A Study of Glossing Behaviour Among Second Language Readers

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ABSTRACT

This study investigates the effects that a computerized glossary had on the reading comprehension of six upper intermediate ESL students enrolled in an academic English class. Earlier empirical research in second language reading has revealed that students acquire and retain information better when it is presented in both a textual and visual format. However, little research has been conducted on how specific annotations promote comprehension and the role that individual variables contribute to it. Specifically, little information has been collected from individual students as to what types of multimedia annotations promote or hinder on-line reading comprehension and what reasons they give for it.

Participants in this investigation read and summarized an on-line expository text that had been annotated using three context-based glossing formats: definitions, pictures, and definitions + pictures. Data was collected from pre and post session interviews, an on-line tracker that monitored and recorded their movements on-line and from recorded think aloud protocols that were divided into clauses using Trabasso and Magliano's 1998 model.

The findings from the data suggest that video clips were the most useful of all of the annotations in helping the students comprehend and summarize the article because of the real life quality that they added to the text. Verbs in particular were best understood and remembered when they were illustrated with video formatting. Additionally, associations between the text and real life scenarios were more readily made through the use of video clips. Recall protocols for vocabulary were also higher for those items that were glossed with definition + picture or a combination of multiple types of annotations. These results support Pavio's dual-coding theory, but also indicate that individual learning styles, strategies and experiences all come into play during the reading process.

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Acknowledgements

When I think of you dear friend, it's with a happy state of mind, for the laughter and good times we've shared have not been left behind.

When I think of you dear friend, it is with a thankful heart for the kindness and the care you've shown and the comfort you impart.
(Jill Wolf)

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Dedication

"There is a wisdom of the head...and a wisdom of the heart"
(Charles Dickens)

I have been fortunate to have people in my life who have
shown me both.

This thesis is dedicated to my family – my father, my mother and my brother. They have not only given me the greatest gifts that I have ever received - their love and support - but are in turn, the gifts that I treasure the most in my life.

CHAPTER ONE

Introduction

The processes involved in reading in a second language (L2) are complex and difficult to understand. Moreover, they become further complicated when the added variable of reading on-line is introduced. For second language learners, the Internet and multimedia technologies offer promising opportunities to access authentic language through text, sounds, and a variety of visuals. However, little is understood as to what the effects of a computer environment within an instructional situation are in enhancing reading comprehension and what combination of media tools and information fosters the construction of knowledge and understanding.

Early research concerning on and off line reading comprehension among second language learners (Coady, 1993; Grabe, 1991) and of learning in general (Kellogg & Howe, 1971; Underwood, 1989) focused for the most part upon the learner's lexical knowledge as a determination of reading ability. This work suggests that in the learning of a second language, foreign words are learned more easily when accompanied by visuals. In more recent years, researchers (Chun & Plass, 1996, 1998; Hong, 1997; Lyman-Hager, Davis, 1997; Takefuta & Takefuta, 1997) have suggested that computerized glossing (providing definitions or explanations of independent words using textual, visual and audio annotations) may promote vocabulary acquisition and retention and enhance reading comprehension.

Other researchers (Jacobs, 1994; Johnson, 1982; Pak, 1986) dispute the effectiveness of on-line glossing on reading comprehension. Much of the research conducted in the last fifteen years has been based on pitting the effectiveness of on-line dictionaries against that of traditional texts. What has become clear is that there does not exist a theoretical or research model that readily lends itself to the investigation of this new technology. While it is believed that vocabulary knowledge is the cornerstone of reading (Nagy, Herman, & Anderson, 1985; Coady, 1997; Hazenberg & Hulstijn, 1996; Stoller & Grabe, 1993), it is not possible to

maintain such a focus and yet have a full understanding of how the many components of multimedia technology affect reading comprehension among second language learners. To adequately evaluate the effectiveness of computerized glossing, it is necessary to take into consideration the many variables that are an integral part of this new technology and those that play a role in the second language learners' environment.

This study will examine the effects of computerized glossing on reading comprehension based on Paivio's (1971,1986, 1991) dual coding model that argues that students acquire and retain information better if it is presented in both a visual and textual format. It posits that there are two cognitive subsystems, one that identifies and processes verbal information (i.e. visually presented words and sound) and another that specializes in the nonverbal properties of language (i.e. analysis of images and the creation of mental modes).

At a general level, the main assumptions of his theory are that information within each of these two systems is organized and processed into distinctive hierarchical structures. The two systems operate independently of each other and may do so without the other being activated. There is however, an interconnectedness between them such that one can activate the other. Thus information can be processed directly either through the verbal or nonverbal processing system, synchronously, or referentially where one system activates the other. His theory as applied to the processing of images and text suggests that information is more readily understood and recalled when presented in a dual format.

Pavio's model is embedded in an approach to language learning which posits that reading involves the integration of lower-level processes such as decoding and understanding vocabulary items and higher-level processes such as accessing background knowledge, applying various learning styles and strategies, and affective factors. In order to have a better

understanding of how L2 learners process computer-generated information and what these new practices mean from the perspective of the learner (Warschauer, 1998b) this study will examine what types of glossing intermediate ESL students enrolled in an academically structured English class use and find to be the most helpful to them when their assigned reading task is comprehension, and how certain variables such as reading histories, learning preferences and language backgrounds may relate to the choices they make.

Research Questions

The research questions that were addressed in this study originated from issues that emerged from earlier inquiries into the effects of computerized glossing on reading comprehension and vocabulary acquisition in L2 learning environments. Research conducted in the last fifteen years has contributed invaluable information to this field of study; however little attention has been given to the kinds of glosses that help to promote reading comprehension, particularly from the viewpoint of the students themselves.

The following questions were designed with the specific intention of evoking participant involvement and feedback on an on-line reading experience and to determine what effects an on-line glossary, which offered the students a choice of textual definitions, images (both still and video), and definitions plus images, had on their comprehension of the text. The responses to these questions could assist teachers and educational designers explore, create, and incorporate new technologies into pedagogical practices.

- What forms of glossing (definitions, images, and images plus text) do students refer to (as indicated by the on-line tracker) when reading for comprehension?
- What forms of glossing do students report as being useful in helping them during reading tasks and reading comprehension, and what reasons do they give for their choices?
- Do any patterns emerge in students' think-aloud protocols that suggest a relationship between look-up behaviour (what glosses the students access) and comprehension (as indicated by their written summaries and final interview)?
- How has students' exposure to on-line reading changed their perceptions of reading, how they read and what they read (as indicated by triangulating their initial Background Survey with their on-line behaviour and final interviews)?

Definition of Terms

As many of the following terms are specific to research in the areas of second language learning and computer technology, they are defined below as they are used in the context of this study and in the order in which they appear in the text.

L2:	Second language learner.
Internet:	International computer network linking computers from many different institutions and agencies around the world.
Multimedia technologies:	an extension of hypertext that allows for the cross referencing of text with audio and visual components.
On-line glossing/ computerized glossing:	a contextual explanation of a word or idea in either a textual, visual or audio format as created and presented on either an Internet website or a website confined to a local hard drive.
On-line reading/ reading on-line:	reading that is done in a computer-generated environment either from a local hard drive or from the Internet.
ESL:	English as a second language.
Hypertext:	a software system that allows for the cross-referencing of related text and associated materials.
CALL:	Computer Assisted Language Lab
ELPI:	English Language Program Intensive
UAPC:	University Admissions Preparation Course
Glossing formats:	Different methods in which contextual explanations are presented, such as visual, audio, textual formats.

CHAPTER TWO

Literature Review

With the advent of the computer into the realm of education, there has been a growing body of research into on-line reading processes. As electronic texts lack the conventional boundaries and completeness typical of printed text and incorporate sound and visuals into their infrastructure, researchers (Rouet & Levonen; 1996, Tuman, 1992, 1996; Postman, 1992) postulate that reading in hypertext environments may require knowledge and skills different than those used in a print-based medium. In English as a second language (ESL), the integration of computerized reading into the curriculum is becoming more commonplace and yet little research has been conducted to determine how ESL students process and respond to materials presented in a hypertext environment.

Based on the premise that one of the integral components in the process of reading comprehension in a second language is the ability to decode and understand individual words (Cooper, 1984: Gleitman & Rozin, 1973; Saville-Troike, 1984; Stanovich, 1980; Wilkins 1972), there is a growing body of research on the effects of vocabulary glossing (explanations or definitions of the meaning of words typically located in the side or bottom margins of a page) (Lomicka, 1998, p.41) on reading comprehension on-line. Much of the earlier research has focused on the use and effectiveness of electronic dictionaries and vocabulary acquisition and retention.

Knight (1992) investigated whether students were better able to acquire unknown words through exposure to an on-line dictionary or incidentally, and what impact verbal ability had on vocabulary acquisition and reading comprehension. Incidental vocabulary is defined as "vocabulary that is learnt as a by-product of another activity, such as reading or communication, without the learner's conscious decision or intention to learn the words"(Laufer & Hill, 2000, p.58). In her study, one hundred and five second year Spanish students were divided into either a high or low verbal ability group as determined by a

median split of their American College Test (ACT) verbal ability scores (high or low). They were then randomly divided into either an experimental group that had access to computer glossing or a control group that did not have dictionary access. Each group was given two readings of approximately 250 words in length that contained twelve unknown lexical items, none of which were annotated for either group. The students were pre-tested to ensure that they were unfamiliar with them. They were instructed to read the texts for comprehension and then were given a comprehension and two unexpected vocabulary tests to determine their levels of understanding. They were tested again two weeks later to determine their retention levels. In the first, they were instructed to supply an English definition for the targeted Spanish word, and in the second they selected the most appropriate definition from five options. All subjects were tested on both text sets of two to determine how many words were learned in context. A tracker installed into the computer program logged the words the students looked up in each reading and recorded the reading time and test results. Her findings indicate that high verbal ability students acquire more words than low verbal ability students, reading comprehension among the high verbal ability group was similar regardless of dictionary use, and they were better able to learn from meaning than those subjects who had a lower verbal ability. Among the lower verbal group, those who had access to and took advantage of the on-line dictionary outperformed those who either looked up fewer words or who were unable to access the annotations. She concludes that computerized glossing may aid in reading comprehension.

Hulstijn's (1993) study into dictionary use and look-up behaviour included two experiments. The first investigated the influence of reading goals and tasks on word relevance and word inferability and the second examined the "relationship between word look-up behaviour and two learner variables: the readers' vocabulary knowledge in a second language; and their ability to infer the meaning of unfamiliar words from information contained in the context" (p. 140). As in Knight's (1994) study, the students' actions were

logged; however, in order to illicit more natural responses than might otherwise be given in such an artificial testing environment, they were not informed of the tracking device.

Eighty-two Dutch students in grades ten and eleven with four to five years English instruction were given a passage of 772 words that included one hundred and nine low frequency words which were translated into Dutch in the on-line dictionary. They were randomly placed into two groups, the first of which wrote a summary of the passage in Dutch and the second answered twelve comprehension questions. The second group was given the questions prior to reading the text.

