or external resources in another website. For example, Jae-Hoon clicked the "Rewind" and "Fast Forward" buttons to move to a different portion of a math video.

## *Using References*

When all the ELLs and teachers read computer-based texts, they referred to diverse references to facilitate both their reading and teaching. They used both computer-based resources and paper-based resources. They also used additional reference materials.

### *Referring to a Computer-Based Resource*

Jae-Hoon and Brian accessed computer-based resources such as online dictionaries to have a better understanding of particular texts. For example, after Jae-Hoon discussed the meaning of the word “custom,” he looked up the word in the online dictionary at <http://dictionary.reference.com> again. Brian typed an essay about his best friends at a computer lab. During the computer session, Brian asked his classmate how to spell the word “miscellaneous,” and the student accessed the *dictionary.com* website to look for the word. They discussed the meaning of the word and the spelling.

In Jae-Hoon’s case, Mr. Hill asked students to take an online quiz about decimals. Jae-Hoon referred to the electronic math textbook at the *enVisionMath* website through <https://www.pearsonsuccessnet.com> and read the information about decimals before taking the quiz. The website provided electronic texts that contained the identical pages as paper-based math textbooks, as well as supplementary multimedia resources. Mr. Hill, Mrs. Bryant, and their students oftentimes used the resources for the class.

In addition to using the online dictionaries and electronic textbooks, all the ELLs referred to other computer-based resources, such as Google and *Study Island*, for class projects (see Table 10). Their teachers also showed diverse resources to students. For example, Mrs. Davis accessed the Google Maps web page to introduce a mission to her students and helped them become familiar with the mission area before they actually

visited the place on a field trip. Mr. Hill and Mrs. Bryant also frequently accessed multimedia texts, such as images and videos, to provide visual support for what they had explained during their lectures.

*Referring to a Paper-Based Resource*

All the ELLs referred to paper-based resources when they read computer-based texts at school. In Jae-Hoon's case, Mr. Hill corrected Jae-Hoon's confusion between "customs" and "costumes." As the word was important for Jae-Hoon to understand his project correctly and might help him search for appropriate websites, Mr. Hill spent some time to discuss the meaning of "custom" with Jae-Hoon. He also encouraged Jae-Hoon to guess the meaning and consult a paper-based dictionary. I did not observe ELLs discuss the meanings of words with other students when they used the paper-based dictionaries.

In addition to using paper-based dictionaries, all the ELLs referred to their textbooks when they read computer-based texts. Since students and teachers selected computer-based texts mostly for their school projects, the computer-based resources were relevant to the textbook in many cases. For example, when Brian worked on his social studies project about "Mojave Native Americans," he searched for information from the textbook. When Jae-Hoon and Stacy completed their school projects about "California Gold Rush," they referred to their textbooks, too.

In school contexts, referring to a paper-based dictionary to learn the meaning of a word was a frequently used option. This was also true when they read computer-based texts if they used individual computers in classroom settings. If the ELLs read computer-based texts at a computer lab, they did not usually have immediate access to paper-based

dictionaries. Instead, they asked their teachers questions about the word's meaning or referred to computer-based resources.

#### *Referring to Another Resource*

Classroom teachers offered their instructions and the relevant information in different ways in class. Mrs. White wrote the instructions about how to organize and format the document on the whiteboard in the computer lab. Mrs. White also included several website URLs in her notes. These instructions and notes were basic reading resources for students at the computer lab. In classroom settings, the teachers also took notes on their lectures, class schedules, homework lists, etc. on the whiteboard. They also used a document camera and projector. Through the document camera and projector, teachers could project the memos on their notebooks, paper-based books, and handouts onto a projector screen. They could actually write their notes on a piece of paper simultaneously.

#### *Using Computer Skills and Devices*

All the ELLs in this study used additional computer skills and devices when they read computer-based texts. They used a computer mouse and printed a hardcopy to facilitate their reading of computer-based texts.

#### *Using a Computer Mouse*

All the ELLs used a computer mouse to facilitate the process of reading computer-based texts at school. They used a computer mouse when they pointed to a certain part on the computer screen and selected it. The mouse pointer was a tool for the ELLs to play active roles when they read computer-based texts and to pay attention to the texts on the computer screen.

Kyoung-Min used a desktop computer at the computer lab and accessed the *Study Island* website at <http://www.studyisland.com>. He selected a fourth-grade math quiz and read questions to answer them. Kyoung-Min moved a mouse when he read important information on the computer screen at school. Jae-Hoon, Stacy, and Brian also used this basic computer strategy when they read computer-based texts at school.

#### *Printing a Hardcopy*

Students asked their teachers to print the computer-based texts on their behalf. Stacy printed computer-based texts when she read them, but she needed her teachers' permission first. Brian wrote a personal narrative about his experiences of traveling and asked Mrs. Bryant what other verbs he could use instead of the word "say." Mrs. Bryant accessed the *Over 100 Ways to Say Said* website at <http://www.msgarrett-online.com/100ways.html> and printed the computer-based text for Brian as his resource. Stacy also asked Mrs. White in class to print several tiger images for her science project. In most cases, all of the ELLs' teachers printed computer-based texts and shared them with students so that the students could read them or use them as individual resources.

#### *Confirming a Prediction*

As I mentioned in the "inferring the text" section, Jae-Hoon, Kyoung-Min, and Stacy predicted the content of computer-based texts when they read and inferred the texts, but I could only observe the ELLs using the "confirming a prediction" strategy when their teachers assigned the relevant tasks for the class. In Stacy's case, Mrs. White had a language art period, and the task for the class was to make inferences from images. She showed both computer- and paper-based images of *The Mysteries of Harris Burdick*, and Stacy made inferences from those images and shared the inferences with her classmates.

Mrs. White and students discussed the predictions to check whether they were correct and to help them make more appropriate inferences.

Mrs. Chang also projected a computer-based image onto a projector screen and asked her students to infer or predict from the computer-based image. Jae-Hoon inferred that it would be cold because the image was about three emperor penguins on a glacier. After the discussion, Mrs. Chang and the other students confirmed whether Jae-Hoon's inference was reasonable or not.

### *Sharing an Information Source*

Jae-Hoon, Kyoung-Min, and Stacy shared sources of computer-based texts when they found helpful materials on the Internet. For example, Jae-Hoon shared his information resources about *Open Office* with Mr. Hill. Kyoung-Min searched for a list of Halloween words for a school project and shared it with other students experiencing difficulty due to their lack of information literacy. I could not observe Brian sharing his information about resources with others at school.

The ELLs' teachers also shared computer-based texts with their students. Mrs. Bryant found the *Kids Zone Learning with NCES* website at <http://nces.ed.gov/nceskids/-createagraph> and posted the link to her website. Mrs. Bryant demonstrated how to use the resource in class and shared the source by posting the URL to her personal website. Mrs. Davis and Mrs. White also wrote a list of websites on the whiteboard and shared the information with their students. Classroom teachers knew that not every computer-based resource was safe for young students. They recommended several previewed and safe resources to students.

6. *What Influences These ELLs to Use the Strategies When They Read Computer-Based Texts in Their School Context?*

In this section, I answer the sixth research question: What influences these ELLs to use the strategies when they read computer-based texts in their school context? I identify what affected the fourth- and fifth-grade ELLs' use of strategies when they read computer-based texts in school contexts. I also focus on comprehensive influential factors on the ELLs' use of reading strategies when they read computer-based texts at school. Instead of individually analyzing each ELL, I approach the influential factors for the four ELLs as a whole case.

When the fourth- and fifth-grade ELLs read computer-based texts in school contexts, they adopted a series of strategies to facilitate their reading. Regarding the ELLs' use of strategies at school, four influential factors emerged. The factors were (1) electronic literacies of ELLs and teachers, (2) teachers' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, and (4) technology equipment at school.

*Electronic Literacies of ELLs and Teachers*

In this study, electronic literacies of ELLs and classroom teachers influenced their choice of strategies when they read computer-based texts at school. I discuss the influences of each electronic literacy component: computer literacy, CMC literacy, multimedia literacy, and information literacy.

*Computer Literacy*

As computer literacy was a basic literacy skill when ELLs read computer-based texts at school, classroom teachers paid attention to their students' literacy when they

used computers at school. When I asked what she thought about using computers or technology for her class, Mrs. Davis responded:

I think it's great. I think that's the way the world is going and we need to know it. Um, you know, the basic typing skills, research skills, how to write a report, formatting, um, so we are trying to get until that this year. . . . We're getting incorporated more, so they are not just writing a paper; they are typing on a computer. (Interview with Mrs. Davis)

She emphasized computer literacy for her class and tried to incorporate it into her classes.

However, due to the tight school curriculum, she could not often find time to use technology for her students.

In many instances, all the ELLs typed their schoolwork into a computer when they were at a computer lab or used computers in class. Stacy shared her experiences regarding computer literacy: "Ah, well, every Friday morning we go to the computer lab, and if we don't have any project, we practice typing" (Stacy Think-Aloud 2S). Brian also remembered his computer session at school and said, "[W]e use a computer for like typing, typing something like, like, some, yeah" (Brian Think-Aloud 2S). Moreover, teachers took computer literacy for granted and considered it as a requirement for students' computer-based literacy activities.

In these school environments, all the ELLs adopted particular strategies based on their computer knowledge. For example, Stacy optimized the computer settings, such as the volume of a laptop computer and the size of a browsing window; Jae-Hoon changed the font size. The ELLs also dialogued with other students or teachers to share information regarding their computer literacy, such as changing the font size and inserting an image into a document.

Computer literacy was an influential factor for the use of strategies of ELLs and their teachers. Even though those skills and knowledge did not directly enhance students'



literacy skills (Warschauer, 1999), their computer literacy enabled the students to use particular strategies when they read computer-based texts at school.

### *CMC Literacy*

The second component of electronic literacies, CMC literacy, also influenced the computer use strategy of ELLs and teachers at school. It mainly changed the dialogue patterns and helped students and teachers build their communities (Lam, 2000; Swan, 2002). Unlike their home experiences, at school the four ELLs and their teachers did not often use synchronous CMC and casual social networking sites, such as Facebook, because they were not allowed to access them in the educational contexts. Instead, the ELLs and their teachers used asynchronous CMC, such as personal email accounts, websites, and other Internet applications, such as *WallWisher*.

Email messages enabled Jae-Hoon and Mr. Hill to dialogue with each other and share computer-based resources on the Internet. When Jae-Hoon searched for information about “Southwestern Native American customs” on the Internet, he had a hard time finding informative and relevant websites. Therefore, he requested help from his teacher and asked, “If you find anything else, can you email me?” (Jae-Hoon Observation 17S); the teacher shared relevant website URLs with Jae-Hoon through email. Mrs. Bryant allowed her students or their parents to subscribe to her personal website, and the website automatically sent email about the updates to subscribers when she added any information on her website. Furthermore, Mrs. White requested her students to email their writing draft to themselves and to revise it at home. In these cases, the ELLs and teachers used email for communications and data storage.

In addition to email interactions, classroom teachers used websites and Internet applications for CMC literacy. Mrs. Bryant regularly updated the assignment lists, website URLs, tests, etc., and students and their parents could access the computer-based texts. Through the websites, students could send messages to Mrs. Bryant, too. Mr. Hill accessed the *WallWisher* website at <http://www.wallwisher.com> and created an interactive web page about the topic of water cycle. His students accessed the site and posted their responses to share their ideas about the water cycle.

Through these means, all the ELLs and the classroom teachers dialogued with others. However, Mrs. Davis and Mrs. White rarely used CMC literacy at school. Instead of the CMC, they preferred to dialogue with their students in person, and Kyoung-Min and Stacy did not have opportunities to dialogue with others through CMC and use those strategies at school.

#### *Multimedia Literacy*

Multimedia literacy influenced all the ELLs' use of strategies in computer-based reading environments, and their knowledge and capacities of computer-based multimedia texts could determine their choices of strategies when they read computer-based texts. In school contexts, all the ELLs mostly accessed textual resources and images when they worked on their school projects individually. Audio texts were not their favorite resources, and the popular website for video resources, YouTube, was blocked at school. For example, when Jae-Hoon and Kyoung-Min worked on their school projects and searched for information about "Israel" and "Southwestern Native American Customs," respectively, they referred to textual resources and images on the website, but they did

not access audios, videos, and computer games for the projects. However, classroom teachers still had full access to computer-based texts at school.

All the ELLs in this study also created documents at school. They typed their projects into a word processing document; in many cases they copied and pasted images to the document. Brian had an opportunity to create a video at school, but this was limited to the times when the classroom teachers were competent at multimedia literacy or if a computer specialist could help the students create videos. The ELLs' use of multimedia literacy at school was dependent upon their teachers' willingness and capacities to incorporate multimedia resources into their class.

### *Information Literacy*

The focuses of information literacy in school contexts were how students searched for computer-based texts on the Internet and evaluated them depending on their goals, and it was relevant to ELLs' use of strategies when they read computer-based texts. Information literacy influenced ELLs' use of strategies when they accessed web pages and hypermedia, evaluated the computer-based texts, and decided what to read.

All the ELLs in this study accessed the Google website to search for their computer-based texts at school. Through their Google searches, the ELLs could find web resources containing textual resources and images. Since video texts were restricted and classroom teachers set up the overall or specific topics for the students' searches at school, the students chose their topics under their teachers' directions and guidance. In spite of these limited environments, all the ELLs still adopted diverse searching strategies to access computer-based texts. They directly typed URLs into the address bar, typed keywords into search engines, clicked hyperlinks on an open web page, and clicked a

bookmark. The ELLs also dialogued with the texts by referring to the suggestions of search engines and revised their keywords to have better search results online. Therefore, ELLs' knowledge of information literacy influenced their choices and their use of strategies when they read computer-based text at school.

In addition, teachers' information literacy influenced the ELLs' literacy performances at school. For example, Mr. Hill and Mrs. Bryant helped Jae-Hoon and Brian respectively when the ELLs were searching for websites about their social studies projects; Mrs. White searched for images intended for Stacy's science project. All the teachers called the online search process researching and often assigned research projects to their students. Even though the teachers in this study did not directly instruct their students on how to search for information online, several teachers demonstrated how to search for computer-based texts through search engines. Jae-Hoon, Stacy, and Brian paid attention to their teachers' web searching processes.

#### *Teachers' Guidance and Interest for Computer-Based Text Reading*

Teachers played important and authoritative roles in all the ELLs' use of computers and strategies when they read computer-based texts. Like the parent participants in home contexts, teachers had authoritative discourses, and the ELLs had their internally persuasive discourses (Bakhtin, 1981). All the classroom teachers in this study made decisions on what tasks their students would complete and how they should use computers for the tasks. In addition, the teachers continuously monitored students' use of the computers, as well as computer-based texts, and helped the students when they experienced difficulties.

All the teachers in this study believed that the use of computers in their classroom was positive, and this encouraged the teachers to use the computers more often for their students. In this way, the ELLs had more opportunities to use computers, and teachers' guidance and interest for computer-based texts influenced the ELLs' use of strategies at school. In an interview, Mr. Hill said:

Mr. Hill: So [technology use] is very important for students' future.

Researcher: What do you think about technology use or computer use in your classroom in general?

Mr. Hill: I think it's great. I think more because this is central value for their future to build and keep up with another world and things going. Ah, I just need to keep learning more, so I practice more. So I don't know nearly enough. I don't know. Things change so fast I guess, so I don't really know everything ever, but just keep learning and hopefully kids need to know how to do it and use more often, too. (Interview with Mr. Hill)

Mr. Hill, as well as other teachers, believed that computer use would be important for the students' futures. However, teachers also recognized the difficulties of incorporating computer-based technology and texts into their classes. Mrs. Davis said:

With teaching and my lectures, I use [the computers] probably every day or every other day. Offering something with my computer. Um, but students unfortunately English language arts being so big. Um, we have not had a lot of time to use them. We're trying to incorporate them more, but unfortunately computer lab, we just go there once every week. (Interview with Mrs. Davis)

Mrs. White also experienced difficulties due to her lack of knowledge of electronic literacies. In an interview, she said, "I love teaching math; I love teaching reading; I don't know necessarily what I can teach them on the computer all the time that they may or may not already know that I don't know about" (Interview with Mrs. White).

Classroom teachers admitted that using computers and reading computer-based texts at school were important for students' development in the learning environments of multiliteracies. However, they experienced difficulties due to students' needs, the

requirements from the school, and the limitations of their own electronic literacies. As Paige (2008) argues, teachers have to engage large numbers of students with a variety of interests, motivations, and electronic literacies. At the same time, the teachers should also work within the institutional and cultural constraints and demands from formal school settings, such as school and district policies. In these situations, classroom teachers made their decisions on how to use computers for students, and the computer use at school influenced the ELLs' reading of computer-based texts.

Even though all the ELLs played active roles when they read the texts at school, their internally persuasive discourses were hierarchically lower than the authoritative discourses of their teachers and the school policy. Therefore, the ELLs appropriated their voices when they read computer-based texts at school and followed the guidance of the authoritative discourses, which influenced the ELLs' use of strategies.

#### *ELLs' Purposes for Reading Computer-Based Texts*

As I analyzed in the "setting up the purpose" section, all the ELLs read computer-based texts for information or for fun at school, and their purposes of reading influenced their use of strategies.

#### *Reading Computer-Based Texts for Information*

All the ELLs read computer-based texts to search for general or specific information at school, and classroom teachers requested their students, when they used computers, to find information that was relevant to class activities. Search topics were diverse—from Native American Indian culture, to apostrophes, to California Gold Rush—and they depended on the class topics. The ELLs' efferent purposes of readings were relevant to their use of strategies: accessing a web page, evaluating the computer-

based text and deciding what to read, setting up the purpose, dialoguing, adjusting the reading pattern, and using computer skills and devices. Furthermore, teachers' roles were important.

When all the ELLs in this study searched for informative computer-based texts, they typed keywords into search engines according to their teachers' directions and referred to the teacher-recommended keywords or websites. Large, Beheshti, and Breuleux (1998) found students' tendencies were to copy their teachers' keywords instead of looking for their own keywords, but this tendency depended upon the class tasks. For example, Mrs. Davis offered a general topic to her students and allowed them to select their own subtopic for information literacy, and Kyoung-Min selected Israel for his search topic. Furthermore, when Mr. Hill guided Jae-Hoon to search for websites about Southwestern Native American customs, Jae-Hoon followed his teacher's directions. However, when Jae-Hoon returned to his seat, he used his own keywords for the search.

All the ELLs also directly typed URLs into the address bar and clicked hyperlinks. As I described in the "typing a web address into the address bar" section, classroom teachers provided lists of URLs through a handout, notes on a whiteboard, and hyperlinks on a website, and the ELLs copied or clicked the URLs in those sources. However, they rarely clicked a bookmark at school. Mostly, the ELLs in this study looked for information about their school projects, and their teachers assigned overall topics and clarified the purposes of the reading to them. Therefore, depending on the tasks and teachers' instructions, the ELLs adjusted their searching methods and set up their own

reading purposes. ELLs and their teachers also paid attention to the informativeness and the relatedness of texts when they evaluated them and decided what texts to read.

All the ELLs dialogued with others more often when they used computers to read texts than when they were in a conventional classroom situation. Because there was a large amount of information on the Internet and they encountered diverse issues, the students asked many questions, such as whether the texts were appropriate for the designated task, how they could copy an image, etc., when they read computer-based texts. Teachers were busy instructing students what to do, responding to students' questions, monitoring them, etc.; therefore, in many cases, they allowed the students to dialogue with and help each other. All the ELLs also modified their reading patterns depending on the reading purpose. They read informative, computer-based texts slowly and carefully to have a better understanding, and they frequently read the texts again. Often, when given permission by their teachers, the students printed the computer-based texts.

The ELLs adopted particular strategies more often than others did when they read informative computer-based texts, and their classroom teachers encouraged them to use the strategies. They paid more attention to collecting informative and relevant resources for their school projects and activities and made meanings from them effectively.