To evaluate the relationships between inferability and look-up behaviour, Hulstjin used the same text but replaced eight words in each paragraph with a pseudo-word. Of the eight, it was possible to infer the meaning of four pseudo-words from the surrounding text but the remaining four could only be identified through the on-line dictionary. All students were asked to answer eight comprehension questions.

His findings indicate that there are individual differences among learners. As expected, those with more vocabulary knowledge looked up fewer words than those with a smaller vocabulary base. However, not all students looked up all the words with which they were unfamiliar and they read the text in a strategic manner by selecting the items that they believed to be the most relevant for the task they had been given. Inferability was also found to be related to their reading goals but "it is related to word consultation in a less straightforward manner than is vocabulary knowledge"(p.146).

Unlike the above studies, Laufer and Hill (2000) used a shorter text and highlighted the targeted words on the screen to investigate the relationship between what information sources students use to understand new lexical items and how their choices affect vocabulary recall and the recall of meaning. They also included an audio component as well as textual information in their native language and in English, extra information, "other forms of the word, phonemic transcription, details of levels of formality, prepositions which follow the item, related meanings, and other semantic and syntactic details"(p. 62) and root forms.

Their assumption was that in offering several options, the students would select "the look-up strategy which may be most compatible with their learning style"(p. 72). Thirty-two students from the University of Haifa in Israel and forty non-English majors from the University of Hong Kong were given a computerized glossed short text in which twelve unknown low frequency vocabulary items were highlighted. They were instructed to read the passage for comprehension and informed that these words were important but only to help clarify the text. All students had previous computer experience. Laufer and Hill believed because the task the students were given was text comprehension, that any of the words that the students retained could be attributed to incidental learning.

The subjects were tested before the experiment to ensure that they were unfamiliar with the target words. Those students who were familiar with more than one of the items were separated from the final analysis and those who knew one were not "credited with learning that word"(p. 63). After completing the text, both groups were given an unexpected vocabulary test (paper) that included the twelve vocabulary items as well as a comprehension exercise that they had been previously informed about. They were instructed to write the definitions of the twelve words in either English or in their first language. Learners were classified according to their look-up patterns: those who "predominantly (in 75% of cases) selected Chinese or Hebrew translations were categorized as *L1* type; those who preferred the English meanings were *L2*; those who looked up *L1* and *L2* in equal proportions were *L1/L2*; and those who selected word meaning (in *L1*, and/or *L2*) together with additional information were grouped as *other*" (p. 65). Interestingly enough, individual and group differences emerged. On average, the Chinese L1 students recalled more vocabulary items than their Israeli counterparts and they did not use as many first language translations as the Israeli students. The Chinese students also used more of a variety of glosses than did the Hebrew students. They believe that the individual and group differences "may have to do with individual learning styles, specific features of the learners' mother tongue, or transfer of training" (p. 70).

Overall they found that on-line dictionary use positively affected incidental vocabulary learning but they could not conclusively determine which preference was the most effective. The majority of students used definitions, translations or a combination of the two but the number of times that a word was looked up had little effect on how well it was retained.

In comparing their results to those obtained in Knight (1994) and Hulstijn's (1993) studies, Laufer and Hill found that their students scored higher on recall, accuracy, and recognition tests. They claim that these higher scores resulted from their study design. The students could choose which language and type of information they wanted for the task they were given and the emphasis was on reading comprehension rather than on vocabulary acquisition.

The above studies indicate that dictionary use does to some degree aid in comprehension and vocabulary acquisition, but their focus is very narrow. Their use of only textual definitions (excluding Laufer & Hill, 2000) limits the investigation of media effects on reading and vocabulary acquisition to one that counts the number of words the students understood. In those studies where none of the unknown or low-frequency words were highlighted, there is the question as to whether what the students thought would be relevant and necessary for text comprehension was the same as what the researchers selected. In the Laufer and Hill study (2000) they claim that the shorter text and the highlighting of the target words "meant that the words were more salient in their output" (p. 69). There is some concern however, that in highlighting the items, they are drawing attention to them and thus affect how well the students retain them.

Other studies (Kellogg & Howe, 1971; Underwood, 1989; Lyman-Hager et al., 1993; Paivio, 1986; Mayer & Anderson; 1992) advocate the use of visual information as an integral part of the learning process. Underwood (1989) claims, "a commonplace principle of human learning is visual memory. We remember images better than words, hence we remember words better if they are strongly associated with images "(p. 19). Danan (1992)

investigated the effects of video (that included audio) and bimodal verbal input (subtitles) on vocabulary acquisition. Her results which she attributes to Paivio's 1986 theory of dual coding, which emphasizes the need to expose students to visual and verbal (written) materials to facilitate L2 vocabulary acquisition, show that students are better able to remember vocabulary items when they are presented both visually and verbally.

In assessing the importance of visual definitions, Martinez-Lage (1997) suggests that the benefits to learners in using images may not be isolated to enhancing vocabulary acquisition. She posits that images may also improve their reading comprehension. Using the authoring tool, "Guided Reading" by Herren (1996), Martinez-Lage annotated Laura Esquivel's novel, "Como aqua para chocolate". The program allows instructors to annotate complete texts on-line (Pimentel, 1998) using a variety of multimedia components including still images and video, audio and textual definitions. The results from the project indicate that her students' reading comprehension improved, for the use of multimedia annotations encouraged them to interactively participate in the reading process, thus enhancing their understanding of the text.

In their 1993 study, Lyman-Hager, Davis, Burnett, and Chennault compared the effectiveness of computerized glosses for more difficult to understand words and concepts against a computer generated print out of the same items. The inter-program glosses included audio tape (or digitized audio) (Cooke, 2000), still images, and French and English definitions. An on-line tracker recorded the students' keyboard and mouse controlled selections.

Two hundred and sixty-two third year French students were divided into two groups. The first was instructed to read an on-line glossed version of an excerpt from *Une Vie de Boy* by F. Oyono and the second, or control group was given a printed copy of the same text and glossed definitions. Immediately after completing the story, both groups wrote written summaries and a vocabulary test and one week later, they were given another vocabulary quiz. Their findings indicate that students who had access to on-line glossing retained more

words than those who used the printed handout. They also discovered that students preferred and performed better using definitions in their native language. While their study does not conclusively prove that images are effective in promoting reading comprehension and/or vocabulary acquisition, they do believe it that they may contribute to it.

Hong's (1997) comparison of a "conventional paper-pen dictionary reading method"(p. 335) to the multimedia reading program; 'A Multimedia Chinese Reader for Advanced Students', suggests that reading speeds and comprehension levels are faster and better using multimedia assisted reading. Twenty students enrolled in a Business Chinese course at Purdue University were randomly divided into two groups. Each was given fifty minutes to read a printed version of one of two articles (*Invitation,* or *Karaoke Player*) and answer the accompanying questions. In the second phase of the experiment each group was given a multi-media generated version of the same text that their counterparts had read in print form and were instructed to answer the questions that followed, again within a fifty-minute time frame. Both groups had access to on-line functions such as audio and visual effects, English definitions and inter-program glossaries. Students were able to listen to the pronunciation of a word which they later expressed helped them identify it if they had difficulties in recognizing it in orthographic form. Data obtained from the comprehension tests and student interviews indicate that the audio component was most effective among those subjects whose speaking and listening abilities were stronger than their writing and reading abilities. His findings also indicate that the on-line and inter-program glossaries were much more effective and faster to use than were dictionaries. This in turn contributed to an increase in reading speeds, which he posits contributed to the resulting increase in comprehension levels. As less time was invested in searching for the meaning of unknown vocabulary items, the students had more time to direct toward overall text comprehension. No information is provided regarding the type or frequency of use of visual materials. He claims that authentic visuals as well as audio effects made the reading experience more

pleasurable and did improve the students' reading scores and thus suggests that multimedia annotations be incorporated into foreign language teaching.

Al-Seghayer's study (2001), however, focused entirely on visual annotations and their effect on vocabulary acquisition. More specifically, he was interested in examining the efficacy and possible differences between learning words annotated by still images combined with text and dynamic video also with text. Thirty intermediate ESL students read an adapted version of a narrative passage by Mundahl (1993) consisting of 1,300 words. Although no definitive number is given as to how many words were glossed, he states that only the more difficult vocabulary items were selected. All participants had access to printed text definitions, printed text with still pictures, and printed text definitions with video clips. An on-line tracker logged their actions and immediately upon finishing the text, two vocabulary tests were administered, each consisting of words annotated in the format presented in the text. Thus images, video clips and definitions were included in the testing. The students were not informed of the tests prior to reading the story for it was believed that if they were made aware of them that they would make a concerted effort to learn the new words.

In the first test, students were required to answer multiple-choice questions for twenty-one words that were annotated in the text (Al-Seghayer, 2000), and in the second they were required to produce definitions for six glossed words, also from the story. All were selected "according to their importance to the story, level of difficulty, and part of speech (i.e., 6 verbs, 6 nouns, 9 adjectives/adverbs)"(p. 15). Students were given a questionnaire upon which they rated the effectiveness of the different annotations on a scale of one to three, with "one being very helpful and three, the least helpful"(p. 15). Their responses were converted into percentages to determine which glosses were used to initially understand unknown vocabulary items and which were used to recall them. This was followed by a fifteen-minute informal interview with the researcher to gain an insight into the students' perceptions of what were the most effective annotations.

Results from the recognition and production vocabulary tests indicate that, "words presented under the printed text definition coupled with video clips produced the best results among the three" (p. 16). The questionnaire revealed that students rated the videos as the most useful annotation and when triangulated with the data from the vocabulary tests and the final interviews, the findings indicate that video combined with textual definitions were more helpful than the other annotation modes. Al-Seghayer believes that these results are consistent with Pavio's (1986) dual coding theory that posits that learners acquire information best when they are able to construct referential connections between visual and textual information. He attributes the success of the video materials to the fact "that dynamic stimuli are more easily remembered and more effective in helping learners to build mental images because they more readily depict connections or provide a gestalt" (p. 21). He also suggests that it may be that the participants were interested in what would happen next in the video clips. No conclusions were made concerning the effects that the visual annotations had on overall reading comprehension.

While beneficial in establishing a better understanding of the effects of computerized glossing on vocabulary acquisition, these studies do not provide any evidence that supports the notion that glossing is effective in facilitating reading comprehension. Excluding Al-Seghayer's (2001), study there have been no conclusive distinctions made as to which forms of glossing are the most beneficial for either vocabulary acquisition or reading comprehension. He recommends that alternative assessment techniques need to be implemented to better understand the many variables involved in vocabulary acquisition, including individual performances. None of the aforementioned studies, with the exemption of Hong's (1997) brief examination and discussion of how audio annotations enhanced recognition of unrecognized orthographic forms, takes into consideration individual learning styles and abilities.

In evaluating and comparing the control groups with the experimental groups, testing has been based on think-aloud protocols and more traditional post-test situations.

Myers (1990) suggests that such measures are more indicative of a memory test as opposed to one that tests comprehension. He suggests the use of on-line comprehension testing such as integrating text while reading.

More recent studies (Davis & Lyman-Hager, 1997; Davis, 1997; Chun & Plass, 1996) on how multimedia applications affect reading comprehension are based on an interactive model of L2 reading. The reading process, as interpreted through the lens of this theoretical foundation, is an integration of lower-level (i.e. vocabulary and syntactical knowledge and automaticity of word identification) and higher-level processing (metacognitive knowledge, schemata, reading strategies, skills monitoring). Research based on this theoretical foundation steps beyond the conventional paper testing of on and off-line dictionary use as a means to evaluate reading comprehension and investigates what role different levels of processing may play in the use of various multimedia components (visual, audio and video annotations) and how in turn they are affected by them.

Davis and Lyman-Hager (1997) investigated the use of computerized glosses during L2 reading. Their computer gloss system, GALT (Glossing Authentic Language Texts) was derived from their earlier study (1993) and is based on Bernhardt's (1991) model of L2 reading which outlines six factors that affect reading comprehension/miscomprehension:

> Word recognition (understanding the meaning of individual words); phonemic/graphemic decoding (recognizing words through aural or visual features); syntactic feature recognition (understanding grammatical relationships among words); intratexual perception (connecting words and phrases to those that preceed or follow them); prior knowledge (global knowledge that the learner brings with him/her); metacognition (the readers awareness of his/her cognitive processes used during reading). (p. 60)

Forty-two undergraduates of French were given a glossed version of *Une Vie de Boy*. Davis and Lyman-Hager (1997) investigated the experimental group's relationship between the choices they made and their text comprehension, individual learner styles as indicated by the choices they made to better understand difficult segments, and their perceptions of the

effectiveness of computerized glossing. Students could select from six options to help them understand the text. They could access word definitions and expressions; listen to the pronunciation of a selected word; ask for grammatical explanations; click on an icon that helped them to link ideas and statements; press a cultural button for additional background information about the author and/or his country; and there was a query log which recorded which options they accessed (Davis & Lyman-Hager, 1997).

Information obtained from an internal tracker indicated that students most frequently consulted the English definitions, which implies that they believed that first language translations are necessary to help them understand the text. Davis and Lyman-Hager found many errors in their written recall of the passages which they attribute to problems with the length of the passage for novice learners, syntactic complexity of different segments and difficult vocabulary, lack of persistence or overconfidence on the part of certain individuals, and misinterpretation of sections in light of other segments. When asked about their perceptions of the program and how effective the glosses were in helping them to understand the text, "many of the descriptions contained the adjectives 'helpful,' 'time-saving,' and 'enjoyable'" (p. 67). The majority of the students also agreed that the computer- generated text was more effective and helpful than a book. Davis and Lyman-Hager are quick to point out that "their perceptions of the amount comprehended differed from the reality of the amount comprehended" (p. 68).

Chun and Plass (1996) evaluated the effectiveness of *CyberBuch*, a multimedia application "offering annotations through pictures, text, and video" (p. 42) that is based on an interactive approach. They were interested in identifying if vocabulary was acquired incidentally when the objective was reading comprehension, the effectiveness of visually annotated glossing in vocabulary acquisition and recall and whether or not the look-up behaviour of learners was positively correlated to what students reported using and how well vocabulary is learned. One hundred and sixty second-year German students from three different universities in California were given a video preview about a passage that they

would later read. They then read the story and could select any of the 82 words that had been annotated. All of the vocabulary items had English/German textual definitions and/plus images or short videos. Immediately after reading the passage, the students were given a vocabulary test and wrote a written protocol in English summarizing what they could remember from the text. They received another vocabulary test two weeks later. The post vocabulary tests that included production/translation and recognition/multiple-choice questions indicated that that recall protocols were higher for words that were visually annotated than for text-only annotations. Students had a tendency to use multiple annotations when they were available which is the reason provided by Chun and Plass as to why the overall scores for correct answers were also higher in their evaluation of incidental learning than was expected. When the goal is reading comprehension, they discovered that words were remembered with 24.1%-26.5% accuracy when multiple types of annotations were available. They attribute that to this more active look-up behaviour as indicated by the number of times that words were looked-up and the variety of annotations used. The recall protocol for vocabulary annotated with pictures, text, and video was higher than for text alone that may be explained by the dual-coding effect that posits that information is best remembered if it is presented in both a verbal and visual form. There was no distinct correlation between the look-up behaviour of learners and what they reported using and how well vocabulary is learned. They believe that these findings indicate that there are other factors involved that have contributed to this result.

Lomika (1998) studied the influence of multimedia annotations on L2 comprehension and investigated whether a relationship existed between the types and number of glosses used. Twelve college students in their second semester of French were given an excerpt from the poem *Femme Noire* and exposed to three different reading conditions. The first group read the passage without any glosses, the second had access to English and French textual translations and the final group were able to access textual definitions in English and French, images, references, questions, and pronunciation

(Lomicka, 1998, p. 47). Feedback was obtained by a tracker that was installed in the software and "recorded the amount and type of glosses, and the length of time that each was consulted" (p. 41) and through think aloud protocols. Their verbalizations were recorded and later transcribed and separated into clauses according to Trabasso and Magliano's (1996) think-aloud design that parses clauses into "paraphrases, associations, explanations, and predictions"(Lomicka, 1998, p. 46). They were given prior instruction about the procedures and an opportunity to practice with a short text in the computer lab. She found "their use of glosses were oriented toward the goal of translation and paraphrasing in order to achieve a minimal level of comprehension" (p. 49). There was a heavy reliance on English definitions that she believes indicates a dependence on word meanings to understand the text. She suggests that this pattern may be a habit, "they were satisfied with the construction of a texbase level' (p. 49), or the students did not fully comprehend how the other forms of glossing could help them with the reading process. She concludes that multimedia annotations may help in reading comprehension.

As shown in the above studies, research investigating the effects of multimedia technology on L2 reading comprehension and vocabulary knowledge is progressively moving toward a more integrative approach. However, issues remain that have yet to be adequately addressed. In none of the studies is the relationship between vocabulary acquisition and a global understanding of the text fully investigated. Researchers have continued to concentrate on vocabulary acquisition, retention and knowledge to prove that computerized glossing is an effective means by which L2 learners can improve their reading comprehension. Nor has there been any distinctions made between what forms of glossing are the most effective for vocabulary acquisition as opposed to reading comprehension because of this emphasis on vocabulary research.

Research (Hulstijn, 1993; Knight, 1994; Chun & Plass, 1996) suggests that the lack of an overall correlation between the type of annotation used and performance indicates that there is a need to investigate individual and group differences to determine if, as suggested

by Laufer and Hill (2000), there may exist culturally constructed learning styles and preferences. Chun and Plass (1996) also recommend investigating general, visual and verbal abilities.

Other weaknesses found in select studies (Hulstjin, 1993; Knight, 1994; Hong, 1997; Takefuta & Takefuta, 1997; Lomicka, 1998) is the lack of background information regarding the students' familiarity and comfort level in working in English and with computers, their personal assessment of their reading abilities, and their learning preferences and styles. Current theoretical models of integrative L2 reading and language learning incorporate lower-level and higher-level processes and take into consideration linguistic as well as cognitive and affective processes that affect reading and language skills. Research into multimedia technology needs to be more firmly based on a model that incorporates more of these elements into its design.

In evaluating students' progress, it is also important to use on-line measures. In all of the studies, students were tested off-line, which may affect their ability to recall information. Visualizers may prove to be more efficient test takers if they are tested in the same environment in which they initially had access to the information. Alternatively, students with strong oral skills or those with little keyboarding experience may feel more comfortable in providing spoken responses to questions. Rather than preclude either on or off-line measures, it is important to incorporate both into studies whose design is oriented towards illuminating the conscious processes that students activate to become independent readers.

Overall, research into the effects of multimedia technology on reading comprehension has focused primarily on vocabulary acquisition and retention. There have been no distinctions made as to what forms of glossing learners themselves believe contribute to their comprehension of a computer generated text and how independent variables such as their learning styles, reading strategies, and personal preferences affect their choices in glosses and thus their understanding of the text. The objectives of this study have

been to gain some insight as to what kinds of on-line glossing contribute the most in helping students improve their reading comprehension, to have a better understanding as to what it is that they do when the read a computer-generated text, and how media generated text affects their perceptions of reading and how and what they read. The following chapter discusses the methods, instruments, evaluative measures, and categorization system used to investigate these inquiries.

CHAPTER THREE

The Study

Overview of the Study

This chapter describes the method employed to investigate the use and effect of the on-line glossary on the students' reading comprehension and reports on and interprets the findings from the individual case studies. It is divided into four sections. The first describes the rationale behind and the selection of the setting, participants, and the text. The second section discusses the methodological framework used in this study, the development and implementation of the instruments used to collect the data, and the chronology of the study. The third section describes the transcription, analysis, and categorization and coding of the data from the think aloud protocols and the methods used to analyze and score the final retellings. Information and data collected in each of the individual case studies are presented and interpreted in the fourth and final section.

Section One

Study Setting

The study took place during a two and a half week period in June, 2001at the Computer Assisted Language Lab (CALL) at the University of Victoria, Victoria, B.C. Volunteers were recruited from the ELPI and UAPC programs offered by the Department of Continuing Studies. This particular institution was selected because of the large student population from which volunteers could be drawn and it was felt that the findings from this study would prove to be beneficial to both the students enrolled at the University and to instructors involved in teaching reading in the higher academic levels. Seven teachers who

were approached about the study volunteered their services and were very enthusiastic about their students' involvement in the research as they felt that it was a unique opportunity for them to become more familiar with computerized reading and the options that media technology offered for independent study.

The CALL facility was the best possible location for the experiment to be held in. Firstly, the lab is the only facility at the University that is specifically designed for the study of languages and offers a large variety of language programs including those specifically ear-marked for ESL students. It also has one of the only computers with the video programming required to create videos such as those that were used to gloss segments of the on-line text. Finally, it is an environment that the majority of students are familiar with for it is where many of them access their email, search the Internet for class-related information, and create word processing documents. In using a setting that the students were already familiar with and were comfortable in, it was possible to establish a relatively strong rapport with them.

Participants

Volunteers for this study were recruited from five Upper level ELPI and two UAPC classes at the University of Victoria, Victoria B.C. While over thirty-five students volunteered to participate in this research, there were a number of factors that limited the size of the study group, the most notable being time constraints on the students who were in the process of completing their last two weeks of coursework and the number of hours that the lab in which the experiment was being conducted was open. It is also important to note that only one computer in the CALL facility could support the technology upon which the experiment was based.

Participants were selected on a first come first serve basis. Two upper-intermediate and four advanced level academic (400, 500, UAPC) ESL students enrolled in the ELPI program at the University of Victoria, Victoria, B.C. participated in this study.

Upper intermediate and advanced students were selected as the target group for they have stronger oral and written skills than those in the lower levels; they are able to communicate complex and abstract ideas; they have received instruction in reading and in the writing of global and critical ideas and how to apply these within authentic contexts; and there is a stronger motivation for them to be proficient readers because of their future interests and objectives.