#### *Reading Computer-Based Texts for Fun*

The ELLs' reading of computer-based texts for fun in class was limited, but the entertainment purposes still influenced their use of strategies: accessing a web page, evaluating the computer-based text and deciding what to read, and adjusting the reading pattern. When Mrs. White had a computer session, she allowed her students to access



several websites relevant to keyboarding skills and words, and most of the sites contained computer games. Mrs. White wanted her students to practice typing and learn more vocabulary words; however, students recognized the websites as fun resources and searched for more interesting texts. In addition, Mr. Hill allowed his students to use the laptop computers for entertainment purposes and suggested several websites for the students to access.

All the ELLs directly entered the teacher-suggested URLs when they read computer-based texts at school for fun. In this study, the classroom teachers previewed computer-based texts before they offered the sources to their students. Because of these previewing processes, the ELLs could access screened computer-based texts for entertainment purposes instead of searching for them on the Internet. Because teachers decided what texts to read and offered a list of web resources to the class, the ELLs' selections of computer-based texts were limited. However, they still selected and evaluated those resources based on their interestingness. For example, when Stacy selected a typing computer game, she said, "I'll do it. This looks fun" (Stacy Fieldnote 3S).

When all the ELLs read computer-based texts for fun, they modified their reading patterns, too. Different from reading informative, computer-based texts, the ELLs usually read the entertaining texts quickly in order to have a general idea about the texts. Classroom teachers allowed 10 to 15 minutes on average for their students to read computer-based texts at school for entertainment purposes, and the limited time encouraged the students to read the texts fast.

All the ELLs used certain strategies more frequently when they read computer-based texts at school for fun, and their choices of strategies were subject to change depending on both their purposes of readings and the types of tasks. However, the strict time restriction at school limited the ELLs' use of diverse strategies.

### *Technology Equipment at School*

The possession of technology equipment in class and at school was another influential factor that changed reading of computer-based texts and choices of strategies of all the ELLs and their teachers. As all the participants were in Oracle Unified School District, and every school had similar basic computer-based equipment and regulations. Every school in the District had one or more fixed computer labs with computers that had Internet connections. However, each school had additional computer-based equipment and facilities, such as laptop carts, iPods, Smart boards, etc. At each school, technology specialists staffed the computer labs, but their roles varied. This technology equipment at school or in class influenced teachers' potential decisions to incorporate computer technology into their classes, and these decisions influenced students' opportunities to read computer-based texts at school. The descriptions of the technological contexts of teachers follow.

Mr. Hill and Mrs. Davis were teachers at Dover E.S., and this school had a computer lab. In addition, each teacher had two desktop computers in class for students. They had a computer specialist, but she did not stay at the computer lab to assist students and teachers. Moreover, the individual teachers' situations were different because Mr. Hill, a fifth-grade teacher, had a laptop cart with twenty-five laptop computers in his class, but Mrs. Davis, a fourth-grade teacher, did not have one. Since Mr. Hill frequently

allowed his students to use the laptops for school projects in class, his students had many opportunities to read computer-based texts individually. In a conversational interview, Mr. Hill said:

I think [the laptop cart] is very helpful to keep uh, help students learn more about technology, but also it really helps them engage and they are really excited about them. I know, I was excited [to] . . . have laptops at my classroom, too. (Interview with Mr. Hill)

Mrs. Davis, on the other hand, could not often use laptop computers with her students even though she taught at the same school where Mr. Hill taught because only fifth-grade teachers had laptop carts in their classes; instead, she went to a computer lab for classroom activities several times a month. She experienced difficulties finding time to use desktop or laptop computers for her students due to her busy teaching schedule and the school's focus on major subjects, such as mathematics, science, and language arts.

Mrs. White was a fifth-grade teacher at Hilley E.S., which had a computer lab. There was a part-time computer specialist, but she did not assist students. The computer specialist only managed the computers and other technology equipment. Hilley E.S. did not have a laptop cart or iPods for students; it had two carts of *Alphasmart 2000 Word Processing Computers*, which were only for students' typing at the computer lab. Mrs. White had two old desktop computers, as well as her own personal laptop computer, in her classroom, but her students did not use the desktop computers because they were too slow.

Mrs. Bryant taught at Haynes E.S., and the school had two computer labs, one Mac lab and one PC lab. The Mac lab was opened in late October, but the PC lab was not ready during fall semester. The Mac lab had two laptop carts, which contained thirty-five laptop computers in total, and a full-time computer specialist stayed at the computer lab

to assist students and teachers. The computer specialist instructed students in computer skills, such as computer literacy and multimedia literacy.

Among the teacher participants in this study, Mr. Hill and Mrs. Bryant used the computers for their students most frequently and actively. Mr. Hill had the easiest access to laptop computers because he had a laptop cart in his classroom. Mrs. Bryant was the most enthusiastic computer user, and the computer specialist at Haynes E.S. helped students and teachers very actively and productively. However, before the opening of the computer lab at Haynes E.S., Mrs. Bryant could not often incorporate technology for students' school projects. Therefore, computer-related equipment and active computer specialists at school influenced Mrs. Bryant's choice of technology use for her students.

In an interview, Mr. Hill had these comments about his school experiences with computers:

Researcher: Have you used technology before, at the beginning of your teaching career?

Mr. Hill: No, definitely no. We got the laptop [at Dover E.S.] last year, so that was kind of, so, that's kind of the learning period. So last year was the learning period, and now it's like you have the free year now, so "Use the computer when you can." Um, over projectors, videos, YouTube, it's kind of, it's big one. They are all over there whenever you can. So definitely not, all my years, when I taught in [another school district], we didn't have any technology; I mean the technology that I think as technology. We just had an overhead projector, but it's definitely different from technology in Oracle elementary schools like brand-new schools. It's like an eye-opening. (Interview with Mr. Hill)

Mrs. Davis and Mrs. White could not often allow their students to use computer technology for their projects because their technology equipment or the access to the computers was limited. Mrs. Davis was proficient regarding electronic literacies, but her students could not use the technology frequently due to the limited access to computer-related resources and teachers' busy schedules. Mrs. White was very enthusiastic about

incorporating computers into her class, but the computer equipment was very limited at Hilley E.S.

*7. In What Ways Do ELLs' Use of Strategies Differ When They Read Computer-Based Texts in Their Home and School Contexts, and What Influences These Potential Differences?*

Several patterns, both similar and different, regarding ELLs' use of strategies when they read computer-based texts at home and at school emerged throughout the data analysis processes. In addition, I identified additional similarities and differences. The additional similarities were (1) authoritative discourses versus internally persuasive discourses and (2) their computer education. The additional differences were (1) the website list that the ELLs accessed and (2) the parents' and teachers' opinions of students' computer use.

*Similarities and Differences of ELLs' Use of Strategies at Home and at School*

The ELLs in this study adopted 15 strategies: (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) inferring from the text, (11) scrolling up and down and getting back and forth, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source.

*Accessing a Web Page*

All the ELLs searched for and accessed a web page when they read computer-based texts both at home and at school. I identified five sub-strategies at home: (1) typing

a web address, (2) typing keywords into a search engine, (3) clicking a hyperlink of an open website, (4) clicking a bookmark, and (5) modifying a web address. However, at school I observed four sub-strategies: (1) typing a web address, (2) typing keywords into a search engine, (3) clicking a hyperlink of an open website, and (4) clicking a bookmark.

In both home and school settings, all the ELLs typed website URLs, used search engines, clicked hyperlinks, and clicked bookmarks to access web pages. However, the ELLs showed different patterns when they typed the URLs to access web pages at home and at school. The ELLs referred to both computer-based and paper-based resources to find addresses at home and at school, but teachers' roles were remarkable in school contexts. The classroom teachers offered the URLs by writing them on the whiteboard and shared their notes and the information on the computer screen through document cameras and computer projectors.

The ELLs used bookmarked resources more often at home than at school because they did not use the same computer every time when they went to a computer lab. They did not often bookmark websites' URLs at school. All the ELLs used bookmarks at home even though they did not frequently access them. However, only Kyoung-Min clicked bookmarks at school.

Jae-Hoon and Stacy modified a web address only at home. The contextual environments influenced the ELLs' decisions to adopt those strategies or not. As I mentioned above, in the computer lab at school Jae-Hoon and Stacy did not use the same computers from session to session. Even though Jae-Hoon used the same laptop computer in class every time, students from other classes could use them too. Therefore, at school Jae-Hoon and Stacy could not personalize the computer settings by bookmarking or

saving a personal file into the computer. However, since the ELLs shared a computer with their family members, they did not normally have those restrictions at home, where they bookmarked website URLs and checked the websites that they had accessed before. In addition, since ELLs used their computers in less-confined environments at home, they could be more flexible when they read computer-based texts. Compared to the home contexts, the ELLs' access to computer-based texts was more restrained; their strategies to access the texts were limited.

### *Accessing Hypermedia*

After accessing a website, whether at home or at school, all the ELLs clicked hypermedia of the current website to open or move to another website or a web page. As shown in Table 5 and Table 11, at home ELLs' frequency of access was textual resources (41.4%), videos (27.6%), computer games (18.1%), images (8.7%), and audios (4.2%). However, when ELLs accessed hypermedia at school, the frequencies were textual resources (42.4%), images (36.4%), videos (12.1%), and computer games (9.1%), and they did not access audios (0.0%). When I consider the ELLs and their teachers together, they accessed images (33.4%), videos (30.4%), textual resource (24.7%), audios (7.2%), and computer games (4.3%) in order of frequencies.

All the ELLs accessed textual resources most frequently, and the audios were the least frequently used text format at home and at school. The ELLs frequently accessed videos (27.6%) and computer games (18.1%) at home, but they could not access these texts at school because the schools' filtering software blocked websites for video resources, such as YouTube, and the classroom teachers did not oftentimes allow their students to play computer games. The only video texts and computer game texts allowed

were through educational or screened websites, such as the *enVisionMath*, *Study Island*, and *BBC* websites. The school policy, as an authoritative discourse, regulated students' access to particular computer-based texts, and this fundamentally influenced the patterns of their use of strategies.

*Evaluating the Computer-Based Text and Deciding What to Read*

While they read computer-based texts at home and at school, all the ELLs evaluated computer-based texts and made decisions to read a particular text or not, and this strategy was one of the critical strategies for their reading. In order to make their decisions when they read computer-based texts at home, the ELLs considered if the texts were (1) informative, (2) appropriate, (3) interesting, (4) familiar, (5) long, and (6) relevant. However, at school they only considered if the texts were (1) informative, (2) appropriate, (3) interesting, and (4) relevant.

Different from their school settings, all the ELLs searched for more computer-based texts for entertainment purposes at home; in contrast, at school they more often looked for informative texts to complete their projects. For example, all the ELLs watched fun videos and played computer games at home. Moreover, Jae-Hoon, Stacy, and Brian read websites about sports players, singers, and computer games, etc. In home contexts, the ELLs usually focused on whether the resources were interesting and appropriate for them. However, at school the ELLs watched educational videos, and only Jae-Hoon and Stacy played educational computer games. Furthermore, in school contexts, the ELLs accessed school project-related information, such as Southwestern Native American customs, Mojave Indian culture and history, apostrophes, etc. The



informativeness and relatedness were important at school when they navigated on the Internet.

Compared to their reading of computer-based texts at home, the ELLs' goals of reading the texts at school were more solid and structured. The ELLs did not pay attention to several influential factors, such as the acquaintance and the length, in school contexts. In addition, since the time and the opportunities to search for information on the Internet at school were limited, the teachers guided the students to pursue their goals in the restricted situations. The situational and contextual conditions influenced the ELLs' use of strategies in these cases.

#### *Setting up the Purpose*

All the ELLs set up the reading purpose when they accessed computer-based texts, whether at home or at school. When the ELLs read computer-based texts for information in both contexts, they paid attention to the informative portion of the texts, such as meanings, ideas, knowledge, etc., and searched for informative and relevant resources. Meanwhile, when the ELLs read fun computer-based texts, they focused on whether the texts were interesting and appropriate for them to entertain themselves.

In addition, the ELLs' roles were different depending on the research sites: the home and the school. When the ELLs read computer-based texts at home, they decided on the purpose for reading with minimal restrictions by their parents, as authoritative people. For example, if the ELLs read texts appropriate for their ages within the designated time limit, they could access whatever resources they wanted. Jae-Hoon, Kyoung-Min, Stacy, and Brian accessed interesting websites, videos, and computer

games; Kyoung-Min read web resources about the universe. They actively and flexibly decided on the purposes of reading and searched for computer-based texts.

However, the classroom teachers planned and scheduled computer-based literacy activities before classes. For example, Mrs. Bryant searched for a website about graphs, videos, and images for her class, and she previewed every computer-based text before she showed it to students. Other teachers also previewed the texts to check whether they were appropriate for their students. Furthermore, due to school policy and limited class time, the ELLs had to read computer-based texts with more restrictions. In these situations, teachers usually set up the students' purposes of reading at school. Even though the ELLs set up the purposes of the computer-based reading at school to some extent, they could not do this as actively as they could at home.

#### *Previewing*

All the ELLs previewed computer-based texts on the Internet to search for good resources at home and at school. They read titles, menus, and texts of the computer-based texts for two purposes: to check whether the texts were what they were looking for, and to make a critical decision to read a particular text. Through the previewing processes, the ELLs, as well as their classroom teachers, could infer the content of each computer-based text and identify its organization.

#### *Making a Connection*

When reading computer-based texts at home and at school, all the ELLs activated their schemata to make connections to themselves, texts, and world knowledge. The ELLs connected computer-based texts to themselves by activating their knowledge and the experiences that they already possessed. They also connected the computer-based

texts with other computer- or paper-based texts that they had read at home and at school. In addition, the ELLs made connections between the texts and their world knowledge. Regardless of whether they read computer-based texts at home or at school, all the ELLs used this strategy as active readers.

However, their pattern of making connections was different based on who initiated the strategy. All the ELLs in this study activated their schemata and started the connecting processes by themselves in home contexts. For example, Jae-Hoon, Stacy, and Brian connected computer-based texts to themselves; Kyoung-Min, Stacy, and Brian made connections between computer-based texts and other texts. In school contexts, classroom teachers helped the ELLs and encouraged them to make those connections. For example, when Mr. Hill and Mrs. Bryant showed educational videos to their students, the teachers asked questions about the videos. In this way, Jae-Hoon and Brian could make connections to themselves, texts, and world knowledge.

### *Dialoguing*

Dialoguing was an important strategy for all the ELLs when they read computer-based texts at home and at school, and they dialogued with others, themselves, and texts and authors (Park & Kim, 2011). When the ELLs dialogued with others in person at home, they dialogued with their family members, especially their parents and older siblings, and asked questions. Jae-Hoon, Kyoung-Min, and Brian dialogued with their neighbors, too. The purposes of the dialogues in home contexts were to ask other people questions or to request permission from their parents to access a particular computer-based text.

In school contexts, the ELLs' face-to-face interactions were comparatively more frequent than their dialogues at home. The ELLs oftentimes dialogued with classmates, their teachers, and computer specialists when they read computer-based texts in school settings. The purposes of the dialogues at school were more diverse and dynamic than the purposes in home contexts. For instance, all the ELLs requested help from more capable classmates and teachers, as well as computer specialists, as they did at home. Jae-Hoon, Kyoung-Min, and Brian helped their classmates, and Jae-Hoon and Brian even helped their teachers through dialogic interactions from time to time.

The ELLs also showed a different use of CMC when they read computer-based texts at home and at school. They oftentimes dialogued with others through both asynchronous and synchronous CMCs at home. For example, Jae-Hoon and Stacy logged onto Facebook to read others' asynchronous messages and to respond to them; they also logged onto their email accounts to communicate with others in asynchronous manners. Furthermore, Jae-Hoon and Stacy accessed Facebook to chat with their friends synchronously, but Kyoung-Min and Brian did not access Facebook email because they did not have their own accounts.

Compared to their computer-based dialogic patterns at home, the ELLs did not frequently dialogue with others through asynchronous or synchronous CMCs in school contexts. Potential reasons for less usage of CMCs were the restrictions on students' access to the Facebook website and on their downloading software applications on the school computers. Moreover, the students could not use CMCs due to the short computer sessions.

All the ELLs also dialogued with themselves when they read computer-based texts at home and school. In home settings, the ELLs made utterances to begin to dialogue with themselves; they responded to their initial utterances and evaluated their comprehension by reacting to the utterances. When the ELLs encountered difficult and important texts, they dialogued with themselves more often (Park & Kim, 2011). In school contexts, Jae-Hoon and Kyoung-Min asked themselves questions when they had difficulty with finding the best answers for online quizzes, and the ELLs talked to themselves when they searched for information for school projects. However, I observed them initiate and respond to their utterances to themselves less frequently at school than at home. Since the learning environments at school were more constrained than the environments at home, the ELLs dialogued with themselves non-audibly or spoke quietly.

All the ELLs dialogued with computer-based texts and the authors or creators of the texts both at home and at school. When the ELLs read computer-based texts, they dialogued with them by referring to the suggested keywords and web resources and by responding to those resources in the learning contexts of Web 3.0. In home contexts, Jae-Hoon, Kyoung-Min, Stacy, and Brian dialogued with computer-based texts in this way. They initiated the dialogues with texts and verbally or non-verbally responded to video texts and computer games by dialoguing with video creators, narrators, and the messages on the games. In school contexts, Jae-Hoon and Kyoung-Min dialogued with texts. However, they did not have many opportunities to individually view video texts and to play computer games at school. Furthermore, teachers mostly encouraged students to interact with texts by asking questions.

### *Adjusting the Reading Pattern*

When all four of the ELLs read computer-based texts at home and at school, they adjusted their reading patterns depending on their comprehension and the reading environments. The ELLs modified their vocalization and read computer-based texts aloud or silently; they also read the texts in detail, quickly, or slowly. Furthermore, they reread certain texts from time to time.

The ELLs' adjustments of their reading patterns of computer-based texts were mostly similar at home and at school; but I found differences only when they read the texts aloud or silently. When the ELLs read computer-based texts at home, they read the texts aloud or silently depending on how interesting and difficult the texts were. Moreover, they paid less attention to the environmental factors, such as who was at home. For example, when the ELLs read computer-based texts at home, they read titles and interesting or difficult texts aloud but read other paragraphs silently. However, in school contexts, the ELLs usually read computer-based texts silently, so as to not distract other students.

### *Monitoring the Comprehension*

All the ELLs frequently monitored their comprehension to see if they understood particular computer-based texts when they read them. As they read those texts to make meanings out of them, the comprehension checking was one of the salient components required for the ELLs to become independent and critical readers. However, authoritative discourses played more critical roles in students' comprehension checks at school than at home. For example, the mothers of Jae-Hoon, Kyoung-Min, and Brian did not ask whether their children understood computer-based texts; only Stacy's mother checked her

daughter's reading comprehension. Compared to the roles of parents, classroom teachers actively monitored ELLs' readings of the texts and assisted them to have a better understanding of the texts.

### *Inferring the Text*

Whether at home or at school, most ELLs in this study predicted the content of computer-based texts and guessed their meanings. In home contexts, all the ELLs made a prediction about the content of the texts by previewing the title and texts and by using their prior knowledge. They also guessed the meaning of the computer-based texts or words while they made an inference from the texts. In school contexts, Jae-Hoon and Stacy predicted the content of the texts by previewing the title and texts and by activating their prior knowledge. Jae-Hoon, Kyoung-Min, and Brian guessed the meaning of the computer-based texts or words while they made inferences from the texts. All the ELLs in this study described how they showed their concerns about their lack of competence regarding English vocabulary words; therefore, they guessed the meanings while reading L2 computer-based texts.

To use the inferring strategy, all the ELLs utilized diverse text formats, such as textual resources, images, and videos. Even though their use of this "inferring the text" strategy was similar in home and school contexts, differences still existed. At home, in most cases, the ELLs made inferences from computer-based texts based on their own needs and decisions. However, in school contexts, their classroom teachers encouraged students to predict what would happen in the texts and to guess what the meanings of the texts would be.