Although it was anticipated that the group would include individuals from different ethnic backgrounds and genders, all of the participants were women of Asian descent with an overall average age of twenty-four. It was comprised of two Chinese, two Japanese, one Korean, and one Taiwanese student.

All of the volunteers studied English in high school for three to five years and two had more than five years of English instruction. All of the participants, excluding one who was about to embark on her university career upon returning to Taiwan, had studied English at university in their home country for an overall average of two to three years prior to their arrival in Canada. One volunteer had only had a half a year of university English. Each of the students had also studied English outside of the regular school system in a language or conversation school and two had studied independently.

Text Selection

The decision to use an expository text in this study was based on the premise that it would be representative of one of the text types that is common in most academic communities. It was also one of the most crucial and difficult decisions to make for the success of the research hinged solely on their comprehension or lack thereof of the text that was selected. It was therefore imperative to choose a text that would not only hold the students' interest but would also be appropriate for their level of reading expertise. If it were too difficult, it would hinder comprehension and force them to depend solely on the glossary, a behaviour that they might otherwise avoid. If the text were so simple that it provided them with no challenge at all, the glosses might be seen merely as items of interest as opposed to useful tools that they could access to enhance their comprehension.

In order to select a topic that would be of interest to the participants, volunteers (approximately forty-eight) from four upper level ESL classes who had been informed as to the nature of the study and the reason why their information was important to it, were asked by the researcher to circle items listed on a handout (Appendix A), provided to them by the researcher, that they would enjoy reading about on-line. They also had the option to include any topics that were not present on the list. They were requested to asterix the one topic that they were the most interested in reading about. The canvassing for topic ideas was conducted in January, 2001 and as the students' identities were not included on the handouts, it is not known if any were participants in the actual study.

The feedback provided by the students indicated that they were the most interested in news stories, and articles about travel, art, and culture. Two articles were originally selected for this study. The first, a newspaper article, called "Donors Cash in on Organ Bazaar", (From Chandrash, P. , North-South News Service, reprinted in the Montreal Gazette, August 14, 1990, pp. A1, A11.) and the second an excerpt called "Body Talk" from H. Fisher's Anatomy of Love, 1992 (pp. 22-29) were given to five four hundred level

students who had volunteered to read the two articles and highlight those words, phrases or expressions that they did not understand and felt should be glossed in a computerized text. There were also asked to rate their interest of the two articles on a scale from one to ten.

The rationale behind having the students mark the lexical items that they did not understand originates from the early beginnings of glosses when they were learner-generated (Roby, 1990). Medieval students created them when they encountered words that they did not initially understand. Over time, glosses were implemented as teaching tools and have evolved into modern day dictionaries (Roby, 1999) that students continue to refer to upon encountering a word that they do not understand. Although a researcher or a teacher may anticipate which words or phrases could prove to be difficult for students at a particular reading level, it is impossible to make such a determination without feedback from members of the student population. It was felt that far more insight would be gained in using student input in the selection of which words and phrases should be glossed as well as which text would be of the most interest to them. While all five found both articles to be interesting, four out of the five volunteers indicated that if they were to read the article for their class work, then they would prefer to read the excerpt called 'Body Talk' by S. Fisher, which reports the findings of an anthropological study on flirting behaviour. Given the average age of the participants (twenty-four), such a response was expected.

The decision to exclude the newspaper article from the list of choices was also made based on the researchers' personal teaching experience. Students at the upper levels have been trained and are expected to skim and scan newspaper articles for the main idea and to do little else with them. The language used by journalists is also unique to that forum of writing that targets the general public as opposed to members of the academic community. News articles are also for the most part, relatively short and there is not the elaboration given to supporting ideas that one might find in a more academically written text.

As the students would be reading the article and then writing a summary immediately upon completing it, it was also imperative that the length of the passage did not exceed their

ability to recall it. All five of the student volunteers who originally read the text, had little difficulty in verbally summarizing the main points of the Fisher article, which is approximately 1200 words long and four upper level ESL instructors indicated that the article was appropriate for their class level. The Fry Grading Formula (1969) was used to evaluate the readability of the text that was approximated to be a grade nine level.

Section Two

Methodological Framework

The primary focus of this study was to obtain information directly from the participants involved to gain a more in-depth understanding as to how different forms of glossing aid in reading comprehension among ESL students. Research cited earlier in this proposal indicates that there has been an emphasis on empirical comparisons of dictionary and gloss use between control and experimental groups (Knight, 1992; Laufer & Hill, 200; Lyman-Hager and Davis 1996; Roby, 1991 among others) and correlations drawn between the types of annotations used and participant performance among large sample populations (Chun & Plass, 1996; Hulstijn, 1993). While invaluable to our growing understanding of glosses and their uses, they do not clearly depict what is occurring at the individual student's level and what impact glosses and reading on-line have on his/her perceptions of how and what he/she reads.

In this investigation, the methodological framework within which the research was conducted was based upon on a multiple-case design. Multiple-case designs are those case studies that "follow a replication rather than sampling logic" (Tellis, 1997, np). Thus it was possible to collect comparative data from a number of participants. While it may be true that "multiple case studies shorten the perspective" (Kinkead, 1997, p. 203) for the time invested in each student is limited and thus we obtain less information about them, the "results by replicating the pattern-matching increases confidence in the robustness of the theory"(Tellis, 1997, np). Several case studies conducted on ESL reading comprehension of printed text (Block, 1986; Huckin & Bloch, 1993; Parry, 1991) have furthered our understanding of and helped to establish patterns in strategy use and learning styles. Few such studies have transcended beyond traditional reading into the realm of on-line

comprehension (Horiba, 1996; Ganderton, 1998). It is believed that the use of case studies to further our knowledge of reading using multimedia technology may reveal how the students experience the activity, "what they value, what they reject, what they learn, how they change...as the event is unfolding, thus allowing for alternate accounts of and explanations for students performance"(Hull, 1997, np). Thus a multiple-case design that places an emphasis on qualitative data was used in this study to construct an analysis of the conscious processes that the students move through during on-line reading and to gain insight into what forms of glossing students believe benefits them the most during the reading of an on-line text and to determine what forms (as suggested through written summaries) do.

Introspective (during task) and retrospective (post task) data collection techniques formed the foundation of these case studies for they helped to reveal and identify the processes that the students consciously progressed through while reading the on-line text. These two techniques have been combined in earlier studies (Ganderton, 1998; Horiba, 1996; Nunan, 1992) and have helped to create a more reliable account of what is happening at the student's level for the one method helps to compensate for the shortcomings of the other (Horiba, 1996).

Introspection was the primary source of data collection and the final retrospective report (oral interview) supplemented this information. There have been several studies (Afferbach & Johnston, 1985; Collins, Brown, & Larkin, 1980; Olson, Duffy, & Mack, 1980, 1984; Suh & Trabasso, 1993; and Trabasso & Magliano, 1995, 1996) that have used think-aloud methods to "reveal inferences and mental operations that occurring during comprehension" (Trabasso & Magliano, 1996, p. 262) . Not only does this method help the researcher

identify how and what the participants understand, it also enhances the experience for them. Kucan and Beck (1997) argue that:

> When students participate in discourse environments and engage in dialogue or communication, their learning is not confined to knowledge constructed as a product in such a context, but also includes a developing understanding of and ability to use the processes by which such knowledge is constructed. (as cited in Kibby, 1997, np.)

The instruments used to collect this data and a brief explanation of each is presented below.

Instruments

Changes Made During the Study

It should be noted that rather than conducting a pilot study in which the findings were excluded from this final report and used for the sole purpose of ratifying methodological procedures or problems with the computer program, the results from the first three volunteers who were in effect, 'pilot study' participants, are included in the main body of this study. The problems that arose during these initial trials and the alterations and rationale behind these changes are included below in the presentation of the instruments that were used in the study, so as to provide the reader with a more concise account of the difficulties that arose and how they were resolved than might otherwise be demonstrated through individual accounts. It is important to note that while some of the computer-related problems (such as unconnected links) did have a limited effect on data retrieved from the on-line tracker (by adding to the number accessed), they did not appear to negatively effect the students' ability to work through and understand the reading and their feedback did provide the researcher with an opportunity to make the appropriate adjustments and to address questions and concerns that might otherwise have gone unnoticed.

SLEP Test Assessing Student Language Proficiency Levels

Upon their arrival at the University of Victoria, all ESL students, including those who consented to participate in this study were given the SLEP test (Secondary Level English Proficiency Test) to determine their reading and listening levels. This test measures their understanding of spoken and written English. It is not designed as an aptitude or academic test nor does it provide any background information on the students. It is used strictly as a means to place them in the appropriate English level within the ELPI and UAPC programs. The following excerpt taken from the Official SLEP Guide outlines the structure of this test:

> The test if divided into two sections, each containing four types of questions. For the first section, the four types of questions all use recorded samples of spoken English to test listening comprehension and do not really heavily on written material. Two of them, descriptions of a picture and short conversations followed by questions based on a map, use no written material at all. Two other types of listening questions - multiple-choice dictation and questions based on conversations that take place in school - use short written options only. The four question types in the second or Reading Comprehension Section, which also measures vocabulary and grammar, are based on written or visual materials. Section Two includes written questions based on a cartoon, written questions based on line drawings, three multiple-choice cloze passages, and a literary passage followed by questions on its content. (p. 7)

As the students' proficiency levels had already been ascertained prior to their involvement in the study and they had been enrolled in their classes for over two and a half months prior to the commencement of the experiment, there was no need to conduct any further language proficiency testing.

Background Questionnaire

Students were given a Background Questionnaire (Appendix C) that was used to obtain information about their language and reading histories, dictionary use, and their experience with and comfort in using computers and multimedia systems. This information also helped to establish how the students perceived their own reading patterns and abilities and was later matched against the results from the data collected by the on-line tracker, their final written summaries and oral interviews.

Changes Made to the Background Questionnaire

Relatively few changes were made in the original Background Questionnaire. Those that were altered or questions that were added were done so based on information that arose while the students were filling out the initial questionnaire or during the final interview. The following nine questions were included after the first volunteer (Bluepig) completed the experiment.

In question eight, the term semesters was changed to years for as indicated by the first volunteer, the term was somewhat ambiguous as the semester system is different in her country.

An additional question was added in regards to the kind of books/articles that the students find to be the most difficult to read in English. Bluepig immediately offered the reasons why she found information texts to be difficult to read and thus question eighteen was added "What makes these books/articles difficult to read?" The answers that were provided on the questionnaire were also based on feedback from Bluepig.

A question that emerged while we were conducting the final interview was directed at the types of words that she typically has difficulties understanding. While discussing how

these items should be glossed, I realized that in glossing a text, it might be pertinent to know whether students required assistance in understanding verbs, nouns, adjectives or adverbs. Thus this question was added to the background questionnaire and included in the data so as to determine which parts of speech might best be glossed to augment the students' comprehension of any given text.

Although the emphasis of this study has been on the use of on-line glosses, the question as to why or why the participants do not access a dictionary arose from how frequently they consult a dictionary when they are reading. Bluepig volunteered this information and the question was added to the Background Survey to further our understanding about dictionary use, to determine whether similar issues arose in the use of an on-line glossary, and to examine whether it was possible to alleviate some of the difficulties associated with the need to consult an external source to determine the meanings of unknown lexical items.

Question twenty-three, which addresses the type of learner that a student perceives him/herself to be was included after the final interview with Bluepig. It arose from a brief discussion about how one understands and remembers what he/she is being taught. Both Bluepig and I agreed that we were visual learners who were more likely to understand and recall words, ideas, or concepts when they were presented visually than textually. Although this study does not focus on or pursue in great depth the students' perceptions of their individual learning styles, it was included to gain some insight as to why participants claiming to be partial to a particular way of understanding what they read did or did not make use of those available glossing formats. It was not designed nor is it possible to make any sweeping generalizations about perceived learning styles from this information.

Question twenty-eight was included to try to determine whether students transfer their look-up behaviour from print bound texts to computer- generated readings and to gain some insight as to whether how they read on-line differs from how they read from a book. Similarly, question thirty was intended to expand on our understanding of whether it is easier or more difficult for students to read a computer-generated text as opposed to one that was print bound. Differences could suggest that it is necessary for instructors to establish pedagogical and instructional guidelines for on-line reading purposes.

The only other change that was made to the Background Survey after it was completed by Bluepig, was the addition of question twenty-nine. It was anticipated that individual students would have more computer experience than others, however, prior to the initial run through, no consideration had been given to how much or how little exposure they had been receiving from their instructors in Canada. Students who have been given more experience in reading English texts or completing exercises on the computer may be more comfortable than those who have not received any such practice. This factor may play a role in how they respond to the program and what their overall perception is of reading a computer-generated article for classroom work.

Computer

A web page containing excerpts from S. Fisher's, Anatomy of Love (1993, pp. 20-29) was created using HTML and Java Script and downloaded to the local hard-drive of a Power Mac G4 with a dual processor, 500 megahertz, and 512 megs of ram. Using a combination of HTML and Java Script coding, links to the text were created on the local hard drive so that the words selected for glossing on the main page (the page which contained the text) were connected to a main glossary page containing the definitions, images, and definitions plus pictures. There is only one such computer in the CALL facility at the University of Victoria.

The Glossary

The glossary consisted of three separate forms of glossing: definitions, images (including still and video), and definitions plus images. The definitions as well as the video clips were context specific and were created by the researcher. Digital and analog videos of two individuals progressing through the flirting stages described in the article were recorded in an eating and drinking establishment in Victoria, B.C. Pre-selected ideas and items from the text that were to be used as glosses were filmed at this time. These longer videos were downloaded into the Power Mac G4's IMovie , a video editing software application that enables the user to edit movies by adding sound, text, special effects and transitions. Clips between five to thirteen seconds in length were created with this application for use in the glossary. These mini-movies were then exported to QuickTime, which reduces the size of the files making it easier and faster to access them if and when they are exported to the Internet. As all of the files were kept on the local hard drive, the connection between the main page and the glosses was almost immediate. A total of fifty-six video clips, thirty still images and one hundred and eleven definitions were used to create the glossary. Only twenty-five of the one hundred and eleven glosses did not have an image option, for during the development of the program, visuals that could adequately portray the words could either not be located, or were too difficult to create. In total, fifty-one nouns, thirty-five verbs, nineteen adjectives, and five adverbs were glossed.

Still images were obtained from free sites on the Internet and downloaded into Photoshop 6, an editing application that allows the user to alter the size, shape, colour, and texture of photographs and other images. They were selected based on the context of the article and how the researcher believed the students would interpret them. There were difficulties in selecting images for they could be misconstrued as a result of cultural constructions of meaning as well as through individual and experiential interpretations. Stills, in particular posed the greatest challenge, for unlike the videos they could not be created in a culturally authentic context. For example, the image used to represent

'intangible' was a cartoon rule with its hands in the air and the caption that was included in the definition + picture gloss read "I can't measure it". In order for the students to understand this explanation, it was necessary that they could associate the ruler with the word 'measure' written below it and then transfer that explanation to the context in which it was intended. As the videos were created based on the actual text, it was far easier to depict selected items, particularly those showing action, than it was to find or create still images.

Students in the C.A.L.L. facility (who were not a part of the study) as well as C.A.L.L. staff members provided feedback on both the video clips and the still images prior to the commencement of the sessions in an attempt to guard against the use of pictures that might not trigger the intended interpretation. What also became apparent at that time was how familiarity with a text or an idea within it can lead to an artistic interpretation of the selected items that, while understood by the researcher might be more of a distraction than a benefit to the students involved in the study. Every effort was made to consult with ESL instructors and computer personnel who work on a daily basis with international students to avoid such a pitfall.

Changes made to the images during the study

Aside from a few problems with links that did not work because of incorrect pathway designations, there were three images that were changed or added after the third participant completed the reading. They included: extinguish, go astray, and suitor. The images did not convey their intended meanings and had to be explained by the researcher during each of the first three sessions. They were not immediately changed for it was not clear whether the difficulties were more of an individual problem or one that rested in the nature or presentation of the image. In the case of the word 'extinguish', the original image did not convey an action as only a fire extinguisher was used and thus there was confusion

between the noun 'extinguisher' and the verb 'to extinguish'. Based on feedback from the students, a fireman extinguishing a fire was used to portray the action. 'Go astray' was difficult to present in the context in which it was intended and thus the road sign 'wrong way' was added to the glossary. It proved to be a successful image to illustrate the meaning intended in the text. The final word, 'suitor' was initially depicted by an image of an older, well dressed gentleman speaking with a woman, which proved to be very ineffective in explaining the term. It was replaced with a young man holding a bouquet of roses.

Changes Made to the Definitions During the Study

Few changes beyond an elaboration of a word/phrase were made for the textual definitions used in the glossary. The first three participants did not indicate that they had any problems with the definitions, however Muse pointed out that the definition for 'perceptual' was not clear nor was the definition plus image for 'demarche' understandable. Both were changed and did not pose any problems for the other participants.

The definitions for 'pitch', 'perfunctory', and 'aligned' were also changed because of the difficulties that students appeared to have in comprehending their meanings.

On-line Tracker:

As in Lomicka's study (1998), an on-line tracker was installed to record the time, types and numbers of glosses the students accessed. They were not informed that their actions were monitored to minimize the effects of an artificial testing environment. Knowing that their decisions were being recorded may have encouraged them to limit the number and types of glosses that they selected during the reading process and/or, read the text more quickly than they might otherwise have read it. Their reading speeds and time spent on the glosses were recorded for "Time-on-on-task is a predictor of learning success"

(Wittrock, 1986 as cited by Roby, 1999, p. 97) and as such the amount of time that they spent reading the article and accessing the glosses was taken into consideration in the final analysis of the student's understanding of the text.

Audio recorders

An audio recorder was used to record the students' think alouds and final oral interviews. As students often elaborate on questions asked of them, it was believed that an audio tape would ensure that the data was as rich and as complete as was possible. Each participant was asked prior to the commencement of the reading whether it would hinder their reading process or cause them any discomfort. There were no objections to any of the taping.

Final Oral Interview Questionnaire

A final interview questionnaire (Appendix D) was designed to illicit information from the participants about their understanding of the text relative to their glossary use and to gain more insight as to whether any distinctions could be made between the different glossing formats and a general verses a more detailed understanding of the article. It was also used to provide a forum through which the students could provide feedback as to how they would like to see computer-generated texts integrated into their learning environment.

Changes Made to the Final Oral Interview Questionnaire

There were several questions added to the final oral interview based on inquiries and responses that arose during the final discussion with Bluepig. The original Oral Interview consisted of seventeen questions, many of which seemed rather general in nature and did not provide an in depth examination as to what specific glosses were conducive to promoting an

understanding and recollection of the text, and the organization of the free recall summary. Questions seven, eight, and eleven were included to address these inquiries. Based on information provided by Bluepig, the students were also asked whether the glosses interfered with their reading pace (which may account for their use or lack thereof of the glossary) and to provide feedback as to what kind of images they believed would be helpful to them in understanding other texts (question thirteen) and what kind of items (e.g. nouns, verbs, adjectives, adverbs, cultural expressions) they would gloss (question nineteen).

As Bluepig read through the text, she passed over several items that she did not understand and yet she did not consult the glossary to determine their meanings. This action prompted the need to discover why particular words were skipped while others were not and it was believed that such an inquiry would unveil, if only slightly, what it is that students do while they are reading and how they judge which words carry the balance of information needed to understand the text in its entirety.

Two questions about the role of teachers and reading instruction were also added to the final interview questionnaire (questions twenty-five and twenty-nine). Question nine was asked to determine how much experience students had in reading for main and supporting ideas so that it would be possible to identify those students who had been given such instruction from those who had not. The latter question was designed in such a manner as to provide the students a voice in how they might like to learn.

Chronology of the Study

The researcher met with each student at a prearranged time in the C.A.L.L. facility in the Clearihue Building at the University of Victoria. She sat alongside each volunteer at the designated station (28) throughout the session to: answer any questions that arose and ease any of their discomfort in using the program; observe the students' responses to the text and glossary; and to give the final oral interview. Each session took approximately three to four hours and occurred during the participants' free time.

Pre-reading and Writing Instructions

Prior to the commencement of the actual reading session, the purpose of the study and the student's role in it was again explained to him/her using the original consent form (Appendix E). Any issues or concerns that the participants had were answered at this time. The volunteers were then given the background survey and completed it prior to reading the text. It had been hoped that the survey would have been completed a week prior to the to the sessions so as to allocate the appropriate amount of time needed to instruct each volunteer in the use of the computer-generated text and glosses and to provide the researcher the time to organize and be familiar with their demographic information. Unfortunately, because of the time limitations and the need to ensure participant-researcher confidentiality, it was not possible to distribute the questionnaires prior to the arranged meeting times. This did not however, cause any organizational dilemmas or any time-allocation difficulties for either the students or the researcher. As all of the students had prior experience maneuvering through various web sites on the Internet, only verbal instructions and a brief demonstration were required to familiarize them with this particular site.

Once the students verified that they understood how to maneuver through the program, they were instructed to read the on-line article for its main and supporting ideas and informed that they would have to organize and write a summary about it without the

advantage of having the text in front of them to do so. As few people read or write without a purpose, the students were instructed to read the article as carefully as they would normally do so to prepare for an in-class test (for in fact they would be tested and marked on their performance) and so that they could, if necessary, explain it to a fellow classmate (in this case the researcher) who had yet to read the article on which they were about to be tested. The rationale behind these instructions was that it provided them with a real-life situation and task that they are familiar with and one that would encourage them to search for the most important and relevant information, much as they would when given this task by their classroom instructors.

Each participant was also informed that they could prepare themselves for the test by whatever means they felt the most comfortable using (e.g. note-taking, using the glossary, discussing ideas with the researcher). It should be noted that those who took notes were informed from the onset that they were not permitted to refer to them while writing their summary of the article for they were being tested on their comprehension of the text as presented through the summation of main and supporting ideas.