### *Scrolling Up and Down and Getting Back and Forth*

When all the ELLs read computer-based texts at home and at school, they scrolled up and down to read the diverse forms of intratextual resources and clicked hypertext and hypermedia to access intratextual and intertextual resources. Even though the ELLs scrolled up and down and moved back and forth in home and school contexts, the contextual components influenced their navigation patterns. When they read computer-based texts at home, the ELLs set up their goals and navigated the resources based on their choices and decisions. They accessed diverse texts and topics, and they strayed from their search topics from time to time. Compared to the situations at home, at school the ELLs had firm purposes for computer-based text readings, and classroom teachers monitored the students' access to the texts at school; therefore, they had fewer opportunities to access inappropriate and irrelevant texts. In addition, since classroom teachers had the authority to make decisions more often than students made their own decisions to read computer-based texts, the ELLs' navigations were more restricted when they read computer-based texts at school than at home.

### *Using References*

When the ELLs read computer-based texts at home and at school, they used multiple references to support their reading processes. In both home and school contexts, the ELLs used both paper-based and computer-based resources, such as paper-based books, paper-based handouts, paper-based dictionaries, computer-based dictionaries, and web resources for their readings of computer-based texts. However, in school contexts, all the ELLs referred to additional resources, such as notes on a whiteboard and on a projector screen. All the teachers in this study actively used the whiteboards to deliver



their lectures and information to students. Furthermore, they frequently used document cameras, laptop computers, and computer projectors to show diverse computer-based texts, as well as paper-based resources, to students in more dynamic manners. In these ways, teachers provided their lecture notes, assignments, instructions, handouts, etc. to their students at school.

#### *Using Computer Skills and Devices*

To facilitate their reading of computer-based texts at home and school, all the ELLs used their computer skills and devices. They downloaded the texts, used a computer mouse, or printed a hardcopy. All the ELLs downloaded texts when they read computer-based texts at home. Jae-Hoon and Stacy downloaded textual resources, songs, videos, computer games, and other computer software applications on the Internet to their personal computers or iPods; Kyoung-Min and Brian downloaded only textual resources and computer games to their computers. However, the ELLs did not download those texts at school; when the ELLs downloaded the resources, it took time for the process, and they did not have enough time to access and download a new website. Moreover, since downloading the resources, especially computer software applications, might influence the computer settings and capacities of the school computers, the classroom teachers and computer specialists did not allow students to download large text files or to install new computer programs on their school computers.

A computer mouse was one of the important tools that all the ELLs used both in home and school contexts. The ELLs used the computer mouse to point to and select a particular part of the texts and to follow or highlight particular words or sentences. By

using the computer mouse, the ELLs could control their reactions and become active readers in the learning environments of multiliteracies.

In home contexts, Jae-Hoon and Stacy printed computer-based texts, but Kyoung-Min and Brian did not know how to use a printer. However, in school contexts, only Stacy printed her writing project and only with Mrs. White's permission. Even though students had fewer opportunities to print computer-based texts in school contexts, all the teachers in this study printed computer-based texts to help their students. The resources that the ELLs printed at home and school were mostly school-related texts and informative texts, such as their school projects, the project instructions, and lists of assignments.

#### *Confirming a Prediction*

Before and while Jae-Hoon and Stacy read computer-based texts, they predicted what would happen in the texts and what the content of the texts would be, and they confirmed if their predictions were correct. Jae-Hoon and Stacy confirmed their predictions when they read online articles and electronic storybooks at home and at school. The ELLs used this strategy at home in order to meet their needs; at school, their teachers taught them to adopt it to become better readers through diverse classroom activities.

#### *Sharing an Information Source*

When Jae-Hoon, Kyoung-Min, and Stacy found good resources on the Internet, they shared the sources of computer-based texts with others at home and at school. They shared the information with their family members, relatives, friends, classmates, and teachers in both contexts. In home contexts, Jae-Hoon, Kyoung-Min, and Stacy shared

the information with their siblings and relatives. In school contexts, classroom teachers searched for computer-based resources and shared the materials with their students, too. All the teachers wrote the URLs on the whiteboards, and Mrs. Davis included them in her handouts. Furthermore, Mrs. Chang and Mrs. Bryant posted the sources of computer-based texts on their personal websites. However, parents rarely searched for those resources to share them with their children at home.

#### *Other Similarities of ELLs' Reading Computer-Based Texts*

In home and school contexts, additional similarities include the authoritative discourses and the internally persuasive discourses. The similarities also cover ELLs' experiences with computer education.

#### *Authoritative Discourses vs. Internally Persuasive Discourses*

Even though all the ELLs actively participated in the computer-based reading activities at home and at school, authoritative discourses strongly influenced their reading in each context. The most remarkable authoritative discourses belonged to the ELLs' parents at home and their classroom teachers at school. The parents determined how many hours per day their children could access computer-based texts. They also decided what genres of the texts their children could access and set up the basic rules to use a computer. In these ways, parents tried to guide the children and monitor their use of computers at home. In addition, classroom teachers, as well as the policies of the school and the school district, played authoritative roles when the ELLs read computer-based texts at school. The school did not allow students to access inappropriate or potentially unsuitable computer-based texts, such as YouTube and Facebook; the ELLs could not access those sites. Classroom teachers set up the primary goals of the literacy activities

and offered lists of web resources for their students. They also monitored the ELLs' use of the computers as well as computer-based texts.

For both reading contexts, all the ELLs' internally persuasive discourses were hierarchically lower than the authoritative discourses of their parents and teachers. Therefore, the ELLs appropriated their voices and followed the rules and regulations of their parents and teachers, and this limited the ELLs' access to computer-based texts to some extent. For example, even though Jae-Hoon, Stacy, and Brian wanted to play computer games longer, their parents allowed them to play games for only one hour. Thus the ELLs exited from the games after playing them for one hour. However, the limitations by parents and teachers fundamentally protected the ELLs from inappropriate online resources and assisted them in not getting lost in the enormous amount of information on the Internet. Moreover, since all the classroom teachers provided clear instructions before each computer session, the ELLs could directly follow their guidance and search for information more efficiently on the Internet.

### *Computer Education*

In their interviews, all the ELLs clarified that they did not receive any computer education in private institutions, which meant that the students mostly learned electronic literacy skills at home or at school. The ELLs learned electronic literacy skills by using computers and by reading computer-based texts. Furthermore, they learned the skills from more capable and knowledgeable individuals in each context.

In his home context, when his iPod Touch did not work fast, Jae-Hoon accessed several YouTube videos and learned from the video texts how to restore the device. Stacy played the *Tiki Treasure Island* game without reading the instructions first; she just tried

the game based on her experiences of playing similar computer games. In addition, more knowledgeable family members, such as the ELLs' parents or older siblings, taught them how to use a computer, or the ELLs observed how they used computers. For example, Jae-Hoon saw his older brother using *iTunes* and learned how to download music from the Internet. Stacy learned from her sisters how to search for fun websites.

However, no parent in this study provided instruction in electronic literacies at home. The parents' roles were mostly monitoring their children's use of computers. Instead of providing instructions, all the parents in this study believed that their children would learn how to use computers at school.

In school settings, Jae-Hoon dragged an image text from a web page to his school laptop computer in order to copy it for his school project, but he was not sure whether it would work in a Mac environment. Jae-Hoon knew that dragging and dropping enabled him to copy an image to his computer in Windows settings, but he did not know how it would work on a Mac computer. He just tried it based on his prior knowledge about electronic literacies. Moreover, during a computer session, Brian dialogued with his classmates, the classroom teacher, and a computer specialist when he used a laptop computer for his writing project.

In most cases, teachers gave students instructions in computer literacy and multimedia literacy, and the ELLs learned relevant skills from their teachers. For example, Mrs. Davis taught her students how to turn computers on and off, and Mrs. Chang, Mr. Hill, Mrs. White, and Mrs. Bryant instructed their students how to create documents in diverse text formats. In addition, Mrs. Davis and Mr. Hill offered direction on how to find particular information on the Internet. However, the teachers rarely

provided instructions in CMC literacy. In addition, most teachers assumed that students brought their knowledge about electronic literacies from home.

For the learning experiences about how to use a computer at school, Jae-Hoon said:

Researcher: When you used a computer at school, do you think you learned something?

Jae-Hoon: Yes. . . . I couldn't use *Office Word* well, but now I understand it more, yeah. At school, at the computer period, I use *Office Word*. I also type, I use the computer more often, so I think I can type faster, but I don't know. (Interview with Jae-Hoon)

Stacy also mentioned, "At the computer lab, like the project, we do the project and print it. We learn how to edit paragraphs. Like how to make it long and how to make it narrow. [My teacher] teaches us" (Interview with Stacy).

#### *Other Differences of ELLs' Reading Computer-Based Texts*

Additional differences include diverse web resources that the ELLs accessed and the opinions of parents and teachers regarding the students' use of computers.

##### *Accessing Different Web Resources*

All the ELLs showed different patterns when they accessed and read websites at home and at school. As Tables 7 and 14 show, the ELLs accessed websites both for information and for fun in each context. However, in home contexts, they accessed websites for fun more often than the resources for information and used more linguistically diverse resources. In school contexts, the ELLs searched for more academic topics, and more restrictions existed.

In home contexts, the ELLs accessed informative websites, such as *Elementary Reading*, *Scholastic*, *Study Island*, *Beestar*, etc. They also clicked fun websites, such as *PBS Kids*, *Dav Pilkey's Extra-Crunchy Website O'Fun*, *Funschool Game*, *Cartoon*

*Network*, *FusionFall*, etc. The ELLs did not always access websites for only one purpose because each computer-based text could be informative and fun at the same time. For example, Jae-Hoon read articles at the NBA website for fun, but he found new information about his favorite basketball player, too. Even though Jae-Hoon, Stacy, and Brian played diverse computer games on a certain website, they read the instructions, as information, to learn how to play the games. However, at home, all the ELLs spent more time accessing websites for fun than for information.

All the ELLs actively accessed their L1 and multilingual resources at home. Jae-Hoon and Stacy accessed YouTube to watch fun videos and music videos in their L1s; Brian also accessed YouTube and watched Chinese and Korean SpongeBob videos, which were not even his L1. Jae-Hoon, Kyoung-Min, and Stacy accessed several Korean websites, such as *Drama Style* at <http://dramastyle.com>, *Daum Kids JJang* at <http://kids.daum.net>, *Joon Media* at <http://joonmedia.net>, *Junior Naver* at <http://jr.naver.com>, *Naver* at [www.naver.com](http://www.naver.com), and read diverse computer-based texts. These texts enabled the ELLs to experience their native cultures and L1s.

In school contexts, all the ELLs accessed computer-based texts for both information and fun. They accessed informative websites, such as *enVisionMath*, *Study Island*, *Wikipedia*, *Scholastic News*, etc.; they clicked fun websites, such as *ABCYa.com* and the *Kidz Page*, too. However, the ELLs mostly searched for information for their school projects when they read computer-based texts at school, and their opportunities to access fun websites were limited. Moreover, even though Mrs. Chang and Mrs. White provided a list of fun websites to her students, the resources were originally intended for practicing typing or contained educational content.

The ELLs' access to certain websites was restricted at school. Since every school in this study had installed content filter software, students could not access particular websites, such as YouTube and Facebook, in school settings. This restriction did not allow students to access many multimedia and CMC resources either. However, in home contexts, parents did not install any software to protect their children from potentially harmful web resources. Furthermore, the ELLs did not have opportunities to access their L1 texts unless the teachers and the students had the same L1s.

*Different Opinions about Students' Uses of Computers*

As authoritative discourses (Bakhtin, 1981), the directions and opinions of parents and classroom teachers were critical when ELLs read computer-based texts at home and at school. In home contexts, parents mostly did not have positive attitudes toward their children's use of computers. The mothers of Jae-Hoon, Stacy, and Brian did not consider computer-based texts as important or helpful resources for their children's academic achievement and attainment. The parents believed that their children used computers only for fun, such as playing computer games and watching entertaining videos. Even though the mothers of Kyoung-Min and Stacy recommended that their children access several educational websites, they still believed that the resources were just supportive. In an interview, Jae-Hoon's mother shared her opinion regarding Jae-Hoon's use of a computer at home:

If students actively search for information to have more knowledge, it must be good. However, if students use it only for curiosity and waste too much time, I don't think it is helpful. [Jae-Hoon] loves playing computer games. If I don't limit his playing time, he will play them too long time. So we restrain him. (Interview with Jae-Hoon's mother)

Brian's mother did not like her son to play computer games at home because of the violence and aggressive features of them. In spite of these negative opinions, parents still



allowed their children to use computers for entertainment purposes as a reward for the ELLs' hard academic work at home and at school. Stacy's mother said, "Of course, I don't like them to play computer games. However, they work hard at school during the weekdays, so it is OK for them to play games for a while during weekends" (Interview with Stacy's mother).

Teachers' perspectives on their students' uses of computers were different from the parents' opinions. All the teacher participants believed the use of computer technology for their classes was beneficial. Classroom teachers dynamically used a variety of computer-assisted technology and computer-based texts in their classes. When I asked for her opinion about the use of computers in class, Mrs. Davis responded:

I think it's great. I think that's the way the world going, and we need to know it. Um, you know, the basic typing skills, research skills, how to write a report, formatting, um, so we are trying to get until that this year. (Interview with Mrs. Davis)

Mr. Hill also agreed with Mrs. Davis and emphasized that he needed to learn more about computers:

I think it's great. I think more because this is a central value for their future to build and keep up with another world and things going. Ah, I just need to keep learning more, so I practice more. So I don't know nearly enough. I don't know. Things change so fast I guess, so I don't really know everything ever, but just keep learning and hopefully kids need to know how to do it and use more often, too. (Interview with Mr. Hill)

To the teachers, computers were not only for entertainment but also for learning, and they appreciated the support from the school district and parents. They believed that computer technology was omnipresent and that students' abilities to use computers would be imperative for their future. Mr. Hill said, "It's just gonna be everywhere in the future. I mean, whether it's a laptop, *iPad*, or *Smartphone*, that means that everything is, it's kind of a global shift towards technology. And it's now happening" (Interview with Mr. Hill).

Teachers with these positive opinions regarding the use of computers actively incorporated computer technology into their classes.

## CHAPTER 6: DISCUSSION AND IMPLICATIONS

### Introduction

This study investigated the elementary level ELLs' use of strategies and the influential factors when they read computer-based texts in home and school contexts. I intended to have a better understanding of the ELLs' literacy experiences and use of strategies to support them more effectively in the learning context of multiliteracies. To conduct this investigation, I had participation from four fourth- or fifth-grade ELLs, four parents, and five schoolteachers. Each ELL individually read computer-based texts at home and at school, and I observed their use of strategies and performance during each session. All the ELLs were asked to think aloud while they read the texts in order to inform me of the strategies they used during reading at home and school. Moreover, I observed research sites and participants, interviewed participants, collected documents, took field notes, and kept reflective journals. Participants' verbal reports and interviews were audio recorded.

To analyze the data systematically, I modified Merriam's (1998) case study analysis. I prepared data and read them to develop categories. I also identified salient categories and assigned them a code. After these coding processes, I reread data, refined salient categories and interpretations, and kept a record of where relationships were found. Based on the codes and data, I completed an analysis within categories and searched for themes across categories. In this way, I identified the ELLs' use of strategies, their experiences, and influential factors. After completing the analysis, I used the constant

comparison method to reveal common patterns, similarities, and differences in their use of strategies.

Even though some researchers have found the online reading strategies, the study about ELLs' use of strategies in both home and school contexts has not been their focus. In addition, the studies about the ELLs' use of strategies when they read extended computer-based texts in naturalistic settings were rare. I examined diverse categorizations from previous research on reading and learning strategies, and the readings showed me the overall view while I analyzed data. However, I tried to minimize the influence of the previous research on my interpretations. Although some of the identified strategies are consistent with those defined in the existing literature, I independently developed the strategies in this study.

This chapter consists of five sections: (1) summary of findings, (2) discussion of findings, (3) implications, (4) recommendations for further research, and (5) conclusion. I first summarize my findings from this study in light of the research questions. In the discussion of findings section, I discuss the findings based on my research questions and the emerged themes. In the implications section, I make a connection between my findings and education in home and school contexts. The chapter ends with recommendations for further research and conclusion.

### Summary of Findings

To summarize the findings efficiently, I combine Research Questions 1, 2, 4, and 5 to describe the ELLs' strategies when they read computer-based texts at home and at school. I also combine Research Questions 3 and 6 to summarize influential factors. This section consists of three subsections: (1) multiple strategies in computer-based reading

activities, (2) influential factors, and (3) similarities and differences of the ELLs' use of strategies.

### *Multiple Strategies in Computer-Based Reading Activities*

Regarding ELLs' use of strategies at home and at school, 15 categories emerged. The categories consisted of (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) scrolling up and down and getting back and forth, (11) inferring the text, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source.

Instead of summarizing all the categories in order, I describe them based on meaningful themes and their significance. The emerged themes are (1) accessing computer-based texts, (2) use of computer literacy, (3) making a critical decision, (4) communicative reactions, and (5) active participations in computer-based text reading activities.

### *Accessing Computer-Based Texts*

ELLs initially searched for the resources and accessed them when they read computer-based texts at home and school. To access computer-based texts, ELLs adopted "accessing a web page," "accessing hypermedia," and "using references"; these strategies were the basic skills for information literacy.

The "accessing a web page" and the "accessing hypermedia" categories, as the initial stages of ELLs' reading of computer-based texts, referred to how the ELLs searched for and accessed those resources. Readers can approach information on the

Internet through diverse ways (Kuiper, Volmam, & Terwel, 2005). At this initial stage, the ELLs typed a web address into the address bar, typed keywords into a search engine, clicked a hyperlink of an open website, clicked a bookmark, and modified a web address to access a website. The “accessing hypermedia” enabled readers to access textual resources, images, audios, videos, and computer games at home and school. ELLs in this study also used references to access computer-based texts. They referred to a variety of references, using both computer-based resources and paper-based resources.

### *Use of Computer Literacy*

When ELLs read computer-based texts, they used their knowledge and abilities in using computers in general (Topping, 1997; Warschauer, 1999, 2002). In this category, I assigned “scrolling up and down and getting back and forth” and “using computer skills and devices.” These strategies were basic knowledge and skills to use computers; however, the computer literacy was different for each ELL.

The ELLs in this study scrolled up and down and moved back and forth when they read computer-based texts. All the ELLs scrolled up and down to move the browser viewing window up and down, and they moved to another page of the same resource or to a totally different text when they read computer-based texts. In addition, the ELLs used a computer mouse, printed computer-based texts, and downloaded the texts. They moved the mouse pointer to follow or highlight a particular area of the texts. Using the computer mouse and the mouse pointer was an active and remarkable way to use computer literacy. The ELLs also printed online articles, lists of assignments, and images mostly for their school projects. In home contexts, they downloaded computer-based texts to facilitate the literacy processes.

### *Making a Critical Decision*

When the ELLs navigated and read computer-based texts on the Internet, they made critical decisions to selectively search for and access satisfactory computer-based texts at home and school. I assigned this theme as “making a critical decision” and included “setting up the purpose,” “previewing,” and “evaluating the computer-based text and deciding what to read.”

The ELLs set up their purposes of reading, either for information or for fun, when they read computer-based texts. If they read the texts for information, they acquired their knowledge by navigating websites and accessing diverse resources on the Internet. The ELLs also navigated on the Internet for fun. They accessed funny videos on YouTube, TV programs, computer games, songs, or online articles about their favorite celebrities.

Based on their initial purposes of reading, the ELLs searched for resources on the Internet and previewed titles, menus, and texts. The ELLs in this study made critical decisions when they decided to read particular computer-based texts and evaluated them.

### *Communicative Reactions*

To this section, I assigned “making a connection” and “sharing an information source.” Instead of including “dialoguing” into this category, I assigned it as one of the additional themes because I paid more attention to the strategy. In this study, ELLs utilized their schemata and made connections to themselves, texts, and world knowledge as communicative reactions when they read computer-based texts. The ELLs also shared information about computer-based resources.

### *Active Participations in Computer-Based Text Reading Activities*

When ELLs read computer-based texts, they modified the reading patterns. The ELLs optimized their meaning-making processes and maximized their comprehension. When ELLs adjusted the patterns of their computer-based text reading, they made this adjustment depending on the genres of the texts, their comprehension, and the literacy contexts. ELLs also independently monitored their comprehension of particular texts and made decisions on their next reading steps. Furthermore, the students inferred particular information from computer-based texts and confirmed whether their inferences were correct at the end of the computer-based literacy activities (Oakhill & Cain, 2007; Richards & Anderson, 2003).

### *Influential Factors*

All the ELLs used multiple strategies when they read computer-based texts at home and at school. They adopted the strategies in order to facilitate their reading, and five influential factors emerged: (1) ELLs' electronic literacy knowledge and experiences, (2) parents' and teachers' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, (4) the language of computer-based texts, and (5) technology equipment.

### *ELLs' Electronic Literacy Knowledge and Experiences*

The ELLs' choices of computer-based texts and their uses of strategies were relevant to their knowledge of and experiences in electronic literacies, which were composed of computer literacy, CMC literacy, multimedia literacy, and information literacy (Warschauer, 2002). Computer literacy included basic computer skills, which



were requirements for better CMC literacy, information literacy, and multimedia literacy performances.

CMC literacy influenced the ELLs' synchronous and asynchronous dialogues with their friends, relatives, teachers, and computer-based texts. Multimedia literacy influenced the ELLs' use of strategies, and the ELLs chose and accessed multimedia resources depending on their preferences and perceptions of the resources. Information literacy enabled the ELLs to search for computer-based texts for information and for fun.

#### *Parents' and Teachers' Guidance and Interest for Computer-Based Text Reading*

As centripetal forces (Bakhtin, 1981), parents and teachers provided authoritative discourses and played important roles in their children's use of computers and computer-based texts. At home, parents regulated, allowed, and guided children's behavior and activities regarding their access of multimedia texts (Vandewater, Park, Huang, & Wartella, 2005). At school, teachers changed instructional practices and adopted constructivist approaches when they used computer technology (Windschitl & Sahl, 2002), and they also regulated, allowed, and guided children's use of technology at school.

#### *ELLs' Purposes for Reading Computer-Based Texts*

The ELLs' purposes for reading computer-based texts influenced their use of strategies. If the ELLs read computer-based texts for information, they paid more attention to collecting informative resources and to understanding them effectively. In this case, parents were more flexible regarding their authoritative discourses on their children and allowed them to use computers longer than the designated hours. For their reading for entertainment purposes, the ELLs did not feel pressure to search for

informative resources, and they completed multiple tasks at the same time. For example, they listened to music and played computer games together.

### *The Language of Computer-Based Texts*

In home contexts, Jae-Hoon, Stacy, and Brian used their L1s, but Kyoung-Min spoke only English. However, all the ELLs searched for and accessed computer-based texts using both L1 and L2. In school contexts, they used only English. This language factor was relevant to the ELLs' choice of computer-based texts and their use of strategies to read the texts. In addition, when ELLs accessed websites in their L1s, they mostly read the texts for fun; however, they accessed computer-based texts in English for both information and fun.

### *Technology Equipment*

The possession of technology equipment was another influential factor that changed the ELLs' reading of computer-based texts and choices of strategies at home and at school. In home contexts, each ELL had different technology equipment depending on their parents' socioeconomic status and expertise. Each ELL also had different technology equipment at school. Since all ELLs were in Oracle Unified School District, all the schools had similar basic computer-based equipment and regulations, but they had additional computer-based equipment and facilities, such as laptop carts, iPods, Smart boards, etc. At each school, technology specialists staffed the computer labs, but their roles were also different. This technology equipment at home and school influenced parents' and teachers' potential decisions to use computer technology, and these decisions influenced the ELLs' opportunities to read computer-based texts.

### *Similarities and Differences of the ELLs' Use of Strategies*

All the ELLs in this study played active roles when they read computer-based texts and critically made decisions throughout their reading at home and at school. The ELLs adopted diverse strategies and facilitated their meaning-making processes in each research site. They used 15 strategies at home and at school respectively: (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) inferring the text, (11) scrolling up and down and getting back and forth, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source. Even though the ELLs used the same strategies, their specific patterns of using the strategies and the sub-categories were different. Regarding the sub-categories, the ELLs used “modifying a web address,” “considering if the text is fun,” “considering if the text is long,” “reading quickly or slowly,” and “downloading” only at home.

### Discussion of Findings

In this section, I discuss the findings based on my research questions and the emerged themes. Since one of my research focuses is ELLs' experiences in the learning contexts of multiliteracies and my theoretical framework is composed of Vygotsky's (1978) ZPD and Bakhtin's (1986) dialogism, I pay attention to those topics during discussion. The emerged themes are the following: (1) hybrid reading and learning, (2) agency and identity, (3) roles of parents and teachers in ELLs' computer-based text

reading, (4) technology equipment and education, (5) active and non-linear dialogues, (6) multi-dimensional ZPD, and (7) diverse pedagogical approaches to new literacies.

### *Hybrid Reading and Learning*

All the ELLs read both paper-based and computer-based texts in their home and school contexts. They adopted, modified, and developed strategies to facilitate their reading and learning. In this section, I discuss their reading and learning in these diverse learning contexts, and the emerged themes are (1) computer-based text reading strategies, (2) hybrid reading strategies, and (3) hybrid learning.

### *Computer-Based Text Reading Strategies*

All the ELLs, as active participants of literacy activities, use diverse strategies when they read both paper-based and computer-based texts (Anderson, 1991, 2003; Block, 1986, 1992; Brantmeier, 2005; Coiro, 2003; Elshair, 2002; Foltz, 1993; Hosenfeld, 1977; Hsieh & Dwyer, 2009; Sheorey & Mokhtari, 2001; Zhang & Duke, 2008). As the ELLs in this study showed, L2 readers (1) access a web page, (2) access hypermedia, (3) evaluate the computer-based text and decide what to read, (4) set up the purpose, (5) preview, (6) make a connection, (7) dialogue, (8) adjust the reading pattern, (9) monitor the comprehension, (10) infer the text, (11) scroll up and down and get back and forth, (12) use references, (13) use computer skills and devices, (14) confirm a prediction, and (15) share an information source. Moreover, (1) ELLs' electronic literacy knowledge and experiences, (2) parents' and teachers' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, (4) the language of computer-based texts, and (5) technology equipment in the contexts influenced the L2 readers' use of strategies when they read computer-based texts at home and at school.

The ELLs actively use these reading strategies and transfer them between paper-based and computer-based text reading contexts (Elshair, 2002; Hsieh & Dwyer, 2009). I describe this transfer in the following section: “hybrid reading strategies.” However, this study shows that the ELLs transfer their reading strategies between home and school contexts, too. For example, in this study, Jae-Hoon and Stacy modified website addresses when they accessed websites at home, and they transferred the strategy to the school contexts. Teachers in this study did not teach their students the organization of URLs during their classes or computer sessions. When they read computer-based texts at school, the ELLs predicted the stories or the content and guessed the meaning of the texts or words based on their teachers’ directions. Mrs. Chang, Mr. Hill, Mrs. Davis, and Mrs. White emphasized the inferring strategy in school contexts, and the ELLs also used the strategy when they read computer-based texts at home.

### *Hybrid Reading Strategies*

All the ELLs use diverse strategies, such as evaluating the computer-based text and deciding what to read, setting up their reading purposes, using their schemata, and dialoguing when they read computer-based texts at home and school. These are the identical strategies that the ELLs also adopt when they read paper-based texts and learn from the texts (Elshair, 2002; Hsieh & Dwyer, 2009; Jiménez, García, & Pearson, 1996; O’Malley & Chamot, 1990; Oxford, 1990; Oxford & Crookall, 1989). However, their uses of reading strategies in the computer-based text reading contexts are more dynamic than in the paper-based text reading contexts due to the enormous amount of online information and diverse text types.

In addition to borrowing these paper-based text-reading strategies, the ELLs modify the strategies when they read computer-based texts. Moreover, they develop new and innovative strategies depending on the text and the task (Park & Kim, 2011). For example, the ELLs access web resources and use computer skills to facilitate their computer-based text reading processes. Since the ELLs use strategies for different target texts, both computer-based and paper-based texts, I use the term *hybrid reading strategy* to refer to the ELLs' strategy use as Park and Kim (2011) did. An online dictionary defines the word *hybrid* as “anything derived from heterogeneous sources, or composed of elements of different or incongruous kinds” (Online Dictionary, 2012), and it frequently describes teaching that combines face-to-face and online teaching methods (King, 2002). Through these processes, the ELLs actively select appropriate reading strategies, modify them, and develop new ones to adapt themselves into the computer-based reading environments.

In this study, the 11 reading strategies derived from reading paper-based texts were (1) evaluating the (computer-based) text and deciding what to read, (2) setting up the purpose, (3) previewing, (4) making a connection, (5) dialoguing, (6) adjusting the reading pattern, (7) monitoring the comprehension, (8) inferring the text, (9) using references, (10) confirming a prediction, and (11) sharing an information source. These strategies were also used for paper-based text reading and learning (Jiménez, García, & Pearson, 1996; O'Malley & Chamot, 1990; Oxford, 1990; Oxford & Crookall, 1989).

The ELLs also modified the paper-based text reading strategies for computer-based learning environments or developed new strategies. The two modified sub-strategies were (1) previewing and clicking menu buttons and (2) referring to a computer-

based resource. For these sub-categories, the ELLs adjusted the previewing and the using references strategies. The newly developed strategies were the following: (1) accessing a web page, (2) accessing hypermedia, (3) scrolling up and down and getting back and forth, and (4) using computer skills and devices.

Even though ELLs develop these strategies, in most cases, they do not develop them from nothing. The ELLs transfer their internalized experiences in reading paper-based texts to a new reading context (Park & Kim, 2011). For example, based on their experiences in using additional references and intertextual resources, ELLs refer to multimedia resources by accessing hypermedia. In addition, they use a computer mouse as if they pointed to particular words or sentences with their pencils or fingers. However, the ELLs do not simply transfer the strategies from paper-based reading to computer-based reading contexts. They also consider the presentation format, terms used for each text, linearity of reading a text, and available resources and options (Park & Helsel, 2008; Park & Kim, 2011). For instance, when ELLs read computer-based texts, they access textual resources, images, audios, videos, and computer games in integrative and synthetic ways (Mayer, 1997), and they use the terms, such as windows, frames, screens, links, Internet, etc. They read these texts linearly or non-linearly depending on their reading environments and the presentation formats (Berk & Devlin, 1991; Shapiro & Niederhauser, 2004; van Den Berg & Watt, 1991). They also consider what resources and options are available, and additionally they decide to read or not to read particular texts for their reading.

These findings reflect that the ELLs do not play passive roles when they read computer-based texts; instead, their roles were active and constructive in the learning

contexts of multiliteracies. The ELLs do not simply use individual strategies in the same ways; they adapt themselves to the new reading contexts and apply the best strategies to each reading. They actively and creatively make meanings and develop their own reading strategies, depending on the contexts (Park & Kim, 2011). To facilitate the ELLs' literacy development in the innovative learning contexts of multiliteracies, parents, teachers, and school administrators should develop positive technology-assisted learning environments, and technology incorporation in education needs to be systematically included in school curriculums.

### *Hybrid Learning*

As the ELLs constructively use diverse strategies when they make meanings from both paper-based and computer-based texts (Anderson, 1991, 2003; Block, 1986, 1992; Brantmeier, 2005; Coiro, 2003; Elshair, 2002; Foltz, 1993; Hosenfeld, 1977; Hsieh & Dwyer, 2009; Sheorey & Mokhtari, 2001; Zhang & Duke, 2008), their learning occurs with both forms of texts in situated learning contexts. Situated learning is a model of instruction, and its proponents believe that meaningful learning takes place if it is embedded in the social and physical contexts within which it will be used (Billett, 1996; Brown, Collins, & Duguid, 1989; Herrington & Oliver, 1995, 1997, 1999). Many researchers and teachers think that computer technology can provide alternatives to real-life settings without sacrificing the authentic learning contexts (Herrington & Olive, 1995).

In the situated learning contexts, the ELLs read paper-based resources, such as textbooks, science books, encyclopedias, cartoons, and dictionaries, and they pursue their efferent and aesthetic reading purposes. In school contexts, the ELLs consider the paper-



based resources to be more official and critical resources. Given this inclination, they initially refer to their textbooks or paper-based resources in most cases. In addition, the ELLs access computer-based texts, such as online articles, YouTube videos, podcasts, pictures, and computer games, and they either draw information from those texts or entertain themselves (Kerawalla & Crook, 2002; Mumtaz, 2001; Roschelle, Pea, Hoadley, Gordin, & Means, 2000).

In both home and school settings, hybrid learning occurs, and the ELLs learn new contents, genres, languages, and computer literacies in the situated learning contexts (Kim, 2011; Park & Kim, 2011). They also internalize the knowledge. For example, in home contexts, when Kyoung-Min took online social studies tests (<http://www.beestar.org>), he could not answer the question “Who discovered a sea route to the New World and named the island he landed on San Salvador?” He looked for the information from his books and learned the contents by taking the online quizzes. When his iPod Touch did not work properly, Jae-Hoon tried to find ways to fix it from a computer book at home, but the book did not contain appropriate information. He finally learned how to restore his iPod Touch by watching YouTube videos, thus exhibiting his problem-solving skills. Jae-Hoon and Stacy also accessed the *Study Island* website at <http://www.study-island.com>, which they used at school, and obtained content knowledge.

In school contexts, the ELLs learned by referring to both paper-based and computer-based texts. For instance, before Jae-Hoon searched for information about “Southwestern Native American Customs” on the Internet, Mr. Hill taught his students about Native Americans, and Jae-Hoon referred to the textbook. However, Mr. Hill’s lecture was too general, and the textbook did not contain the detailed information Jae-

Hoon needed to complete his project; instead, Jae-Hoon could find detailed information on the Internet. In Kyoung-Min's case, Mrs. Davis taught the overall organization of the U.S. and requested her students to conduct research about the organization of other countries. Since Mrs. Davis could not teach the organization of every country, and the textbook did not contain all the information, Kyoung-Min could not search for the information by using only the textbook. He could, however, successfully search on the Internet for information about Israel's organization in order to complete his school project. When Brian worked on his school project about "Mojave Native Americans," he referred to his textbook after Mrs. Bryant's lecture. However, Brian could not find any information from his textbook. He requested help from Mrs. Bryant and obtained important information from the *Mojave Indian Culture and History* website at [http://www.nativelanguages.org/mojave\\_culture.htm](http://www.nativelanguages.org/mojave_culture.htm) and the *Mojave Native Americans* link at <http://www.nps.gov/moja/mojahtna.htm>.

Teachers' use of both texts was also remarkable in the school context. During her science class, Mrs. Chang showed several articles and images about volcanoes to the students. Mrs. Bryant accessed a website to give Brian a list of synonyms of *say*. Mrs. Chang and Mrs. Bryant accessed computer-based texts and provided additional information that did not exist in the textbooks in order to facilitate students' understanding of particular concepts and phenomena. Mr. Hill and Mrs. Bryant frequently used their paper-based textbooks and the electronic versions of the textbooks interchangeably.

The above cases reflect that the ELLs read both paper-based and computer-based texts, and they learn contents, genres, languages, and computer literacies in both home

and school contexts. The ELLs do not just access the computer-based texts to support the paper-based texts; instead, the texts were complementary. Since the information that the ELLs could obtain from paper-based text resources was limited or the paper-based resources they could access were limited, they needed to rely on other sources for the necessary information. One of the advantages of computer-based texts is their innumerable resources, including diverse language, culture, and presentation formats, which makes the computer-based texts more important for the ELLs' daily literacy activities at home and school. Computer-based texts even play critical roles in the ELLs' learning. For example, all the ELLs in this study more often showed their excitement when they accessed computer-based texts than when they read paper-based texts. Jae-Hoon and Brian shouted for joy and pounded on the desk with excitement when they watched video texts. Furthermore, all the ELLs in this study worked on their projects more actively when they used computer-based texts than when they just listened to their teachers or read paper-based texts. On the whole, the ELLs became more engaged in the reading activities when computer-based texts were involved. Jae-Hoon and Brian had difficulty in finding appropriate and detailed information within paper-based texts for their school projects. Their textbooks contained more-general information or did not even explain the information relevant to their projects; however, computer-based texts, such as websites and YouTube videos, provided the ELLs more-usable resources. In this case, the ELLs' learning was restricted or less meaningful when they read paper-based texts, but their reading of computer-based texts remarkably facilitated their learning while on the Internet.

Even though the ELLs' learning in computer-assisted educational contexts varies depending on their different learning styles and preferences to particular forms of texts, the findings from this study show that the ELLs learn by reading both paper-based and computer-based texts at home and at school. However, computer-based texts are superior to and more efficient than paper-based texts for several reasons: larger amounts of information, easier access to different types of texts, and greater accessibility to texts with diverse languages and cultures. First, when the ELLs read computer-based texts, they can access innumerable textual resources, audios, pictures, videos, and computer games at one time. However, they have a limited number of paper-based books either at home or at school, and this restraint makes it hard for the ELLs to access numerous resources in a short time period. Second, the ELLs can access all the textual resources, audios, pictures, videos, and computer games with ease if they have appropriate computers and Internet access. However, since paper-based texts only provide textual resources and images, the ELLs need additional tools, such as a cassette player, a video player, and an electronic game system, if they want to access audios, videos, and electronic games. Third, the ELLs can access culturally and linguistically diverse computer-based texts, which may efficiently enable the ELLs to access texts in their L1. However, it will be difficult for them to access paper-based texts in their L1s within school contexts.

All these examples and strengths regarding computer-based texts show that the ELLs' reading of the texts is very important for their literacy development in the situated learning contexts of multiliteracies. Since paper-based text reading and computer-based text reading are complementary, the ELLs' parents, teachers, and school administrators

should understand the importance of the ELLs' hybrid reading and learning in home and school contexts. They all need to invest more in teaching and learning within the computer-assisted learning environments, and school curriculums should be modified to incorporate computer-based texts into the schools' education practices. Doing so will facilitate the ELLs' hybrid learning.

### *Agency and Identity*

All the ELLs read computer-based texts in home and school contexts, and their reading develops their agency and influences their identities. In this section, I discuss their agency and identities.

#### *Agency*

Based on the belief that human beings can influence their own lives and events while they are shaped by social and individual factors (Bandura, 2000; Lasky, 2005), agency refers to their capabilities of making choices and acting on these choices to make a difference in their lives (Martin, 2004). Several researchers use agency as an alternative concept of self-regulation or adopt a sociocultural approach to agency (Lasky, 2005; Martin, 2004).

In this study, the ELLs' agency was remarkable when they read computer-based texts at home and at school. All the ELLs set up their purposes and made choices to access particular websites and hypermedia when they read computer-based texts. For example, in the home context, Stacy decided to search on the Internet for information about "the California Gold Rush" and typed her keywords into the search bar. When a search engine in the Web 3.0 environment offered suggestions about the key words, she dialogued with the texts and revised her key words for the search. In addition, when the

search engine listed the search results, Stacy previewed the texts and decided to read particular websites by clicking on hypermedia. Since all these processes were reader-centered and self-regulated, the ELLs could develop their agency and self-regulated learning skills by reading computer-based texts. Even though Mrs. Davis guided her students as they accessed Google to search for information, and all the teachers provided lists of web resources to their students, a large number of the resources and literacy activities were student-centered, too. The ELLs could still develop their agency while reading computer-based texts at school.