Think Aloud Protcol Instructions

The students were then requested to read the article using a think aloud protocol. The procedure was demonstrated to the volunteers by the researcher using an alternate text that was not selected for use in this study but had been glossed and placed on the computer at Station Twenty-Eight. The students were given a brief opportunity to practice the protocol prior to reading the article. While it may have been beneficial to have the participants spend more time becoming familiar with the using think alouds, there was a concern that they may pattern their behaviour strictly on the practice sessions and the instructions and that the information might not flow as naturally as it otherwise would. There was also the procedural problem in coordinating available lab and computer times

with the students' free periods and because of the number of hours needed for each session it was impossible to incorporate extra tutorial sessions into the study.

Student Procedures

Reading Task

The volunteers initiated the reading process by logging on to the site, which activated the internal clock and tracker. As they progressed through the text, the audio recorder taped their think alouds and any inquiries that they had as well as any discussions that ensued as a direct result of any ideas or concepts presented in the article. The researcher made notes about their activities, responded to questions about the glossary and the text as well as on occasion encouraging responses from those participants who found it difficult to think aloud without any direct guidance from the researcher. Prompts usually directed the students' attention to what they were presently doing, why they had or had not accessed a particular gloss, or how they understood the meaning of a particular word in the text.

Once they had completed the text and were satisfied with their understanding of it, they clicked on the button 'I have finished' that in turn closed the page on which the article was presented and stopped the timer and the tracker and opened the site where they wrote their on-line summary of the text. Three of the nine students wrote their article by hand, claiming that their poor keyboarding and computer skills interfered with their ability to write and think as quickly and as clearly as they could when writing by free hand.

Final Oral Interview Questionnaire

The final oral interview (Appendix D) was conducted with each volunteer immediately after they had completed the summary so as to obtain an immediate and unadulterated account of their impressions of the study and their glossary use as it related to their general and detailed understanding of the article. Their responses were recorded manually and also recorded to ensure that important details would not be omitted from the study.

Section Three

Transcription and Analysis of the Data

The audio-taped think aloud protocols were transcribed into Word 2000 by the researcher using external speakers on the machine to amplify the sounds. There were several problems encountered while transcribing the students' accounts, the most difficult being discerning certain statements that individuals made. In a few cases, it was impossible to transcribe everything that was being said for the student either spoke too quietly for the recorder to pick it up or he/she spoke rapidly with a strong first language accent that made it impossible to identify individual words and thus several items blended together to form one incomprehensible group of sounds.

Another key issue was how to preserve what was said and how it was spoken. As in Pereira's 1991 study of "The Role of the Situation Model in the Reading Comprehension Processes of Grade Seven Readers", pauses are indicated with a single period or dot '.', with one dot being equal to one second of silence. Questions are of course presented using question marks but unfortunately, the prosody and intonation (Pereira, 1991) were lost in the transfer from oral to written language. Upper case letters are used to indicate excitement, stress or surprise. Fillers, such as "um's", "ah's", and retellings of any section of the text were included in the transcript to maintain its authenticity (Pereira, 1991).

Categorization and coding of the data from the think alouds

Data collected from the think-alouds were transcribed and separated into clauses based on Trabasso and Magliano's (1996) theoretical model that identifies four types of thoughts that occur during thinking aloud (Trabasso and Magliano, 1996). As in Lomicka's 1998 study, statements made by the participants were parsed into paraphrases (a translation of a sentence, word or gloss into their own words), associations "(information retrieved

from background knowledge but not necessarily integrated into the text), predictions, (anticipation of future events or future consequences based on the integration of prior text information and background knowledge) and explanations (inferences that casually link events in a text)" (p. 47). In order to simplify the categorization process, explanations also included any statements that indicated an understanding of the glosses or segments of the text through contextual and grammatical associations (for example root word knowledge and grammatical classifications – noun, verb, adjective, adverb). One other category was used in the analysis of the think alouds.. The designation, metacomments, originating from Zwann and Brown's 1996 research was used as a means to identify the students' understanding or lack thereof of the text or glosses as well as any statements made about its overall structure.

Summary Checklist

One of the most arduous tasks in this study was to develop a criterion upon which comprehension could be evaluated. While other measures of comprehension, such as cloze and gap exercises may prove to be easier to tabulate, there are problems associated with both measures that seemed incompatible with this particular research goal. Cloze exercises, which are constructed through the pseudo-random deletion (Alderson, 2000) of ever n-th word, do not give the tester adequate control over which words will be deleted and thus what "individual cloze test measures will depend on which individual words are deleted" (Alderson, 2000, p. 208). It is therefore not possible to adequately predict what will be measured since this particular method is word-based (Alderson, 2000).

The gap-filling test is more strictly controlled by the researcher than is the cloze method. What is deleted depends on whether one chooses to test the students on their overall comprehension of a particular text by "removing those words which are essential to the main ideas," (Alderson, 2000, p. 210) or their grammatical sensitivity by removing

function items "which carry the text's coherence" (Alderson, p. 210). The difficulty that this researcher had with using a gap summary was that there was a great deal of subjectivity involved in selecting which words carried the essential meaning of the text. While several pre-tests and analysis of the results may have validated the measure, the time restrictions on both the participants and the researcher made this an unviable alternative. Additionally, the focus of this research was on reading comprehension and glossing behaviours and the decision would then have to be made as to whether the words that were selected for glossing should be the same words that would be deleted from the summary. If this were the case, would the study then focus more on vocabulary acquisition than on comprehension?

A summary was selected as the evaluate tool for this technique is a non-intrusive measure of comprehension. Cloze and gap-filling tests and direct questions may have limited their responses whereas a written recall provided them with the opportunity to freely express what they understood. One might question as to whether the instructions to read and reconstruct the text based on main ideas and supporting details were not in fact intrusive. This is a task that all students at the four hundred levels and beyond have received instruction in and are expected to be skilled at doing and thus it did not in any way hinder or interfere with their normal reading and writing behaviour. The main and supporting ideas carry the meaning of the text and for the students to demonstrate that they did in fact understand it, it was necessary for them to include these points in their written summary. Telling them to do so could be interpreted as redundant rather than intrusive. Additionally, recalls, whether in a free-recall or summary format do, as posited by Benhardt (1983), help to reveal how information is processed, stored and retrieved when the assigned task is text reconstruction.

Admittedly, there are problems in using such a technique. Does the summary written in a second language reveal more about their writing abilities than their comprehension of the text? Findings by Lee (1986) indicate that summaries would best reveal what information the students understood if it was written in their first language.

Unfortunately, to have the students do so would have exceeded the practical boundaries of this study and, as stated above, during their regular classes the students involved in this research project are expected to read and write reports in English about what they have read and will need to do so when enrolled in post secondary institutes. The use of a summary, while not an exact measure of comprehension, was believed to be an appropriate indication of understanding within the confines of this particular study.

Scoring the Summary

Another difficulty in using written summaries as an evaluative technique is how one scores the recall. As comprehension is heuristic and cannot truly be measured, it was evaluated in terms of performance and thus the students were evaluated on what the researcher instructed them to focus on during both the reading and reconstruction of the text, which in this study was what the students understood the main and supporting ideas to be. Should the summaries be graded according to how many idea units are included in them or on another scale? Admittedly, any evaluation of the test is subjective to what the researcher identifies as being the main points. In an attempt to alleviate or lower the degree of subjectivity, five upper level ESL instructors from the University of Victoria were requested to read and then construct a summarized list of main and supporting ideas. Those ideas that were commonly identified by the teachers and this researcher were used to establish a checklist against which the students' responses were matched (Appendix F).

There were several problems that arose in using this scoring procedure. The first difficulty was in deciding whether the units that were included would be ones that all five instructors had selected or whether it was acceptable to also include those that only three out of the five teachers had written down. The decision was made to create the checklist from responses that four out of the five teachers had selected. This choice was made to avoid creating a "lowest common denominator summary" (Alderson, 2000, p. 233) created by lowering the proportion of responses.

Another difficulty was in determining the marking scale for each idea that was presented. The main idea of each identified section (as selected by the instructors) was scored two points and the most important supporting ideas a one. Less important supporting ideas but ones that provided examples of the major points were scored as .25.

The final concern was that while this checklist did provide a framework through which the students' recall of details could be easily assessed, it was believed that it may not further our understanding as to how the participants comprehended the text as a whole. According to Tierney, Readence and Dishner (1995),

> Each student's retelling is individualistic with regard to reaction, personality, and depth of understanding and thus assessment should be done by examining the whole recall and not just its component parts. Only by examining the totality can the richness of the reader's understanding be judged. (p. 517)

Irwin and Mitchell's (1985) five level scoring system was used to evaluate the student's recall of the text by assessing the richness of their understanding. The criterion that was used to establish each level is shown in Appendix G. While the checklist was used to help compare the students' summary to that of the original story, Irwin and Mitchell's system helped to identify the quality of the retelling. As is indicated in Appendix H it is believed that the better able a student is in generalizing beyond the text and including the summarizing statements, major points, supporting details and relevant supplementations, the better he/she understood the story. For the purposes of this study, generalizing beyond the text included general statements that provided the reader with an overview about ideas or words found in the text; supplementations were identified as those items that added personal experiences or information from other sources in the retelling such as ideas presented in the glosses; a thesis or summarizing statement entailed the paraphrasing of the main idea of the article that in turn provided a clear introduction to the retelling; and the major points and supporting details were those identified and included in the summary checklist that had been

generated by the instructors prior to the study. Coherence included a clear organizational structure to the retelling such as an identifiable and concise introduction followed by main and supporting details and a clear and definitive conclusion. Transitional markers, such as first, second, third, also contributed to creating a coherent retelling as well as playing an important role in helping to develop a comprehensible summary. Although the retellings were not marked on grammatical correctness, a comprehensible summary included the construction of complete sentences that expressed ideas and opinions organized in such a way that the researcher could understand and follow the development of the retelling from its introduction to its conclusion. The summary was considered complete if it included the aforementioned points and most importantly the main and supporting ideas.

Triangulation of Data

Lastly, information collected from the background surveys, on-line tracker, written summaries, and final interviews was triangulated to determine whether a glossing pattern would emerge among the participants.

Initially, each student's performance was individually assessed and then a group comparison was made to determine whether there were any similarities or relationships that could be established based on the information that was obtained. Information collected from the background surveys such as their English skills, dictionary use, reading and computer histories were cross-referenced with their observed and tracked reading behaviours, time on task, use of contextual and grammatical clues, and their summary recall protocols. This information helped to identify the transfer of reading patterns from print-bound to on-line texts or changes in these behaviours, the importance of time on task and careful reading, and how affective factors may have either enhanced or inhibited their performance.

The students' use of glosses and the inferences and metacomments originating from them were then triangulated with their summary scores and their richness of their retellings

as well as with the items that were derived from the glosses and included either verbatim or in a paraphrased form in their summaries. This information helped to identify which glossing formats assisted the students in comprehending and recalling items or ideas in the article as well as what parts of speech were most readily understood through specific gloss types.