In addition, a learner has a high degree of ownership of learning when the learner finds personal values, feels in control, and takes responsibility for the learning process as well as the results of the project (Armitage, Wilson, & Sharp, 2004; Milner-Bolotin, 2001). The ELLs had a high degree of ownership of learning through the self-regulated and hybrid learning processes when they read computer-based texts. The ELLs understood the importance of their schemata and made connections to themselves, texts, and world knowledge.

### *Identity*

All human identities are social identities, and the processes to identify ourselves and others always involve interactions, such as agreement, disagreement, communications, and negotiations (Jenkins, 2000). In addition, ethnic identities are “part of an individual’s self-concept which derives from his knowledge of his membership in a social group (or groups) together with the value and emotional significance attached to that membership” (Tajfel, 1981, p. 255). An identity is formed through the process of self-categorization and identification, and language is a primary resource for enacting

social identity and displaying membership in social groups (Hogg, Terry, & White, 1995; McNamara, 1997; Miller, 2000; Stets & Burke, 2000). In this study, languages, cultures, parents' beliefs, and electronic literacies influenced the ELLs' identities when they read computer-based texts at home and at school.

### *Languages and Cultures*

ELLs continually use their L1s, L2s, or both languages and practice the literacy to make sense of texts (Busch, 2008; Jiménez, García, & Pearson, 1995, 1996; Kim, 2011), and they also use the languages when they read computer-based texts. However, the ELLs' attitudes toward their L1s influence reading behaviors (Kamhi-Stein, 2003). Even though Jae-Hoon, Stacy, and Brian used their L1s, but Kyoung-Min spoke only English in home contexts, all the ELLs searched for and accessed computer-based texts using both L1 and L2. In school contexts, they used only English. The language factors, such as their language experiences and proficiency levels, were relevant to the ELLs' choice of computer-based texts, their use of strategies to read the texts, and their identities (Hakuta & D'Andrea, 1992; Horowitz, 1994; Kamhi-Stein, 2003; Smith, 1999). For example, when ELLs accessed websites in their L1s, they mostly read the texts for fun; however, they accessed computer-based texts in English both for information and for fun.

The reason why the ELLs accessed particular languages was relevant to their orientations toward language planning. As Ruíz (1984) identifies, the orientations consist of language as a problem, language as a right, and language as a resource. According to a language-as-a-problem orientation, minority languages are associated with the minority groups' problems, such as poverty and low educational achievement. This orientation sees that the solution is to learn the majority language. The second orientation, a language

as right, views minority languages as a basic human right and seeks affirmation of the speakers' language rights. A language-as-resource orientation views minority languages as a resource for their groups and the community at large. Researchers (Blonski Hardin, 2001; Jiménez, García, & Pearson, 1995, 1996) argue that successful bilingual readers view their home languages as resources and use them when they read texts; however, less-successful bilingual readers view their home languages as problems and avoid using them.

Jae-Hoon, Stacy, and Brian adopted the language-as-a-resource orientation, and they believed that L1 computer-based texts were useful resources. They also experienced their native cultures by accessing their L1 computer-based texts. In particular, Jae-Hoon and Stacy identified themselves as Korean, and Brian thought of himself as Filipino. These ELLs frequently accessed their L1 computer-based resources at home. They accessed portal sites, such as *Daum* at <http://www.daum.net> and *Naver* at <http://www.naver.com>, or searched for diverse L1 texts through Google, YouTube, etc. They read their L1 online textual resources, watched L1 TV programs, listened to L1 music, etc., and all these L1 texts enabled the ELLs to maintain their native cultures to some extent. However, Kyoung-Min adopted a language-as-a-problem orientation. Even though Kyoung-Min did not refuse his Korean ethnic background, he thought that the Korean language was not necessary for his life. Kyoung-Min sometimes accessed his L1 TV programs and videos, but he viewed his home language as a hindrance to his settling into his new school in the U.S. and avoided using his L1 computer-based texts in most cases when I began to observe him at home.



In addition to the ELLs' orientations toward languages, their L1 proficiency levels and linguistic self-confidence also explained the language influences on their reading of computer-based texts (Chiswick & Miller, 1994; Csizér & Dörnyei, 2005). Language plays a key role in the ELLs' social adjustment and in the social and political cohesion both within and among groups; their linguistic skills have important political implications (Chiswick & Miller, 1994). Jae-Hoon, Stacy, and Brian still spoke their L1s fluently when I visited them; however, the ELLs were not confident with reading in their L1s and expressed awareness of their L1 loss. All the ELLs were oftentimes not willing to read L1 computer-based texts for information because they did not want to make mistakes in their school projects, but they accessed them for fun because they did not need to be fluent L1 readers to comprehend such texts. The ELLs mostly preferred to use their L1s and to read L1 computer-based texts in informal settings (Warschauer, El Said, & Zohry, 2002), but they accessed English computer-based texts for both information and fun. By reading their L1 computer-based texts, the ELLs still learned about their L1 cultures and maintained their native cultures and identities.

Kyoung-Min, on the other hand, did not speak Korean, and he was not able to read and write Korean at all. His limited L1 proficiency level discouraged him from accessing Korean computer-based texts and maintaining his Korean identity. At the beginning of this study, Kyoung-Min did not identify himself as Korean, and he did not even want to learn Korean. He suffered from his lack of English proficiency, and this made Kyoung-Min avoid using his L1 and lose his Korean identity. However, after he began to go to a Korean afterschool, his attitude toward his L1 changed. At the Korean afterschool, Kyoung-Min took a Tae-Kwon-Do class and learned how to play Korean

musical instruments. In addition, he met and interacted with many Korean students on a regular basis. Finally, Kyoung-Min began to take a Korean class and regain his Korean identity.

### *Parents' Beliefs*

The parents' L1 and L2 language use and proficiency influenced the ELLs' language choice and use and their identity construction, and the ELLs who conversed with their parents with different languages felt more emotionally distant from their parents (Kamhi-Stein, 2003; Tseng & Fuligni, 2000; Wong Fillmore, 2000). In this study, parents' orientations toward languages influenced the ELLs' access to L1 computer-based texts significantly. All the parents in this study adopted both the language-as-a-resource and the language-as-a-right orientations regarding their children's languages. The parents believed that their L1s were a basic human right for their children and that the L1s could be an important asset for their futures (Kamhi-Stein, 2003; Ruíz, 1984). They wanted their children to grow up with dual identities; the parents wanted their children to become active members of the mainstream culture and society in the U.S. but maintain the native culture, too. In an interview, Kyoung-Min's mother clarified this:

When I first came here, I wanted them to grow up like American kids. But after I spent some time here and saw other people's lives, I began to think that we must keep our own nationality. So I think parents have to help children live here with the Korean nationality, both Korean and American ones. After all, as kids grow older, they mostly get together based on their nationality. That's what I heard from other parents, and I felt that it was right. I could not ignore the issue. Although we would like to get into the upper class in America, we have to get along with other Korean people first; I think that is the right step. I also heard that even after they go to college, they get together according to their nations, so Chinese students work with other Chinese students and help each other. My kids can't have the connection if they don't speak Korean. And as Korean kids get together, they may talk about their nation, so I have to take care of those issues, too. (Interview with Kyoung-Min's mother, August 7, 2010)

They believed that education in U.S. schools would enhance the formation of their children's identities as citizens of the U.S., but at home the parents educated their children to retain the culture from their countries of origin.

The mothers of Jae-Hoon, Kyoung-Min, and Stacy believed that Korean computer-based texts would help their children maintain their Korean language and culture. They encouraged their children to read Korean computer-based texts at home. For example, they allowed their children to access TV programs, movies, videos, computer games, and stories about celebrities in their L1s. These computer-based texts helped the ELLs maintain their native languages and cultures; at least, accessing the L1 computer-based resources delayed the process of losing their native languages and cultures or encouraged them to voluntarily access those L1 resources. In these contexts, Jae-Hoon and Stacy considered themselves to be Korean, and Brian clarified that he had Filipino ethnic background. All three ELLs searched for computer-based texts about diverse topics regarding their native countries, such as news about their countries, updates about the celebrities, and L1 TV programs and songs; they also kept interacting with their friends and relatives in their native counties. For example, Jae-Hoon was excited when he accessed websites about the Samsung (a Korean company) Smartphone and Taekwondo (Korean martial arts), and Stacy frequently accessed websites about Korean singers and TV dramas and was thrilled when she explained the resources to me. Brian was also glad to tell me about his L1, Filipino, and asked about my L1 and culture. Their access to and engagements with their L1 computer-based texts and original cultures influenced or were influenced by their N-Identities, I-Identities, D-Identities, and A-Identities (Gee, 2001a). Compared with other ELLs, Kyoung-Min had already lost the

largest amount of his L1 and was not interested in news about Korea. He did not clarify his ethnic identity as Korean; instead, he emphasized that he wanted to adjust himself to the school system in the U.S. However, Kyoung-Min still called his mother *Eom-Ma* (엄마; mom) and his sister *Nu-Na* (누나; older sister), and he accessed websites about Korean TV programs.

According to Ruíz (1984), the implementation of a language-as-resource orientation to language planning can enhance the language status of “subordinate languages” (p. 25) and ease tensions among various majority and minority communities. Even though none of the ELLs in this study accessed their L1 computer-based texts in school contexts, they frequently visited their favorite L1 computer-based texts in out-of-school contexts, such as homes, churches, temples, etc. In this way, the ELLs could maintain their L1s to some extent and could experience their native cultures.

The ELLs’ and their family members’ orientations toward language planning played important roles in the ELLs’ L1 retention and their identities (Ruíz, 1984), and the family’s roles are critical for the ELLs’ successful bilingual development and academic success (Kamhi-Stein, 2003; Keith & Lichtman, 1994). Family members should encourage their children to have the language-as-resource orientation instead of the language-as-problem orientation. Furthermore, teachers can also help the ELLs maintain their own native languages and cultures, as well as target languages and cultures, by incorporating multilingual and multicultural computer-based texts into their classes. We need this comprehensive support from homes and schools in order to educate all students so that they may grow up as active citizens in their new working, civic, and private lives.

### *Knowledge and Experiences of Electronic Literacies*

In addition to their languages and cultures, their knowledge and experiences of electronic literacies also influenced their social identities. Among other electronic literacies, CMC literacy influenced the multiplicity of the ELLs' dialogues and also changed their communities, ZPD, and identities (Bloch, 2004; Lam, 2000, 2004; Swan, 2002). Since CMC users could interact with others all over the world, Jae-Hoon, Stacy, and Brian could communicate with people in the U.S., as well as individuals in other countries. Lam (2004) emphasizes, "in the contemporary period of globalization, the construction of identity and social relations is increasingly taking place amidst the trans-border circulation of cultural and discursive materials that embed forms of belonging and subject-making beyond the nation" (p. 45). The ELLs' potential communities were not limited to their homes and schools in their physical space, but they encompassed the virtual world of computer games and the world of friends in their online space, such as online social networks. For example, Brian dialogued with other players when he played the *FusionFall* game as seen in Figure 6. Even though he did not know who the game players were, Brian called them friends and chatted with them. Brian asked where he could gain an item that he needed to complete the game's mission, and the other game player gave him the information. Brian also said that he had meetings at a particular location in the game or communicated with other game players through email. In these ways, CMC literacy expanded Brian's range of potential learning communities and enhanced his learning in ZPD when he read computer-based texts. In addition, due to the multiple social networks and communities across national borders, the ELLs were attached to others, and they attached themselves into the world (Grossberg, 2000).

In these expanded communities in the online space, the ELLs' cultures and identities were also different, and computer-based texts, such as multimedia and electronic games, influenced this change (Chen, Lien, Annetta, & Lu, 2010; Fromme, 2003). In this sense, in the *FusionFall* game, Brian identified himself as a gunman who could run fast and jump high, and he had to kill the enemies and complete the mission. Jae-Hoon was a soldier in the *Brothers in Arms* game. They were nervous and excited when they played the games, and they felt disappointed and depressed when the character died. All the ELLs were decision makers when they decided to read certain computer-based texts, and they were also addressors and addressees while dialoguing with others, themselves, and texts. By adopting the computer-based texts for their literacy activities, the ELLs were engaged in the reading processes.

#### *Roles of Parents and Teachers in ELLs' Computer-Based Text Reading*

When all the ELLs read computer-based texts at home and school, their parents and teachers played important roles in students' accessing the texts. In this section, I discuss (1) authoritative discourses vs. internally persuasive discourses and (2) different opinions about students' use of computers.

#### *Authoritative Discourses vs. Internally Persuasive Discourses*

As "centripetal forces" (Bakhtin, 1981, p. 270), parents and teachers provided authoritative discourses and played important roles in their children's use of computers and computer-based texts. Parents, as "children's 'first line of defense' against inappropriate media consumption," regulated, allowed, and guided children's behavior and activities regarding their access to multimedia texts (Vandewater, Park, Huang, & Wartella, 2005, p. 608). Furthermore, students have access to more technology in their

homes than in their schools (Mumtaz, 2001). Teachers changed instructional practices and adopted constructivist approaches when they used computer technology (Windschitl & Sahl, 2002), and they also regulated, allowed, and guided children's use of technology at school.

All the ELLs in this study had their internally persuasive discourses and adjusted their discourses depending on their parents' and teachers' guidance and interest for the use of computers at home. The main authoritative discourses included how many hours their children could use a computer per day and what genres of websites they could access (Lee & Chae, 2007; Van den Bulck & Van den Bergh, 2000). The parents and teachers had their children's access to computers and computer-based texts monitored and established the rules in home contexts. Even though the ELLs wanted to use computers more and to play computer games or access fun computer-based texts at home and school, they accessed pre-approved websites during designated hours. The ELLs accessed fun textual resources, images, videos, and computer games at home from one to two hours, and they mostly read informative textual resources and images at school for less than fifty minutes during their computer sessions. Tensions and conflicts existed between the authoritative discourses and the internally persuasive discourses, but ELLs in this study followed their parents' and teachers' rules and words regarding the contextual regulations.

Therefore, when parents and teachers impose their words on their children, they should not only restrict and limit their children's use of computers, but they should facilitate their children's learning while using computers. For example, in home contexts, the mothers of Kyoung-Min and Stacy encouraged their children to access several

educational websites, such as *Beestar* at <http://www.beestar.org> and *Daum* at <http://www.daum.net>. In addition, the mothers of Jae-Hoon, Kyoung-Min, and Stacy allowed their children to access their L1 multimedia resources and helped them maintain their native languages and cultures. In school contexts, classroom teachers searched for and introduced multiple educational websites to their students, and this effort helped students utilize computer-based texts more effectively. If parents and teachers use their authoritative discourses and play more-productive roles, they can help their children become active users of computer-based texts in the learning contexts of multiliteracies and also play critical roles in their working, civic, and private lives.

#### *Different Opinions about Students' Use of Computers*

As authoritative discourses, the opinions of the parents and teachers about the ELLs' use of computers had an effect on the ELLs' access to computer-based texts (Downes, 2002), and they had different opinions about the use of computers. In home contexts, all the parents allowed their children to use computers both for information and for fun during designated hours. However, parents did not like their children to use computers at home because they believed that their children only played computer games or accessed only fun materials. Several researchers support the parents' belief and argue that game playing becomes the predominant purpose of using computers at home for most children (Downes, 1999; Kerawalla & Crook, 2002; Livingstone & Bober, 2004; Livingstone & Bovill, 1999).

The mothers of Jae-Hoon, Kyoung-Min, and Brian believed that computer and electronic games possessed a harmful effect on their children's studies at home; they were even concerned about their children's addiction to the games. Even though the



mothers of Kyoung-Min and Stacy introduced and recommended educational websites to their children, they did not believe that their children would voluntarily access those resources if they were not being monitored. Instead, all the parents in this study would simply allow their children to use computers at home for entertainment purposes as a reward for their hard work at school during weekdays. In most cases, the use of computers in home contexts was not productive except when the ELLs searched for information for their school projects. However, except for Stacy's father, other parents in this study were not technologically knowledgeable enough to actively monitor their children's computer use at home. They did not know how to check the list of websites that their children accessed after using computers; instead, parents placed the computers in public places, such as a living room, and directly observed whether their children were accessing appropriate web resources. All the ELLs in this study wanted to access fun computer-based texts and use computers longer than their parents designated, but ELLs adjusted their internally persuasive discourses and followed their parents' authoritative discourses at home.

Differently from parents' perspectives, all the teachers believed that the use of computers in their classrooms was positive, and this encouraged the teachers to use the computers more often for their students. In this way, the ELLs had more opportunities to use computers, and the teachers' guidance and interests for computer-based texts influenced the ELLs' use of strategies at school. In an interview, Mr. Hill said:

Mr. Hill: So [technology use] is very important for students' future.

Researcher: What do you think about technology use or computer use in your classroom in general?

Mr. Hill: I think it's great. I think more because this is a central value for their future to build and keep up with another world and things going. Ah, I just

need to keep learning more, so I practice more. So I don't know nearly enough. I don't know. Things change so fast I guess, so I don't really know everything ever, but just keep learning and hopefully kids need to know how to do it and use more often, too. (Interview with Mr. Hill)

Mr. Hill, as well as other teachers, believed that the use of computers would be important for students' futures. However, teachers also recognized the difficulties of incorporating computer-based technology and texts into their classes. Mrs. Davis said:

With teaching and my lectures, I try to use [the computers] probably every day or every other day. Offering something with my computer. Um, but students unfortunately English language arts being so big. Um, we have not had a lot of time to use them. We're trying to incorporate them more, but unfortunately computer lab, we just go there once every week. (Interview with Mrs. Davis)

The different opinions and expertise of parents and teachers either encouraged or discouraged ELLs' access to and use of computers at home and school. The parents of Jae-Hoon and Brian did not actively encourage their children to use computers, but Kyoung-Min's and Stacy's parents did actively encourage their children to access computer-based texts for their studies at home. However, they still believed that traditional paper-based texts were more effective for their children's studies. The parents' negative attitudes toward computer technology and computer-based texts limited the ELLs' access to the texts at home.

Compared with these home contexts, Oracle Unified School District encouraged the incorporation of technology into educational contexts and also educated teachers of each school; therefore the teachers would learn about the nature of instructional technology and apply it in their classes. All the classroom teacher participants in this study appreciated computer technology and computer-based texts although their actual

uses of computers at school were different depending on diverse factors, such as teachers' electronic literacies, the possession of technology equipment at school and in classrooms, and their willingness to adopt computer technology for their lectures, etc. (Mumtaz, 2001). Even though teachers predominantly used the word processor and the graphics packages (Mumtaz, 2001), they also searched for good online resources and shared them with students. The teachers' positive attitudes toward computer technology and computer-based texts facilitated the ELLs' access to the texts at school.

Even though all the ELLs played active roles when they read the texts at home and school, their internally persuasive discourses were hierarchically lower than the authoritative discourses of their parents, teachers, and the schools' policies. The ELLs appropriated their voices when they read computer-based texts and followed the guidance of their parents and teachers, which influenced their use of strategies. Therefore, parents and teachers should offer more productive guidance to their children so that the children can learn computer technology and play active roles in their working, public, and private lives (Cope & Kalantzis, 2000, New London Group, 1996, 2000).

### *Technology Equipment and Education*

In home and school contexts, the possession of technology equipment and computer education were important factors. The situations regarding these factors encouraged or discouraged the ELLs' use of strategies when they read computer-based texts. In this section, I discuss (1) technology equipment and (2) computer education.

#### *Technology Equipment*

The possession and the use of technology equipment changed the reading of computer-based texts and the choosing of strategies for the ELLs at home and at school;

in addition, technology equipment possession could help support the ELLs' learning and develop critical thinking and literacy skills (Goldberg, Russell, & Cook, 2003; Roschelle, Pea, Hoadley, Gordin, & Means, 2000). In this study, all the ELLs had access to at least one computer at home, but the computer setup and the family's computer use were different according to their parents' income and education. For example, children from families with more income and more-educated parents were much more likely to have a computer with many features (Becker, 2000). The following four paragraphs describe the computer equipment in each home context.