Lastly, responses from the final interviews were examined in light of the previously collected information to help clarify any possible misinterpretations of the students' observed behaviours or the data. These interviews also gave the students the opportunity to provide feedback as to how teachers, researchers, and programmers could develop on-line academic materials.

Section Four Student Profiles

The following section is a discussion of the information collected by the aforementioned methodology and instruments. It is presented and interpreted as individual case studies and in the order in which the sessions occurred. The collective findings and interpretations are presented in Chapter Four.

Session One: Bluepig

Bluepig is a Taiwanese woman between 21-24 years of age. Her native language is Mandarin and English is her only second language. She has been studying it since high school and has had more than five semesters of English at the university level as well as two semesters in the ELPI program at the University of Victoria. She is hoping to return to Canada to resume her English studies in the fall of 2001 and aspires to attend an English university in either Canada or the United States as a full time student.

When asked what her strengths and weaknesses are in English, she responded that her writing and reading skills were stronger than her listening and speaking skills. This may be attributed to the fact that her primary focus prior to arriving in Canada was reading and writing in English and also to the fact that she is a frequent reader in English, with a reading averaging of three to five times a week.

At the present time, her reading is, for the most part, recreational in both Chinese and English with an emphasis on novels in her native language, and information texts (e.g. science, history books) and magazines in English. When reading novels, she has difficulties with cultural expressions and ideologies and in particular humour that is directed at a

Western audience. She also has difficulty reading information texts and she attributes this to problems in understanding more technical and field specific vocabulary items.

She frequently consults a dictionary when she reads but does so after she has completed the article or book that she was reading. Bluepig is an active and avid computer user who logs onto the Internet for a variety of reason on a daily basis.

Observations made while Bluepig was reading

Bluepig took approximately fifty-five minutes to read the text. As she progressed through the article using the mouse to guide her, she paused to write down those words that she did not understand. She did not initially consult the glossary for their meanings but did so after she finished each section and then reread those sentences in which the items were embedded. Bluepig was very comfortable reading on the computer and used the main headers of each section to help her find her way back to the text after she consulted the glossary. She was very relaxed in reading aloud and in discussing what she understood and why.

Tracker Data

Information from the tracker data indicates that Bluepig did not rely heavily on the glossary. Only thirty six words out of a possible one hundred and ten items were looked up (29.1% of the total number of words that were glossed) (Table 1) which included sixteen nouns, thirteen verbs, five adjectives, and two adverbs.

The total number of glosses or lookups was seventy-three, with the glossary being used more than once for twenty different items including ten nouns, eight verbs, one adjective, and one adverb (Table 2). It is also notable that Bluepig accessed the picture

glosses first in each case where she consulted the glossary more than once for the same word.

Approximately 56% of the total glosses consulted were pictorial (when the picture plus definition category is included in this calculation) and only 44% were textual definitions. These figures do support her earlier statement that she believes herself to be a visual and textual learner.

Table One

Data Collected from On-line Tracker
Tabulation of Time Spent on Task and Number and Types of Glosses Accessed By Bluepig

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Definition + Picture Glosses
55 min.	1014 sec. (16.9 minutes)	73	32	40	1

Table Two

Number and Grammatical Categories of Words Looked Up by Bluepig

Number of Words Looked Up	Nouns	Verbs	Adjectives	Adverbs
36	16	13	5	2

Think Alouds

Bluepig provided seventy-four inferences during the entire reading session (Table 3). Forty-three of these were made directly from the text, twenty after accessing the picture glosses, six after using two kinds of glosses, four from definitions and only one was made after accessing all three glossing formats. The high number of inferences made while reading the text suggests that Bluepig is more dependent upon grammatical and contextual clues than on definitions provided in the glossary to help her understand selected items in the article. Both paraphrasing and explanations dominate the think aloud categories used by Bluepig, making up 45 (60.8%) and 23 (31.5%) of the total.

Text Drawn Inferences

Paraphrases

Bluepig's emphasis on paraphrasing directly from the text is, as was later discovered, representative of how she reads on a regular basis. Unlike some of the latter volunteers, she was not overly concerned with a complete understanding of items that she was unfamiliar with. Instead, she appeared to be content to obtain the gist of the article and to derive the meaning of unknown words from textual and grammatical clues, rather than look up their definitions in the glossary. She was approximately fifty-percent successful paraphrasing items from the text with an almost equal division between the number of recorded correct and incorrect paraphrases, thirteen and eleven respectively (Table 4). Some examples are provided below in Table 5.

Table 3

Number of Inferences and Types of Glosses Used by Bluepig During Reading
Trabasso and Magliano's (1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	After Accessing Two Kinds of Glosses	After Accessing All three Glosses	Total Number of Inferences Per Category
Paraphrase	24	4	11	-	5	1	45
Association	3	-	3	-	-	-	6
Explanation	16	-	6		1		23
Prediction	-	-	-	-	-	-	-
Total Number of Inferences	43	4	20	-	6	1	74

Table 4

Number of Correct (0) and Incorrect (X) Inferences Made by Bluepig During Think Aloud Protocols

Think Aloud Categories	**During Reading (Text)**		**Definition**		**Picture**		**Picture + Definition**		**After Accessing Both Picture and Definition Separately**		**After Accessing All Three Glosses**	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	13	11	4	-	5	6	-	-	3	2	1	-
Association	2	1			3							
Explanation	12	4	-	-	4	2	-	-	1	-	-	-
Total Number of Correct and Incorrect Inferences	27	16	4	-	12	8	-	-	4	2	1	-
Total Number of Inferences	43		4		20		-		6		1	

Table 5

Examples of Positive and Negative Paraphrases Made Directly from the Text

Original Text	Positive Paraphrases	Negative Paraphrases
…then she drops her eyelids…	Drops her lids down. Down? (mimics the action)	
…giggling nervously as she retreats behind her palms.		I mean I think it means she tried to show something, right?
Anthropologist	I know maybe scientist is.	
…to spell success..		To show or say something.
…accoutrement	Something for example, maybe have expensive pants or something.	
…grooming talk		Not talk very hard.

Text Drawn Inferences: Explanations

The information obtained from the tracker data indicates that she was far more successful in using explanations in her think alouds (ten out of fourteen or 71.4% correct) than she was in making paraphrases directly from the text (thirteen out of twenty-six or 54%). Even more notable was that she was equally competent in using both contextual and grammatical explanations (Table 6). As is shown below, she not only used an equal number in both categories, she also made the same number of correct and incorrect explanations (36% and 14% respectively).

Table 6

Think-Aloud Category: Explanations Made During Reading
Total Number of Correct and Incorrect Inferences According to Grammatical and Contextual Categories

Total Number of Explanations	Based on Grammatical Inferences		Based on Contextual Inferences	
14	O	X	O	X
	5	2	5	2
	7		7	
Percentages %	36	14	36	14

The examples provided in Table 7 are indicative of her use of these clues, which as she later confirmed during the final interview, is the way that she typically works through a text that contains items with which she is not familiar.

Table 7
Examples of Correct and Incorrect Explanations Made by Bluepig
Taken Directly from the Text

Original Text	Students Statement	Explanation
anthropologist	Because 'ist' means someone.	EX (o) Grammatical
	Yeah, like this (biologist)	EX (o) Grammatical
…many potential love affairs	…but I think because they talk lover, it must be adjective	EX (o) Contextual
	So maybe adjective something	EX (o) Grammatical
mellifluous hello	Because I know that this is something to say hello	EX (o) Contextual
	An adjective because here, here, here, here.	EX (o) Grammatical
	What's the important things is the hello is important thing of the sexual interest.	EX (o)
…whereas a clipped, low…hi	And this is something you just say happy.	EX (x) Contextual
Bobbing, tilting, gazing, swaying	I don't know all of the words but I know – those pairs continue to talk and to touch – that all of them is a kind of touch	EX (x) Grammatical

EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
(o): Correct inferences
(x): Incorrect inferences

It is important to note at this time, that although the above tables provide isolated accounts of each of the think aloud categories, Bluepig did intermix metacomments, paraphrases and explanations to process different words and images in the article. The following examples are typical of her reading performance and provide a clearer picture of

her reading behaviour than might otherwise be constructed through isolated examples of selected inferences.

Table 8
Inferences Typifying Bluepig's Reading Performance

Original Text	Student's Statement	Statement Category
Anthropologist	I don't know	MC (x)
	I know maybe scientist is.	AS (o)
	I'm not quite sure.	MC (x)
	I don't think it is important because someone job and someone is keeps job, keeps this.	EXP (o)
	'ist' means someone	EXP (o)
	Yeah, like this (points to biologist)	EXP (o)
Accoutrements	Something for example, maybe have expensive pants or something?	PA (o)
	Because clothes and other accoutrements.	EXP (o)
	I think maybe for example he will have excessive ties or maybe he has expensive shoes.	EXP (o)

PA: Paraphrase (Restatements of the text)
AS: Associations (Information from background knowledge)
EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
MC: Metacomments
(o): Correct inferences
(x): Incorrect inferences

The above examples suggest that background information and contextual clues play an important role in her understanding of the text. Although she was not sure of what accoutrements were, she was able to extrapolate the meaning from the context. The suffix 'ist' provided her with the clue that allowed her to connect it to a specific word family and while she was not sure of its exact meaning, she was able to obtain a general understanding of its meaning.

Associations

Surprisingly, only three associations were made directly from the text. One, which is shown above, is associated with 'anthropologist', the second refers to the sentence that states, "David Givens, an anthropologist, and Timothy Perper, a biologist, think so", and the third association was made about escalation point, "but I know point". There may have been other associations made but they were not expressed in the think alouds and thus were not recorded. However, the few clues that were provided and her overall use of contextual and grammatical clues do indicate that background knowledge drawn from many different areas of learning had an impact on how she understood the text.

Glossary Use

Bluepig accessed seventy-three glosses (Table 1), however, only thirty-one inferences were made about them during the session.

Definitions

Four inferences were made either during or after Bluepig accessed the definitions, all of which were paraphrases and were correct. While the numbers are too low to make any generalizations, they do indicate that the definitions that were created based on the context of the text were beneficial in helping her to understand the items. As one can see from the examples below, she did not simply reiterate the definitions, but made an attempt to change them into her own words.

Table 9
Bluepig's Paraphrases Made from Textual Definitions

Original Text	**Original Definition**	**Student's Paraphrase**
...demarche	strategies, manouevers, steps that the man has taken to attract a woman	Like a game?
...surmounted	to overcome or manage to complete something very difficult	To overcome? To overcome something very hard?
...body synchrony	something that occurs at the same time as something else, in this case the couple's body movements become the same and happen at almost the same time.	So it means the couple do something at same time, the same thing at the same time?
...grooming talk	conversation that is used to give a certain impression about the speaker and make the other person feel comfortable - like brushing someone's hair to relax them and give them your attention	Not only talking, uses some talk (special talk)

Pictures

Paraphrases and Explanations

Paraphrases and explanations were also the most prevalent think aloud categories employed after Bluepig accessed images from the glossary (Table 4). While the number of inferences was relatively low (only twenty in total), almost an equal number of correct and incorrect paraphrases were made after she referred to the pictorial formats (six and five respectively). Four of those that were correct were verbs depicted through images and out of the five that were incorrect, only two were verbs (Table 10).