Jae-Hoon's father ran a fast-food restaurant and used a computer at home and work, and Jae-Hoon used a desktop computer and an iPod at home. These computer devices had diverse software applications, such as *Open Office*, *Winamp*, and *Firefox*, and Jae-Hoon used them for entertainment and for completing his school projects. He also used them for computer literacy, CMC literacy, multimedia literacy, and information literacy.

Kyoung-Min's father was a construction laborer, and Kyoung-Min could use a desktop computer at home. The computer was very old, and it did not have many software applications. The computer contained only *Windows Explorer* and other basic software applications, such as *Windows Media Player*, *Notepad*, etc., which came with *Windows XP*. Kyoung-Min used the computer to play games and search for computer-based texts for his homework. He used the computer for computer literacy, multimedia literacy, and information literacy.

Stacy's father owned an export firm and used computers at home and in his work place. Stacy had several computers at home and was allowed to use a computer in her

study area. The computer contained diverse software applications, such as *Microsoft Office*, *Winamp*, *Audacity*, *Photoshop*, *Macromedia Dreamweaver*, etc., and Stacy and her sisters used the computer for information and for fun. She used the computer for computer literacy, CMC literacy, multimedia literacy, and information literacy.

Brian's parents worked, and his mother used a computer at work. Brian used his family's laptop computer when his parents permitted, and the computer had diverse software applications, such as *Microsoft Office*, *Winamp*, *Firefox*, etc. Brian used the laptop computer for computer literacy, CMC literacy, multimedia literacy, and information literacy. However, he mostly played computer games.

As Becker (2000) argued, even among computer-owning families, children whose parents had more income and more education used their families' computers in more diverse ways. Jae-Hoon and Stacy used their families' computers in more diverse ways than Kyoung-Min did, and they used word processing at home more often than Kyoung-Min and Brian did. Students' access to computers in home and out-of-school contexts affects their confidence and fluency in using computer equipment and software (Mumtaz, 2001; Shoffner, 1990). Therefore, technology equipment and the ELLs' experiences in using computer technology at home are important influential factors when the ELLs read computer-based texts in the learning contexts of multiliteracies.

Each ELL also had different technology equipment at school. Since all the schools in this study were in the Oracle Unified School District, every school had similar basic computer-based equipment and regulations. Every school in the District had one or more fixed computer labs with computers that had Internet connections. However, each school had additional computer-based equipment and facilities, such as laptop carts,

iPods, Smart boards, etc. At each school, technology specialists staffed the computer labs, but their roles were different. This technology equipment at school or in class influenced teachers' potential decisions to incorporate computer technology into their classes, and these decisions influenced the ELLs' opportunities to read computer-based texts at school. The following paragraphs describe the technological contexts of each teacher.

Mr. Hill and Mrs. Davis were teachers at Dover E.S., which had a computer lab. In addition, each teacher had two desktop computers in class for students. The school had a computer specialist, but she did not stay at the computer lab to assist students and teachers. Moreover, the individual teachers' situations were different because Mr. Hill, a fifth-grade teacher, had in his class a laptop cart with twenty-five laptop computers, but Mrs. Davis, a fourth-grade teacher, did not have a laptop cart. Since Mr. Hill frequently allowed his students to use the laptops for school projects in class, his students had many opportunities to read computer-based texts individually. In a conversational interview, Mr. Hill said:

I think [the laptop cart] is very helpful to keep uh, help students learn more about technology, but also it really helps them engage and they are really excited about them. I was excited about when I have laptops at my classroom, too. (Interview with Mr. Hill)

Contrarily, Mrs. Davis could not often use laptop computers even though she taught at the same school as Mr. Hill did because only fifth-grade teachers had laptop carts in their classes; instead, she went to a computer lab for whole-class activities several times a month. She experienced difficulties finding time to use desktop or laptop computers for her students due to her busy teaching schedule and the school's focus on major subjects, such as mathematics, science, and language arts.

Mrs. White was a fifth-grade teacher at Hilley E.S., which had a computer lab. There was a part-time computer specialist, but she did not assist students. The computer specialist only managed the computers and other technology equipment at school. Hilley E.S. did not have a laptop cart or iPods for students; it had two carts of *Alphasmart 2000 Word Processing Computers*, which were only for students' typing at the computer lab. Mrs. White had two desktop computers, as well as her own personal laptop computer, in her classroom, but her students did not use the old and slow desktop computers.

Mrs. Bryant taught at Haynes E.S., and the school had two computer labs, one Mac lab and one PC lab. However, the Mac lab was opened in late October, and the PC lab was not ready during fall semester. The Mac lab had two laptop carts, which contained thirty-five laptop computers in total, and a full-time computer specialist stayed at the computer lab to assist students and teachers. The computer specialist instructed students in computer skills, such as computer literacy and multimedia literacy.

Among the teacher participants in this study, Mr. Hill and Mrs. Bryant used the computers for their students most frequently and actively. Mr. Hill had the easiest access to laptop computers because he had a laptop cart in his classroom. Mrs. Bryant was the most enthusiastic computer user, and the computer specialist at Haynes E.S. helped students and teachers very actively and productively. However, before the computer lab opened at Haynes E.S., Mrs. Bryant could not often incorporate technology for students' school projects. Therefore, computer-related equipment and active computer specialists at school influenced Mrs. Bryant's choice of technology use for her students. In an interview, Mr. Hill commented:

Researcher: Have you used technology before, at the beginning of your teaching career?

Mr. Hill: No, definitely no. We got the laptop [at Dover E.S.] last year, so that was kind of, so, that's kind of the learning period. So last year was the learning period, and now it's like you have the free year now, so "Use the computer when you can." Um, overhead projectors, videos, YouTube, it's kind of, it's big one. They are all over there whenever you can. So definitely not, all my years, when I taught in [another school district], we didn't have any technology; I mean the technology that I think [of] as technology. We just had an overhead projector, but it's definitely different from technology in Oracle elementary schools like brand-new schools. It's like an eye-opening. (Interview with Mr. Hill)

However, Mrs. Davis and Mrs. White could not often allow their students to use computer technology for projects because of limited access to technology equipment. Mrs. Davis was proficient regarding electronic literacies, but her students could not use the technology frequently due to the limited access to computer-related resources and teachers' busy schedules. Mrs. White was very enthusiastic about incorporating computers into her class, but the computer equipment was very limited at Hilley E.S.

The ELLs' diverse socioeconomic statuses in home contexts influenced the ELLs' experiences in using computers at home (Becker, 2000). This trend was also the same in the school contexts. Even though every school of this study was in the Oracle Unified School District, each teacher had different access to computer technologies. Mostly, the socioeconomic statuses of the homes and the budget issues of the schools influenced and determined their possession of technology equipment at each site.

To find the solution to the issue of technology equipment availability, it is necessary to consider three factors that Hickling-Hudson (1992) introduced. When Hickling-Hudson described different types of school experiences regarding the development of computers in the curriculum, she explored instrumental, social, and administrative factors. Instrumental factors refer to computer-related resources, such as the extent and adequacy of available hardware and software resources, and the



experiences and expertise of computer coordinators. Social factors should include contextual components, and they consider the extent to which there is a demand from and commitment by parents, students and the community to the computer program.

Administrative factors may include the role of the computer coordinator, principal, and teachers; the quality of school planning; and the extent of in-service professional development in computer pedagogy.

Even though the minimal technology equipment, such as computers, is required, parents, teachers, and school administrators can maximize the use of software resources by using open sources. Open source, a comprehensive term, includes open software applications, open operating systems, and open content. The characteristics of open source are that developers of open sources share the source information, making it possible for users to modify the content depending on their needs; also, they can redistribute it to other users without any restriction (K-12 Open Technology, 2007; Open Source Initiative, 2007; Park, 2008, 2009). In this way, parents and teachers can possess diverse computer software and content; they can also offer the resources to their children without paying any money.

Regarding the social factors, like the situations at the three schools in this study, parent associations can purchase technology equipment for their children to use at schools. However, this is not a fundamental solution because not all the parents' associations can raise funds to purchase equipment for schools.

For the technology equipment issue, administrative factors are critical to improve the situation. Since schools can organize for high levels of computers in the curriculum if they have a certain level of equipment and some motivated and highly skilled teachers

(Hickling-Hudson, 1992), the teachers' roles are important. They should effectively incorporate available technology into their classes and develop their curriculum accordingly. In addition, each school district should monitor the needs of schools regarding the technology equipment and reasonably support the schools. Moreover, the U.S. Department of Education should consider this inequality of opportunities regarding computer technology and offer solutions to both homes and schools.

### *Computer Education*

In their interviews, all the ELLs clarified that they did not receive any computer education at private institutes; they mostly accessed computers and learned how to use them at either home or school. Moreover, in both contexts, the ELLs' selections of computer-based texts and their uses of strategies were related to their knowledge of and experiences in using computers. This knowledge and experience was not limited to computer literacy, such as turning on and off the computer, opening and closing computer software, and typing words into a *Microsoft Word* document (Computer Literacy USA, 2012; Topping, 1997; Warschauer, 1999, 2002). It also encompassed other components of electronic literacies, including CMC literacy, multimedia literacy, and information literacy (Warschauer, 2002). Every one of these components should be considered as part of computer education.

Computer literacy, as basic computer skills and environments, was necessary for children's development (Robinson, 2008; Roblyer, 2003), and computer literacy was required for the ELLs to become technologically literate persons in the learning contexts of multiliteracies. CMC literacy influenced the ELLs' choice and use of strategies when they read computer-based texts. The ELLs synchronously and asynchronously dialogued

with their friends, relatives, and teachers, and the interactions facilitated their language socialization and language learning (Bloch, 2004; Koutsogiannis & Mitsikopoulou, 2004; Lam, 2004). They also accessed and interpreted multimedia resources (Warschauer, 2002). Regarding the last component of electronic literacies, information literacy, ELLs searched for computer-based texts for information and for fun, and it was even essential to consider how to teach language for learners to effectively use information technology (Shetzer & Warschauer, 2000).

In order to incorporate technology into education, the National Council for Accreditation of Teacher Education (NCATE) standards, the American Council on the Teaching of Foreign Languages (ACTFL) standards, and the state's Common Core Content Standards all include standards relevant to technology use. For example, the NCATE standard for teacher candidates' knowledge, skills, and professional dispositions emphasizes that teacher candidates should facilitate their students' learning of content through the integration of technology (NCATE, 2012). In addition, ACTFL program standards require teacher candidates to experience technology-enhanced instruction and to use technology in their teaching (ACTFL, 2012). However, even though the standards emphasize the technology use in their classes, the ELLs' teachers were not required to accomplish any task regarding these standards, and the ELLs' parents did not even have enough knowledge about technology to educate their children.

In home contexts, the ELLs learned how to use computers by using them, or they learned from more-capable family members. As Becker (2000) found, the experiences of parents had an important effect on children's home computer use, and computer-knowledgeable siblings facilitated recruitment into computer activities. In addition,

students access information technology at home more often than they do at school (Mumtaz, 2001). However, the computer education in home contexts was limited; the ELLs' parents did not teach their children how to use computers systematically, or they did not even know how to use computers. All the parents regulated how many hours their children could use computers and determined the genres of computer-based texts that the children could access. Even though the parents of Kyoung-Min and Stacy introduced several educational websites, encouraging their children to visit them, Jae-Hoon's and Brian's parents mostly depended on school education regarding electronic literacies. Parents in this study did not meet the ELLs' needs regarding computer education and the use of computer-based texts.

In school contexts, classroom teachers and technology staff were mostly in charge of students' computer education, but computer education was not mandatory for the teachers. Even though a technology specialist at Haynes E.S. taught students how to use word processing software on Mac computers, other technology specialists did not teach students. All the classroom teachers taught their students how to use particular computer software, such as *Microsoft Word*, *iPhoto*, etc., and introduced several computer-based resources, such as *Study Island* and *enVision Math*, as Kerawall and Crook (2002) found.

However, the teachers' computer-relevant instructions were not comprehensive but focused on particular computer skills. Their instructions concentrated on computer literacy and multimedia literacy; they did not frequently cover CMC literacy and information literacy. Since word processing in writing instruction was beneficial (Bangert-Drowns, 1993; Goldberg, Russell, & Cook, 2003), all the classroom teachers in this study taught their students how to use word processing software for their writing

projects. Mrs. Davis taught her students how to create a document by using iPhoto, and all the classroom teachers showed computer-based images and videos for their class activities. However, only Mrs. Bryant demonstrated how to search for information on the Internet, and Mrs. Bryant and Mr. Hill helped their students look for certain web resources. Only Mrs. White emphasized the use of CMC in class. The computer education was not well-balanced for each component of electronic literacies at home and at school. However, all the electronic literacy skills are relevant to each other, and the ELLs need to obtain a balance of knowledge and experience for each skill. In addition, since the concept of text encompasses traditional prints, audio, visual, and spatial components (Hamston, 2006; New London Group, 1996, 2000), the ELLs should be able to search for and read different types of computer-based texts because computer-based texts do not appear in an isolated way. Furthermore, students are expected to think critically, productively, and flexibly in diverse and fast-changing learning environments (Gee, 2004; New London Group, 1996, 2000). Parents and teachers actively need to help their children become more proficient in the diverse learning contexts of electronic literacies and multiliteracies and acquire balanced knowledge about reading of computer-based texts.

Another important issue to be considered regarding computer education is that of parents' and teachers' belief in their roles in computer education. All the parents in this study believed that their children used computers only for fun and that they would acquire knowledge of computers at schools. Even though the classroom teachers believed that computers and computer technology would help their students' academic achievement, all the teachers, except for Mrs. Davis, believed that their students obtained

computer knowledge and skills from home. Mrs. Davis thought that the students did not learn how to use computers at home. Interestingly, both parents and teachers did not think that they fulfilled the primary role in teaching their children how to become literate in the contexts of multiliteracies. Due to this confusion, the students did not know where they could learn how to use computer technology.

To resolve these issues, additional education programs for both parents and teachers about electronic literacies and multiliteracies are necessary. It is important for both parents and teachers to recognize that becoming computer literate is important for their children and that they need to play more-active roles in helping their children. In particular, teacher education programs regarding CMC literacy and information literacy are needed. CMC literacy is important because it assists students to communicate with others, build their communities, and recognize their identities (Lam, 2000; Swan, 2002); it will help them to grow up as active and collaborative individuals in a global society. Information literacy is also critical when students search for and evaluate computer-based texts on the Internet; this will become essential when the students grow up and use higher-thinking skills (Brown & Dotson, 2007; Fitzgerald & Galloway, 2001; Hölscher & Strube, 2000; O'Sullivan & Scott, 2005; Schmar-Dobler, 2003; Warschauer, 2002). Therefore, classroom teachers need to know the importance of each electronic literacy component and help their students learn it for their futures.

In addition, parents and teachers need to encourage their children to be actively engaged in basic text reading and to transfer their strategies. All the parents and teachers can also help their children become more independent and critical readers in the learning contexts of multiliteracies.

### *Active and Non-Linear Dialogues*

The reading of computer-based texts provides specific contextual formats, such as “hybrid” and non-linear reading (Park & Kim, 2011, p. 2164), and this is relevant to the features of the texts and to readers’ dialogic manners. One of the prominent characteristics of computer-based texts is the hyperlink, such as hypertext and hypermedia, and it creates unique ways of storing, presenting, and accessing computer-based resources (Berk & Devlin, 1991; Bolter, 1998; Warschauer, 1999). Researchers believe that hypertext and hypermedia allow readers to rapidly move from topic to topic in non-linear ways by clicking the links when they read computer-based texts (Berk & Devlin, 1991; Shapiro & Niederhauser, 2004; van Den Berg & Watt, 1991). The ELLs in this study dialogued with texts non-linearly, too (Park & Kim, 2011). When all the ELLs read computer-based texts at home and at school, they clicked hypertext and hypermedia to access textual resources, images, audios, videos, and computer games. For example, when Kyoung-Min accessed a science website at <http://hubblesite.org>, he read textual resources on the main page and clicked “Gallery” link in order to access images of the Hubble space telescope. He also clicked the “Explore Astronomy” link to watch a video about black holes. Kyoung-Min neither read these texts from top to bottom nor accessed the hyperlinks in a linear order. In addition, when Brian wanted to know how to download *World of Warcraft*, he looked for the information from the YouTube site and watched a video (*Wowbeez download*) at <http://www.youtube.com/watch?v=dm5Jj-DN2dqM>. Based on the information from the video, he also accessed a website at <http://www.wowbeez.com> and read textual resources while viewing the video. He accessed multiple computer-based texts by clicking diverse hyperlinks. The ELLs

critically decided to read particular texts and clicked hyperlinks to access intratextual and intertextual resources. Their critical decision-making processes and the hyperlinks enabled ELLs, as active readers, to become more engaged in the computer-based literacy activities.

However, the linear reading patterns of paper-based texts and the non-linear reading patterns of computer-based texts still need more discussion because several researchers do not agree with the argument. For example, Bolter (1998) and McKnight, Dillon, and Richardson (1996) believe that readers do not necessarily read book-based texts linearly from the beginning to the end and that they can read computer-based texts in a linear fashion.

As researchers' arguments are diverse, the ELLs in this study showed both linear and non-linear patterns of computer-based text reading. However, their non-linear reading patterns were more remarkable than the other patterns when they dialogued with others, self, and texts. When all the ELLs in this study began to read computer-based texts, they started dialoguing with themselves by making diverse decisions and setting up their reading goals. The ELLs were engaged in an ongoing "self-directed" planning process, which included a series of inferences about what would best fit with their internal representation of the text's meaning (Coiro & Dobler, 2007, p. 241). They also constructed their external texts and made decisions about which links were most relevant to their reading. It was clear that the ELLs had constructed not only their internal understanding of computer-based texts, but also had constructed a unique external representation of the texts based on their needs (Coiro & Dobler, 2007; Tierney & Pearson, 1983).



During these processes, all the ELLs drew upon their schema and preceding utterances as well. As every utterance has its author, an addressee, and a higher super addressee (Bakhtin, 1981), computer-based texts also belonged to particular authors and developers. ELLs non-linearly dialogued with intra- or intertextual texts by clicking hypertext and hypermedia. In this way, ELLs could refer to diverse resources on the same webpage or access a different website (Berk & Devlin, 1991; Bolter, 1998; Kommers, Grabinger, & Dunlap, 1996; Warschauer, 1999). However, the ELLs did not click hypertext and hypermedia after they finished reading a certain website, but they accessed images, audios, and videos while they read computer-based textual resources. They might have returned to the original text or accessed other resources, but students' preceding dialogues had not yet ended (Park & Kim, 2011).

This non-linear reading pattern of computer-based texts can be beneficial if the readers concentrate on what they are reading and where they are. If they are not focused, they will be lost or distracted in the huge online learning environments and miss their purposes for reading. Moreover, they may not feel the commitment to keep searching for more information in the hypermedia learning environments (Coiro & Dobler, 2007; Conklin, 1987; Hammond, 1989; Heller, 1990). For example, when Brian searched for "How to download *World of Warcraft*" on YouTube, the site recommended both relevant and irrelevant videos, such as "how to download world of *Warcraft* for free full version" and "how to make money on the web." Since Brian watched several irrelevant videos, he spent more than 20 minutes before he accessed the target video.

However, if readers can monitor their comprehension of each computer-based text and keep searching for relevant resources, the non-linear reading pattern will facilitate

their reading because enormous supportive resources exist on the Internet. For example, Stacy accessed a website at [http://en.wikipedia.org/wiki/-California\\_Gold\\_Rush](http://en.wikipedia.org/wiki/-California_Gold_Rush) for her social studies project at school and clicked several hypertexts, such as “gold” and “chemical element,” to refer to word definitions. The hypertexts helped Stacy understand the textual resources while she read them. Kyoung-Min accessed a website about Israel at <http://en.wikipedia.org/wiki/Israel> for his school project and looked at an image on the page and expressed his excitement, “Oh, it is cool! This is the national flag of Israel” (Kyoung-Min Think-Aloud 3S). He also looked at the images of the Sea of Galilee, the Knesset building, Israeli tanks, etc., and the images enhanced Kyoung-Min’s reading processes. Both Stacy and Kyoung-Min anticipated and monitored whether the texts were relevant to their reading purpose as Coiro and Dobler (2007) found in their study.

In the learning contexts of multiliteracies, all the ELLs’ dialogues were diverse and dynamic because they read the computer-based texts and dialogued with diverse computer-based texts, authors, and creators. For example, Jae-Hoon, Kyoung-Min, and Brian dialogued with the narrators of video texts at home and school as if they were speaking with their friends. Jae-Hoon and Brian even dialogued with the game’s characters and other game players by reading and typing texts. All the ELLs in this study regarded all the texts as their resources to facilitate their reading processes.

Not only do all the ELLs access diverse computer-based texts and dialogue with others and themselves in non-linear ways, but also they dialogue with multiple texts simultaneously. This multitasking was common to those students when they accessed computer-based texts and media, and the students preferred to conduct multiple tasks at the same time (Foehr, 2006; Jeong & Fishbein, 2007; Oblinger & Oblinger, 2005;

Prensky, 2001b, 2001c). According to the survey results of the Kaiser Family Foundation (2010), students spent an average of nearly 7 hours and 38 minutes per day with media. In addition, they managed to pack a total of 10 hours and 45 minutes' worth of media content into those daily 7.5 hours by multitasking. Furthermore, the survey showed that the students used computers for 1 hour and 29 minutes per day, and online media encouraged young people to use multimedia more than ever. For instance, while ELLs read computer-based textual resources at home, they could also turn on multimedia resources, such as audios and videos. In addition, Brian even played computer games and listened to music while he searched for information. In both home and school contexts, the ELLs read computer-based textual resources, but they simultaneously looked at the images and videos to comprehend the textual information. The process to access multiple resources was not predetermined; instead, the ELLs randomly or deliberately created their own ways to dialogue with the computer-based texts by clicking hypertext and hypermedia and constructed meanings from the processes (Park & Kim, 2011).

Throughout their reading of computer-based texts, all the ELLs made their dialogical attempts to construct meanings of the texts and to fill the gaps between what they could do individually and what they could do by means of those dialogues in their individual ZPD (Bakhtin, 1981, 1986; Vygotsky, 1978). In addition, every dialogue cannot occur in isolation, and we cannot totally segregate each dialogue from others in the contexts of computer-based text reading. Instead, every dialogue needs to be considered in each socially and culturally situated environment, which is integrative and comprehensive.

### *Multi-Dimensional ZPD*

Throughout this study, all the ELLs showed dynamic developmental changes when they dialogued with others, self, and texts during their reading of computer-based texts. As Kozulin, Gindis, Ageyev, and Miller (2003) argue, Vygotsky used the concept of ZPD in three different contexts. Even though the concepts of ZPD in each context are important, I interpreted ZPD as the metaphoric space and believed that students' human development occurred in the space by dialoguing with more capable individuals, such as parents, siblings, teachers, peers, themselves, and authors of diverse texts. In this research context, the texts included diverse formats of computer-based resources, and the ELLs actively dialogued with each computer-based text.

For example, Jae-Hoon accessed a YouTube video to learn how to resolve a problem about his iPod Touch and restore the device. In the video, a female narrator explained how to restore iPod Touch and fix freezing and errors, and Jae-Hoon listened to and responded to her utterances. Instead of considering the video as a simple text, Jae-Hoon recognized the existence of the author and identified her as a capable individual who could dialogue with him and provide scaffolding to him. When Brian played an online computer game, *FusionFall*, he also dialogued with game characters and other game players. Brian ran around within the game area and asked for help from other game characters and game players by chatting with them. In this situation, he considered the game creators and the game players as capable individuals and paid attention to the dialogues with them. In these cases, by dialoguing with the authors, Jae-Hoon and Brian could receive scaffolding from them, and this changed the ELLs' performances and achievements. In their dialogues, the video and computer game texts were not simply

affordances, which Gibson (1977) defines as “what [the environment] offers the animals, what it provides or furnishes, either for good or ill. . . . something that refers both to the environment and the animal in a way that no existing term does” (p. 127). The ELLs believed that the learning occurred in their ZPD, and the dialogic interactions with the authors of the texts were critical in this learning process.

As the findings of this study showed, scaffolding and assistance did not occur in unidirectional ways; instead, all the ELLs needed supportive assistance from more-capable and knowledgeable persons, and they also helped other less-capable individuals. In home and school contexts, the more-capable and knowledgeable persons could be the ELLs’ parents, siblings, relatives, neighbors, teachers, peers, etc. However, these individuals could simultaneously become less-capable persons in other contexts depending on the topic, situation, and time. Researchers argue that these diverse interactions create bi-directional ZPD (Forman, 1989; Goos, Galbraith, & Renshaw, 2002; LeBlanc & Bearison, 2004; Pata, Lehtinen, & Sarapuu, 2006). In the bi-directional ZPD, more- or less-capable persons can coordinate their different perspectives and achieve their goals (Goos, Galbraith, & Renshaw, 2002). Furthermore, peers can serve as both teachers and students for each other (Forman, 1989) as in Figure 8.



*Figure 8.* Diagram of bi-directional ZPD

Teaching and learning contexts in multiliteracies are very complex, and every dialogic interaction is interrelated with every other. In addition, the teaching and learning occur in both the physical space, such as home and school, and the online space, such as,

email, Facebook, and computer games, at different times. Internet-based learning activities and computer-based texts motivate students to become more responsible for their learning, and this responsibility enhances self-directed learning habits for students (McNabb, Hassel, & Steiner, 2002; Mossop, 2000). In addition, Internet-based pedagogical tools, such as CMCs, can support students' development of self-regulatory skills (Dabbagh, 2002; Dabbagh & Kitsantas, 2004). These learning environments also enable readers to obtain diverse knowledge and facilitate higher levels of engagement with the meaning-making processes (Coiro, 2003). Moreover, the ELLs' reading of computer-based texts was not linear but dynamic and non-linear due to the features of the texts. The diverse text formats of computer-based resources encouraged the dynamic and non-linear reading patterns. The ELLs actively dialogued with more- or less-capable individuals, themselves, and authors of computer-based texts and learned from them in their ZPD. They also dialogued with multiple individuals and texts at the same time while they read computer-based texts.

Researchers adopt the more advanced concept, bi-directional ZPD, to have a better understanding of the human development through dynamic interactions between more- and less-capable individuals (Forman, 1989; Goos, Galbraith, & Renshaw, 2002; LeBlanc & Bearison, 2004; Pata, Lehtinen, & Sarapuu, 2006). The directionality is an efficient concept to monitor and display the interactions in dyads, such as between a teacher and a student or between peers. However, the directionality is limited when it describes more-complex and simultaneous dialogic interactions at different times within complex ZPD in both the physical space and the online space. Therefore, a broader

concept is necessary to explain the complicating and non-linear dialogic circumstances and the metaphoric space.

The concept of dimension includes three spatial dimensions, such as a line, a plane, and a cube, and they refer to one dimension, two dimensions, and three dimensions respectively (Bork, 1964; Menger, 1943). Since the dialogic interactions in the learning environments of multiliteracies are non-linear and simultaneous in multiple dyads, it is not easy to separate each dialogue (Park & Kim, 2011). Students' preferences for conducting multiple tasks (Foehr, 2006; Jeong & Fishbein, 2007; Oblinger & Oblinger, 2005; Prensky, 2001b, 2001c) also need more-complex dimensional approaches to ZPD. In addition, the dimension encompasses a temporal dimension, a dimension of time (Bork, 1964; Menger, 1943), which will capture readers' dialogic interactions and human higher mental functioning over a different short time period, referring to microgenesis (Vygotsky, 1986; Wertsch, 1985). Therefore, the concept of dimension is more appropriate to describe individuals' dynamic non-linear dialogues and learning in the contexts of multiliteracies at different times. For the ELLs' computer-based text reading contexts in this study, I used "multi-dimensional ZPD" to understand the ELLs' development in the diverse learning contexts of multiliteracies.

When all the ELLs in this study read computer-based texts at home and at school, the scaffolding and assistance were multi-dimensional. They could complete certain problem-solving tasks better when they received others' guidance or collaborative assistance from more-capable individuals and authors of computer-based texts. In addition, they could attain independencies as a shift from the other-regulated stage to the self-regulated stage. For example, in addition to providing their typical lectures, Mrs.

Chang, Mr. Hill, and Mrs. Bryant frequently adopted particular computer-based texts, such as textual information, images, and videos, to support the content of their lectures. In these situations, Jae-Hoon, Stacy, and Brian dialogued with their teachers, themselves, and a narrator of videos simultaneously. The ELLs learned and solved problems based on the guidance from teachers' lectures, the discussions with teachers and peers, and dialogues with computer-based texts.

Figure 9 and Figure 10 show Jae-Hoon's dialogic interactions with Mr. Hill, himself, and computer-based texts in his multi-dimensional ZPD at two different time periods when Mr. Hill accessed a science video, *How a Thunderstorm Forms*, at <http://activities.mac-millanmh.com/science/ca/scienceinmotion/Common/-SIM.html?Module=../Grade5/Chapter5-HowAThunderStormForms>. Jae-Hoon also read an online article about the topic at <http://www.eoearth.org/article/Thunderstorm>. In Figure 9, Jae-Hoon was reading a computer-based textual resource and referring to images. He was reading them and frequently responding to the utterances by the author in the short period of time; his dialogues were bi-directional in this sense. Jae-Hoon was listening to Mr. Hill's questions and responding to the narrator of the video text. His interactions with Mr. Hill and the video were unidirectional at this moment. Mr. Hill, as a more capable individual, asked questions to facilitate ELLs' meaning-making processes at this time. In Figure 10, Jae-Hoon was still reading the computer-based textual resource and responding to the utterances by the author, which was bi-directional. Jae-Hoon was watching the same video but assisting Mr. Hill by sharing his knowledge about free office software, *Open Office*; he became a more capable individual at this moment. His interactions with Mr. Hill and the video were unidirectional at this moment. All these



dialogic interactions with Mr. Hill and computer-based texts occurred in both the physical space and the online space at the same time or in a short period of time. Moreover, Jae-Hoon continuously dialogued with himself in order to evaluate the texts and make the decisions on his next reading steps. Jae-Hoon's multi-dimensional ZPD clearly shows that his dialogic interactions, teaching, and learning occur in each space and time, and it may be hard to describe this complex and simultaneous situation with the bi-directional ZPD model.

As Vygotsky (1978) implies, students' interactions and collaboration with people in social, cultural, historical, and institutional contexts are critical components for their development. However, even in the identical social, cultural, and institutional contexts, the direction of the guidance and collaborative assistance changes depending on time. For example, Mr. Hill assisted Jae-Hoon as seen in Figure 9, but Jae-Hoon shared his knowledge about free office software with Mr. Hill in Figure 10. Furthermore, even though Mrs. Bryant introduced a website, the *Kids Zone Learning with NCES* website at <http://nces.ed.gov/nceskids/createagraph> to her students, Brian identified how to submit numeric data to create a graph and helped Mrs. Bryant solve her problem.

When all the ELLs read computer-based texts at home and school, they created their own multi-dimensional ZPD in order to dialogue with others, themselves, and computer-based texts non-linearly and received productive assistance from these discussions. At the same time, they also shared their schemata with less-capable individuals and facilitated their development and learning in the ZPD.

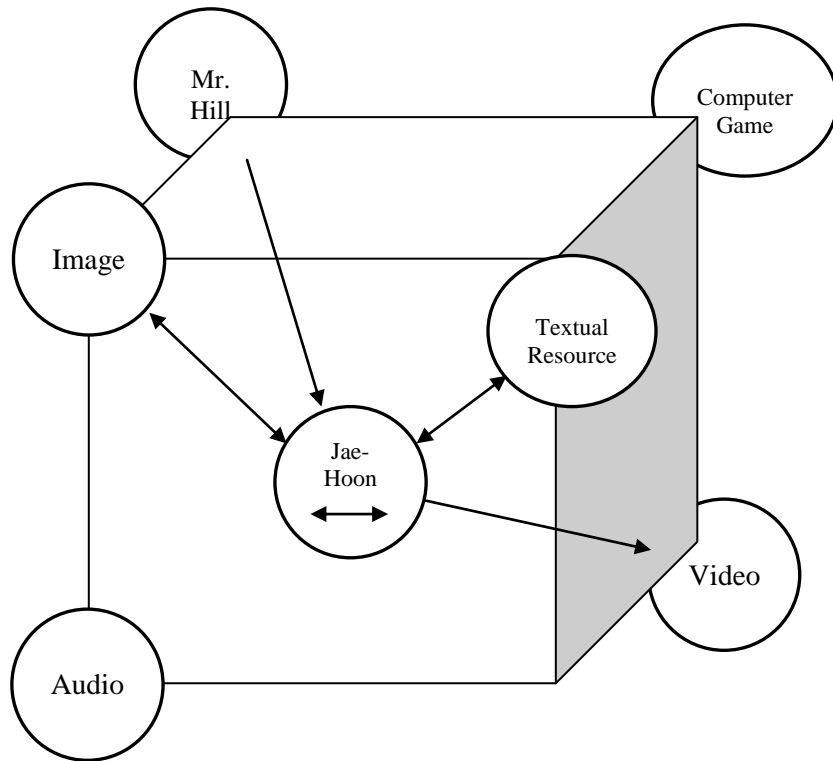


Figure 9. Diagram of multi-dimensional ZPD at one time period

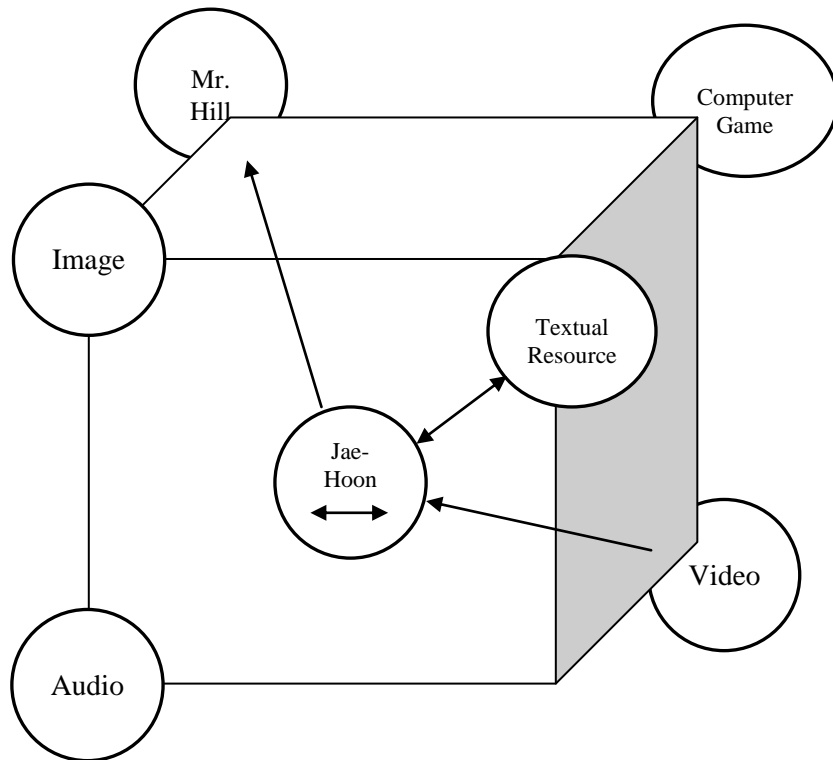


Figure 10. Diagram of multi-dimensional ZPD at another time period

Therefore, to capture students' dynamic reading and complex dialogues in the learning contexts of multiliteracies within a short time period, the concept of multi-dimensional ZPD will be more appropriate than bi-directional ZPD.

*Diverse Pedagogical Approaches to New Literacies*

Regarding the new approaches to literacy, the New London Group (1996, 2000) emphasizes the relationship between the changing social environments and a new approach to literacy pedagogy. The authors argue that diverse communication channels, languages, and cultures require a broad view of literacy and that multiliteracies will overcome the limitations of traditional approaches. According to the New London Group, multiliteracies approaches to pedagogy will enable students to create access to the evolving language of work, power, and community and to foster critical engagements.

The New London Group (2000) argues:

[P]edagogy is a complex integration of four factors: Situated Practice based on the world of learners' Designed and Designing experiences; Overt Instruction through which students shape for themselves an explicit metalanguage of Design; Critical Framing, which relates meanings to their social contexts and purposes; and Transformed Practice in which students transfer and recreate Designs of meaning from one context to another. (p. 31)

The concept of multiliteracies also refers to "a way to comprehend the literacy curriculum as extending beyond formal school learning and as being supportive of productive participation in the community" (Baguley, Pullen, & Short, 2010, p. 4). Based on the concept of multiliteracies, the New London Group (1996, 2000) emphasizes the

four pedagogical components: situated practice, overt instruction, critical framing, and transformed practice.

In new learning contexts, Jenkins, Clinton, Purushotma, Robison, and Weigel (2006) argue that students also need to learn how to participate and develop cultural competencies and social skills. They contend that afterschool programs and informal learning communities, instead of schools, have significantly reacted to the emergence of the new participatory culture, which refers to “a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one’s creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices” (p. 3). According to the researchers, “Schools and afterschool programs must devote more attention to fostering what we call the new media literacies: a set of cultural competencies and social skills that young people need in the new media landscape” (p. 4).

In addition, the findings of this study show that parents play vital roles in the development of students’ electronic literacies and multiliteracies, and their home contexts, as an informal learning community, need to be considered as learning environments of multiliteracies. However, the pedagogy, based on multiliteracies, has mostly focused on the formal educational contexts and teachers’ roles, and researchers also paid more attention to the pedagogy and practices at school (Kitson, Fletcher, & Kearney, 2007; Lotherington, 2008). Since parents also need to teach their children at home, researchers and educators should suggest pedagogy to parents in hybrid learning contexts. In addition to the four pedagogical factors that the New London Group (1996, 2000) suggests, researchers and educators should consider more-specific pedagogical topics about

electronic literacies, including computer literacy, CMC literacy, multimedia literacy, and information literacy (Warschauer, 2002). They also need to incorporate core media literacy skills into the pedagogy in the learning contexts of multiliteracies. The core media literacy skills include (1) play (“the capacity to experiment with one’s surroundings as a form of problem-solving”); (2) performance (“the ability to adopt alternative identities for the purpose of improvisation and discovery”); (3) simulation (“the ability to interpret and construct dynamic models of real-world processes”); (4) appropriation (“the ability to meaningfully sample and remix media content”); (5) multitasking (“the ability to scan one’s environment and shift focus as needed to salient details”); (6) distributed cognition (“the ability to interact meaningfully with tools that expand mental capacities”); (7) collective intelligence (“the ability to pool knowledge and compare notes with others toward a common goal”); (8) judgment (“the ability to evaluate the reliability and credibility of different information sources”); (9) transmedia navigation (“the ability to follow the flow of stories and information across multiple modalities”); (10) networking (“the ability to search for, synthesize, and disseminate information”), and (11) negotiation (“the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms”) (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006, p. 4).

Based on these diverse pedagogical perspectives, ELLs’ parents need to provide their children situated practices within the informal communities, including homes, afterschool programs, churches, etc., and utilize available primary discourses from the ELLs’ lifeworlds and simulations of the relationships in both physical and online spaces. The parents also need to incorporate situated practices that are relevant to core media

literacy skills and four components of electronic literacies as much as they can. Regarding overt guidance, ELLs' parents should provide productive scaffolding about learning activities and progresses to their children and collaborate with them to enhance the ELLs explicit, systematic, analytic, and conscious understanding of what is being learned in the learning contexts of multiliteracies. The parents should also help their children “denaturalise and make strange again from what they have learned and mastered” (New London Group, 2000, p. 34) through critical framing and encourage the ELLs to become more self-regulated learners. In addition, the parents should help their children be able to apply and transfer what they learned to other learning contexts of multiliteracies.

In this way, the multiliteracies approaches admit that parents are core members of the changing social environments and that they can help the ELLs dialogue, negotiate, and engage critically with the conditions of multiliteracies and new literacies. In addition, this expanded scope of literacy pedagogy can account for the ELLs' reading of diverse text forms associated with multimedia technologies in both home and school contexts.

### Implications

To further develop my discussion above, I would like to consider two implications resulting from this study. The two overarching implications that apply to the new learning contexts are (1) roles of parents and teachers in the learning contexts of multiliteracies and (2) connections between home and school contexts.

#### *Roles of Parents and Teachers in the Learning Contexts of Multiliteracies*

As mentioned earlier, parents and teachers possess authority in home and school contexts respectively, and their authoritative discourses influence ELLs' use of

computers and their access to computer-based texts. In home contexts, the parental regulation of ELLs' time to access multimedia reduces their time to view those resources (Lee & Chae, 2007; Livingstone & Helsper, 2008; Vandewater, Park, Huang, & Wartella, 2005). Parents believe that computer-based resources on the Internet will be helpful for their children's academic achievement and that they will learn worthwhile things from the resources. However, the parents are still concerned that using computers may lead their children to isolate themselves from their friends, to encounter sexually inappropriate and violent online content, and to become addicted to some activities, such as computer games (Livingstone & Bober, 2004). Compared with the parents' concerns and attitudes towards the Internet, students are less concerned about the risks of the online resources and environments (Livingstone, 2003). Furthermore, even though parents strongly believed that household computers should assist their children's learning, their children mostly spent their time with playing computer games (Downes, 1999; Kerawalla & Crook, 2002; Livingstone & Bovill, 1999).

In this study, the parents' roles regarding ELLs' use of computers and computer-based texts were mostly monitoring the ELLs' performances. The parents sat with their children and supervised them while they were on the Internet, communicated with them about safety on the Internet, tracked to see which websites their children had visited, and listened to their children talking about their uncomfortable situations on the Internet (Liau, Khoo, & Ang, 2008). Among the four types of parental monitoring, all the parents focused on supervising them and checked if the ELLs accessed appropriate and permissible computer-based texts, at least for a short time. Moreover, the parents communicated with their children and listened to them. However, the roles of the ELLs'

parents in teaching and guiding their children were limited. They did not teach the ELLs how to search for good computer-based texts, how to use the resources for their reading, and how important the computer-based resources were. Only the mothers of Kyoung-Min and Stacy introduced educational websites to their children and encouraged them to access them. They communicated with their neighbors or referred to the letters from their children's classroom teachers and recommended that Kyoung-Min and Stacy access the websites. Jae-Hoon's and Brian's parents did not guide their children at all; instead, they believed that their children knew more about computers and computer-based texts than they did. In these learning contexts, ELLs relied more on their friends and older siblings, or they simply accessed computer-based texts to become literate in the new literacy contexts.

In school contexts, classroom teachers played more active and constructive roles in ELLs' use of computers and computer-based texts. The teachers changed their instructional practices when they used computers or computer-based texts in their classes, and computer use enhanced their shift toward more constructive pedagogy (Becker & Ravitz, 1999; Windschitl & Sahl, 2002). In addition, computer-using teachers used a more diverse mix of software when they taught high-achieving classes than when they taught low-achieving classes (Becker, 2000). ELLs learned more in computer-assisted environments by both actively engaging in computer-relevant tasks and participating in groups. Moreover, frequent interactions and feedback, as well as connections to real-world contexts, enhanced students' learning in these environments (Roschelle, Pea, Hoadley, Gordin, & Means, 2000).



In this study, teachers' roles were more active than that of parents. In addition to monitoring ELLs' use of computers and computer-based texts in class, the teachers taught the ELLs how to use certain computer software applications, searched for computer-based resources, shared the materials with their students, and developed activities for their classes. However, not all the teachers equally used computer technology for their classes. Mr. Hill and Mrs. Bryant used computers and computer-based texts for their classes very actively. They used computer technology on a regular basis, and they both taught and learned from their students by communicating with them. In contrast, Mrs. Davis and Mrs. White did not actively adopt computer technology for their classes but minimally used it. The reasons for the teachers' minimal use of computers at school were their lack of computer knowledge, limited time to use computers, or tight class schedules. As research indicates, to use computer technology as an effective learning tool, broader educational and technological reformations at school needs to occur. These reformations should include teacher training, academic curriculum, and student assessment, and schools need the capacity to change these issues (Roschelle, Pea, Hoadley, Gordin, & Means, 2000).

In each research setting, parents' and teachers' roles were fundamental and critical when ELLs used and accessed computer-based texts for information and for entertainment. However, their roles were limited, and they could not fully support ELLs' efficient and productive use of computer technology. Even though the limitations exist, parents and teachers can no longer simply shift the responsibilities for computer-based text reading and the reading strategies onto students (Park & Kim, 2011). In other words, parents and teachers should not believe that their children learn how to read computer-

based texts autonomously or from their friends. As the ELLs need to learn how to effectively use reading strategies when they read paper-based texts, so teachers need to learn how to create, adjust, and transfer online reading strategies at school (Janzen, 2002). The reading of paper-based and computer-based texts does not need to occur separately; instead, teachers can apply the paper-based text reading strategies to the computer-based text reading contexts. For example, all the ELLs could access a website at <https://www.pearsonsuccessnet.com>, which offered pages identical to the paper-based math textbooks, and Mr. Hill and Mrs. Bryant frequently used them during their classes. However, the electronic textbook site also provided supplementary multimedia resources, such as electronic lectures and videos, which were not included in the paper-based textbooks. The different forms of texts and resources were complementary, and teachers could use them depending on their instructional purposes. Teachers can also include the online reading contexts when they teach students particular reading strategies, such as previewing, making connections, and dialoguing. The ELLs can preview texts by using a computer mouse and can connect existing texts with what they have already read, listened to, and watched online. For new and creative strategies in computer-based text reading environments, the ELLs need to learn how to search for appropriate resources on the Internet, and how to use them for their school projects (Park & Kim, 2011). Parents can also help these processes depending on their capacities of electronic literacies. Even if parents do not know how to use computers or how to search for computer-based texts, they can monitor their children's reading processes and dialogue with the children.

In each context, it may be necessary for parents and teachers to consider how they can help their children become proficient readers of computer-based texts in the learning

contexts of multiliteracies. Instead of assuming that the ELLs use computers for playing computer games and waste their time, parents need to help them access useful computer-based texts and effectively read the texts. Moreover, the roles of teachers and school districts are important to facilitate students' systematic learning of electronic literacies and to help the students grow up as more-capable individuals in their working, civic, and private lives. To pursue these developmental objectives in the learning contexts of multiliteracies, their literacy goals need to expand and encompass students' online critical thinking skills, computer-based text reading strategies, and electronic literacies. The teachers should incorporate computer-based text reading into their curriculums more efficiently and demonstrate how the ELLs can use the texts for their reading. In addition, the collaboration between parents and teachers is imperative, and schools and school districts should play active roles in educating both students and their parents.

#### *Connections between Home and School Contexts*

Education, formal and informal, has been a boundary between home and school, children must live in both contexts and move back and forth between the two (Rosenthal & Sawyers, 1996). Both teachers and parents believe that they have mutual power and influence on students' education and that concrete and mutually beneficial partnerships between teachers and parents are vital to children's successful learning and development in school contexts (Blanchard, 1997; Lawson, 2003; Martin & Haga-burke, 2002).

Even though most Americans are interested in and support the idea of the home-school connection, not many parents actively participate in the connection (Blanchard, 1997). Most of the parents in this study had communicated with their children's classroom teachers only when they had official meetings with them. Only Stacy's mother

had frequently interacted with Mrs. Chang and Mrs. White, asking about Stacy's language improvement and academic performance. Brian's mother contacted his classroom teacher when Brian first came to the U.S., but after that she did not frequently communicate with Mrs. Bryant. The mothers of Jae-Hoon and Kyoung-Min had never contacted their children's teachers, other than in official meetings, because of their lack of English proficiency.

Kohl, Lengua, and McMahon (2000) define the three dimensions of parental involvement as parent-teacher contacts, parental involvement at school, and parental involvement at home. According to the researchers, parents contact teachers to facilitate the monitoring of their children's school progress at school and to help their children with homework. Moreover, parents directly participate in school activities or help their children at home to enhance their intellectual stimulation and school success.

The ELLs' parents in this study, excluding Stacy's parents, minimized their parental involvement. Furthermore, their parental involvement at home was also not active. Instead of helping their children with their homework directly, Jae-Hoon's mother wished her older son to help his younger brother, and Brian's mother paid for his son's personal tutors. Regarding computer technology, Jae-Hoon's and Brian's mothers only provided computers to their sons. Even though Kyoung-Min's mother referred to the notes from Kyoung-Min's teachers and encouraged her son to access several educational websites, she could not help her son with his homework. She just relied on her oldest daughter to help Kyoung-Min with his school projects. Stacy's mother actively contacted Stacy's teacher and participated in school activities, but she also depended on Stacy's older sisters to help Stacy with her homework.

In these home contexts, the ELLs' development in reading computer-based texts relied on the students' individual use of computers or dialogues with others and texts. For example, Jae-Hoon accessed YouTube videos and learned how to fix his iPod Touch; Stacy and Brian simply played computer games and learned how to play them. Moreover, Jae-Hoon and Stacy learned how to download music from the Internet and how to search for fun websites. However, it is too risky to rely on students' individual experiences and responsibilities regarding their reading of computer-based texts because systematic learning is important to help the students grow up as more-capable individuals in their working, civic, and private lives. To enhance students' literacy development in the contexts of multiliteracies, the home-school connection is critical.

For the effective home-school connection, the roles of school districts and schools are necessary. School districts and schools need to assign facilitators, acknowledge accomplishments, meet on a regular basis, establish predictability, keep the processes simple, make informed decisions, and assess acceptability and treatment integrity (Martin & Hagan-burke, 2002). However, these steps are not enough to facilitate effective communications and maintain solid connections with ELLs' parents in the context of multiliteracies. To facilitate the communication process and connections between parents and teachers, both the incorporation of innovative technology and the addition of further educational opportunities are also necessary.

Facilitators must have thorough comprehension of linguistic and cultural diversities, or the school districts or schools must have other persons who are able to support the facilitators regarding this issue. In addition, the facilitators are required to fully explain the necessity of the home-school connection and how parents can contribute

to the connection (Martin & Hagan-burke, 2002). These steps and components are critical because parents do not typically become involved in the home-school connection activities, due to their insufficient time, inadequate understanding of the connection, and lack of English proficiency (Green, 2005).

In addition, diverse technologies, such as conference calls, email, Elluminate, websites, and school blogs, will provide new and efficient tools to reach students' parents and maintain the connections (Rogers & Wright, 2008). For example, parents and students could subscribe to Mrs. Bryant's website. The website would automatically send email about the updates to parents and students when she added any information to her website. In this way, Mrs. Bryant could actively communicate with students' parents. If these technologies are efficiently developed and used, parents can easily access the resources on the Internet and communicate with school staff and teachers. Schools can also maintain concrete connections with parents and collaborate with them for students' development.

It is also necessary to provide parents educational opportunities on various topics, such as educational technology and electronic literacies. School districts or schools can offer to parents instructions that are relevant to technology and teach them how to guide students' computer use and access to computer-based texts at home. Since many parents think they cannot help their children due to their lack of electronic literacies, these opportunities will help the parents obtain minimal knowledge of computer-based technology at home for their children. Furthermore, the parents will be able to supervise their children when they read computer-based texts in home contexts.

School districts and schools can also support the ELLs and their teachers by previewing, screening, and recommending reliable computer-based texts to them. All the ELLs in this study searched for computer-based texts by themselves, obtained the information about the texts from their friends or siblings, or referred to their teachers' websites. Teachers also searched for computer-based texts for their classes by themselves, referred to school websites, or shared the information about the texts with their colleagues. Mrs. Chang, Mr. Hill, and Mrs. Bryant actively searched for these resources for their classes. To support this search process, several schools posted a list of educational websites to school websites. Dover E.S. recommended 27 websites on the school website; the topics included "Online Books," "Book Fair," "California Missions," "Kid Friendly Web Resources," "Meet the Authors," "Mrs. Shaw's Book Picks," etc. Hilley E.S. listed 10 websites for interactive learning on the school website, but Haynes did not offer such information. Even though several schools provided the information about useful websites for students and teachers, the district website did not contain it. To provide the information about qualified computer-based resources to students, parents, and teachers, district-wide and statewide effort is necessary. If school districts and states previewed and evaluated educational computer-based texts and recommended a comprehensive list of the resources, students, parents, and teachers would be able to access good resources with ease. It would also save teachers' time and the effort used to search for information, thereby enabling them to concentrate more on teaching.

## Recommendations for Further Research

The research purposes of this study were to find how ELLs used reading strategies and relevant influential factors when they read computer-based texts in the learning contexts of multiliteracies. I adopted Bakhtin's dialogism (Bakhtin, 1981, 1986) and Vygotsky's (1978) ZPD to interpret the participants' reading in the new environments. Therefore, my research focuses were on ELLs' experiences, dialogues, and reactions at home and at school. However, as Vygotsky's view of interactions in school contexts involves the concept of *obuchenie*, which refers to both teaching and learning (Scrimsher & Tudge, 2003), teachers' roles need to be investigated in detail. In other words, the influences of teachers' knowledge and experiences in electronic literacies, as well as their pedagogy regarding computer-based text reading strategies, on ELLs' development in the learning contexts of multiliteracies will be a topic worthy of researchers' interest. That is the first recommendation.

The second recommendation is relevant to the scope of research participants and contexts. For this study, fourth and fifth graders in the Oracle Unified School District participated. Another study could investigate ELLs in different age groups, such as middle schools, high schools, or colleges. Comparing and contrasting between studies might present similar and different uses of computer-based text reading strategies and their developmental stages. In addition, students' and teachers' perceptions of and approaches to computer-based texts at different ages might show diversities. Furthermore, a study could be conducted to compare different school districts and families with different socioeconomic statuses. Depending on their socioeconomic statuses, schools



and families can support students' technology use differently, and this might influence students' use of strategies, to some extent, when they read computer-based texts.

A third recommendation would be to investigate the issue of strategy use while reading computer-based texts on more-diverse computer devices. Recently, more school districts and families provide their students innovative computer devices, such as iPods and iPads, and use them for education (Banister, 2010; Skylar, 2008). In addition, students' use of strategies when accessing these devices might be similar to and different from when they use desktop or laptop computers. How these different types of computer devices would influence teachers' pedagogy and lesson plans might reveal innovative ways to incorporate computer technology in the learning environments of multiliteracies.

### Conclusion

The findings of this dissertation indicate that ELLs use multiple strategies when they read diverse computer-based texts at home and at school. In both contexts, they used 15 strategies: (1) accessing a web page, (2) accessing hypermedia, (3) evaluating the computer-based text and deciding what to read, (4) setting up the purpose, (5) previewing, (6) making a connection, (7) dialoguing, (8) adjusting the reading pattern, (9) monitoring the comprehension, (10) inferring the text, (11) scrolling up and down and getting back and forth, (12) using references, (13) using computer skills and devices, (14) confirming a prediction, and (15) sharing an information source. The ELLs transferred their reading strategies among all the learning contexts. The ELLs transferred the strategies between their paper-based and computer-based text reading contexts and between their home and school contexts.

However, their specific patterns of using those strategies showed both similarities and differences in each context. The differences were due to the contextual restrictions of home and school and the influences of the ELLs' parents and teachers. For example, in school contexts, filtering software blocked certain websites, such as YouTube, and students were not allowed to download software applications without the permission of their teachers or the technology specialists. ELLs' parents and teachers determined how many hours or minutes per day their children could use computers to access computer-based texts, and they decided which genres of the texts the ELLs could read.

The additional similarities were (1) authoritative discourses versus internally persuasive discourses and (2) their computer education; the additional differences were (1) the website list that the ELLs accessed and (2) the parents' and teachers' opinions of students' computer usage. In both home and school contexts, the ELLs appropriated their internally persuasive discourses and voices and followed the rules and regulations of their parents and teachers, and this limited the ELLs' access to computer-based texts to some extent. They learned electronic literacy skills by using computers and by reading computer-based texts, or they learned the skills from more-capable and knowledgeable individuals in each context. However, they still accessed different types of websites at home and at school. At home, all the ELLs spent more time accessing websites, including their L1 resources, for fun than accessing the resources for information; however, they mostly accessed computer-based texts for information. In addition, parents' and teachers' perspectives on ELLs' computer use differed. The ELLs' parents mostly had negative attitudes toward their children's use of computers, but teachers had very positive perspectives on their use of computers.

The ELLs' use of reading strategies was influenced by the following factors: (1) ELLs' electronic literacy knowledge and experiences, (2) parents' and teachers' guidance and interest for computer-based text readings, (3) ELLs' purposes for reading computer-based texts, (4) the language of computer-based texts, and (5) technology equipment in the contexts. The ELLs' knowledge of and experiences in electronic literacies influenced their choices of computer-based texts and the use of strategies, and their parents and teachers played important roles in their children's reading computer-based texts and using the strategies. The ELLs used different strategies depending on whether they read computer-based texts for fun or for information and whether the texts were in their L1s or L2s. Furthermore, the possession of technology equipment was the influential factor that changed ELLs' reading of computer-based texts and their choices of strategies at home and at school.

The findings suggest that ELLs actively adopt strategies when they read computer-based texts at home and at school. They create their multi-dimensional ZPD and dialogue with others, themselves, and texts in non-linear and dynamic ways. ELLs and teachers mostly understand the importance of computer-based resources on the Internet and appreciate them. In particular, teachers identify the importance of multiliteracies for students' futures regarding their working, public, and private lives. However, parents did not consider the vital needs of being literate in the learning contexts of multiliteracies. L2 reading research with computer technology involves more factors to consider in diverse social, cultural, and technological contexts. In addition, more issues about parents' and teachers' roles and the home-school connection still need to be

explored. The findings of and discussion in this dissertation shed light on some possibilities for future research regarding reading in a new literacy era.

## APPENDICES

### Appendix A

Interview questions for ELLs, parents, teachers, a principal, and community members

#### Interview Questions for Parents

1. Can you tell me about your reasons and motivations for coming to the U.S. and the life in the U.S.?
2. Can you tell me about your educational opinions for your child?
  - a. What is the best education for your child?
  - b. What do you think about the education in the U.S.? (What do you like or don't like?)
  - c. What do you think parents' roles are for your child?
  - d. Do you want your child to grow up with your culture and language? Do you want your child to grow up as an American?
3. What educational resources do you provide to your child?
  - a. Computer, iPod, Audio, Video, etc.
  - b. Various language materials (English materials; materials in your language)
  - c. Various cultural materials (English culture; your culture)
4. What do you think when your child uses a computer, a video, and an audio and plays games. Do you like that or not?

5. What do you want your child to grow up to be? Do you want anything from school or education board?

#### Interview Questions for Teachers

1. How long have you taught at an elementary school(s)?
2. How often do you use computers for students' projects and for your lectures?
3. What activity/task/project do students do when they use computers?
4. What do you think about using technology/computers for your class in general?
5. What are advantages and disadvantages to using the computer technology for your class?
6. Is there any issue to make the computer use/access difficult in your class or school?
7. Is it good to have a laptop cart in your class? Or is it bad not to have a laptop cart in your class?

#### Interview Questions for Students

1. Please tell me about your experiences when you first came to the U.S.
2. Please tell me about your school experiences in Korea and in the U.S.
3. What are your language learning experiences?
4. Please tell me about how you use computers at home.
5. Please tell me about how you use computers at school. What kind of projects/research do you have, and how do you complete them?
6. Do you use technologies when you communicate with your friends or others? If yes, what do you use and how do you use them?
7. Do you think the computer is helpful for doing the projects? If yes, how is it helpful?

8. You use the computers at home and at school; do you think they are the same or are they different to you?
9. What do you think you learned about using computers at home and at school?

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