Table 10

Correct and Incorrect Paraphrases made from the Pictorial Glosses

Original Text	**Correct Paraphrases**	**Original Text**	**Incorrect Paraphrases**
...mellifluous hello	so very happy?	retreat	retract?
...flinches	means take back	extinguish	machine?
...bobbing	(demonstrated the motion)	body synchrony	they use all of body language, no?
...gazing	look at with interest	align	-to look at each other -I can understand that they look at each other.
...desynchronize	I'm not sure but for me, the first part language is same way, same time and then they move in a different way, at the same time		
... begin to move in tandem	They look like they drink at the same time again		

All of the above paraphrases, excluding the image for 'extinguish' were videos and the paraphrases that originated from them were all interpretations of the actions that she saw depicted in them. This suggests that this form of imagery had a positive impact on her understanding of the text.

Pictorial explanations were, for the most part made while Bluepig was viewing the images. Six out of the eight explanations made were correct (Table 4) and while the number of inferences is low compared to those made directly from the text (eight to fourteen), her overall success rate is slightly higher, standing at 75% as opposed to 71% for those made while reading. Each one was an attempt to interpret what was occurring in the video or the reasons behind the actions that she saw. For example:

Retreats behind her palms: Ohhh, okay, when someone nervous or happy or shy.

Withdraw: and also I know this one, flinches because I saw picture right, and then I know what he did.

So if he withdraw it mean maybe never touch again or something.

Or ignore this one maybe she will from... the whole picture I think.

What is obvious in the above examples is that three of the explanations are derived from one word (withdraw). However, this one item does provide insight as to how Bluepig connected and organized the information from this and previous videos, which suggests that images designed specifically for the intended text and created in a culturally authentic context can enhance comprehension not only of a selected item but also of the section of the text in which it is embedded. It is also indicative of her ability and desire to test her own understanding of the item.

While Bluepig accessed the glossary more than once for twenty-one different words, only seven inferences were made (including the 'after accessing both picture and definition separately' and 'after accessing all three glosses' categories) with the most prevalent think aloud category again being paraphrases (six in total). Four of the six paraphrases were correct and the remaining two were made during her attempt to understand the word 'perceptual' which is the adjective preceeding 'onslaught'.

Bluepig: "They know to something?
"You don't want to upset something?"

She did however, understand 'onslaught' to mean 'fight' after referring to both the textual and pictorial definitions and may have based her interpretation of the meaning of 'perceptual' on the noun.

Associations

Only five associations were made during the session, placing it third in the think aloud categories that she used. Two were made while she was reading the text and three after she accessed the pictures in the glossary. The statements ranged from a clear response such as "I know" for the word 'risky' to a more complex remark as to why the interpretation of the gazing action as a sign of sexual interest proved to be problematic for her. She states "maybe a cultural problem or something, but if I look at everything, what she talk about. And maybe one group of people talk over there, what you talk about, I think I will have big problem, make mistake". Loosely interpreted, she is stating that gazing may be a cultural problem for her for when she gazes about a room or bar she is in fact interested in everything, including what people are talking about and is not necessarily attempting to transmit a signal of sexual interest.

If the low number of inferences made from the textual glosses (four) are excluded from the overall evaluation of Bluepig's inference success rate, then it can be suggested that on a percentage basis, she was far more successful in understanding unknown lexical items by accessing the pictorial glosses than she was in using contextual and grammatical clues taken directly from the text (75% as opposed to a 63% accuracy rate). However, one must bear in mind that there were more opportunities for error because of the greater number of inferences made while reading the text than there was from those made from using images in the glossary.

Metacomments

Bluepig produced a total of fifty-two metacomments, twenty-four of which were derived from both the text and pictorial glosses (Table 11). There were fourteen positive metacomments made directly from the article and only eleven from the picture glosses suggesting that she had difficulties ascertaining the intended meanings of select images. A closer examination of which pictures posed the greatest problems indicates that the majority were those that were used for nouns or adjectives. While many of the verbs could be depicted through video clips, other parts of speech, such as nouns, adjectives, and adverbs, could not be presented in any other way than through still images. Similar findings were found in the paraphrases that Bluepig made after accessing the picture glosses. Examples of these metacomments are presented below in Table 12.

Table 11
Total Number of Positive Verses Negative Metacomments Made by Bluepig
(Including those made about the text)

Text		**Definitions**		**Pictures**		**Definition + Picture**		**General Comments About Glosses**		**Total**	
Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
15	9	3	-	11	13	-	-	1	-	30	22
Totals 24		3		24		0		1		52	

Table 12

Examples of Metacomments made by Bluepig

Gloss Type	Positive Metacomments	Negative Metacomments
Textual (made directly from the article)	Mellifluous: So I don't look, I can know.	Swaying: I'm not quite sure of this one.
	General statement: I don't know all of the words but I think I can get main idea.	Employ the entire arm: I don't understand.
		Escalation point: I don't know escalation but I know point.
Pictures (Made from the pictorial glosses)	To employ the entire arm: I think that I can understand now.	Courting Episode: The picture doesn't make sense.
	Courting cues: Yeah, it makes sense, it is very interesting.	Extinguisher: If I saw the picture first I would think it is a fire extinguisher.
	Eons Ago: Got it.	Demarche: - Is the image confuse - I would think about the game but I won't think about strategies.

Overall, the number of positive and negative metacomments made about the glosses alone was almost evenly balanced (15 positive, 13 negative) (Table 11). This division can be attributed to the ease in which action words could be translated into and understood through video, verses the

difficulties inherent in understanding selected verbs, nouns, and adjectives depicted through still images.

Two comments were made about the importance of adjectives in a text but were not included into the metacomment category as they did not relate directly to this text. They do however, provide an insight as to why in this case, Bluepig decided to forgo consulting the glossary to help her understand adjectives which she did not know.

"If you have time limit, I will give up some adjectives because sometimes you say something is beautiful but you don't need to know beautiful right? Something is important than the beautiful so that means I won't know what that means."

Summary Results

Bluepig took approximately one hour to write a summary that was one hundred and twenty-four words long. Her accumulated score based on the checklist created by the instructors at Uvic and the researcher was eleven out of a possible total of forty, which suggests that she did not in fact understand the text according to the specifications outlined by the researcher. She did not correctly identify the main idea of the article, writing that it was "Body language show lots of meanings" but was successful in identifying four of the five stages of the singles bar courtship, although she did not elaborate on them other than to write that "they know each other more do something similar at same time". Three of the items that she looked-up in the glossary were paraphrased in her summary. These include grooming talk (talk), body synchrony (keeping time, doing something similar at same time), and mellifluous hello (there are many kinds of ways to say hello). She also included that "they show their feeling by not only language but also using body language". Interestingly enough, she also expanded on the text by adding her own interpretations as to how the

individuals would feel and what might happen. "Sometime they feel shy but will open their heart again. The last, they feel more relax and happy after they know the other well."

Richness of the Retelling

Bluepig scored a one on Irwin and Mitchell's (1983) retelling scale. While the above interpretation implies that she did generalize beyond the text, it was not possible to score her any higher than a one in this category for the generalization was simple and focused on emotions which were not the key points identified in this article. She provided no thesis statement and although she included major points, she did not provide any supporting details. She was completely lacking in supplementations and although the text was coherent in that one could understand what she wrote, it was incomplete (Table 13).

The analysis of the summary was surprising given that Bluepig was quite confident that she understood what she had read in the article. There are of course difficulties in writing in a second language, but even so, the results were unexpected. The final oral interview did however, shed light on the situation.

Table 13
Richness of Retelling

Criteria for establishing criteria	**Level**				
	5	4	3	2	1
Generalizes Beyond Text					X
Thesis Summarizing Statement					X
Major Points				X	
Supporting Details					X
Supplementations					X
Coherence					X
Completeness					X
Comprehensibility					X

Final Oral Interview

The final interview with Bluepig validated much of the data collected from the on-line tracker and from the summary and also provided some insight as to why her summary was not as strong as was expected by both the researcher and the volunteer. During the interview she claimed that images not only proved to be the most useful for overall comprehension but also aided her in recalling the main and supporting ideas of the article. While she confessed that she found reading to be boring, she stated that the text presented in this format was interesting, particularly because of the images which she felt gave a TV quality to the article. The images, voices, and action added a dimension to the text that made it easier for her to "read and understand it". Still images on the other hand may confuse her more than help her. "No voice, no sound, no action, so maybe when I see picture, for example we just did, I see o.k. It's machine no actually it's a action". This information prompted the question as to what grammatical categories should be glossed using images. She responded that verbs and nouns are the most important lexical items and they should be glossed. Adjectives and adverbs are not that necessary and thus need not be included in the glossary as they do not carry the meaning of the text.

She claimed that she does not usually remember everything that she reads, only the important words, which again she identified as being nouns and verbs. Bluepig was adamant that testing should be based on one's comprehension of the text and not on the vocabulary in it. This assertion is further supported in her claim that she understood "almost all of the story but only some of the vocabulary". It is therefore not important for her to understand every word that she reads.

She was asked what clues she uses within a given text to help her understand it and she claimed that "grammar is important as it helps her decide if she wants or needs to know

a particular word or idea". The context also aids in the understanding of the meaning of other words and when neither of these two are constructive tools in generating any understanding, she guesses.

When asked for suggestions as to how it might be possible for her academic teachers to make it easier to use the computer for the purpose of academic reading she suggested using articles that contained pictures and sound. She emphasized the use of cartoons, particularly animated characters. Bluepig also added that the most important contribution that teachers could make in their bid to help her improve her academic reading was to provide interesting topics. When asked how her instructors could determine what would be the most interesting subjects to read about, she replied, "They could ask us".

Overall, she enjoyed reading the text on-line and found that the only difficulty that she had with it was that the scroll bar did not return back to its original position in the text after she consulted the glossary. She informed the researcher that she prefers to read on-line as it is interesting and the Internet and computer-generated texts offer her a variety of ways to learn English. This session did change how she felt about reading on-line in that she "likes it more" than she did before she partook in this study.

Overview

Information collected from the questionnaires and the tracker suggests that in Bluepig's case, images were the preferred glossing format in her quest to comprehend the text and to identify main and supporting ideas. Images, videos in particular, offered a television appeal for the pictures combined with the voices and actions helped her to understand the text. Unfortunately, the low scores that she received for both her summary and richness of its retelling do not support her positive review of the pictorial glosses for they did not appear to have enhanced her retelling of the article. One might surmise that her poor standing is attributable to having spent only fifty-five minutes reading the text, her fundamental belief that it is only necessary to have a general understanding of what she reads as she does not feel that it is important to understand every word, and the fact that she is writing in a second language. Suprisingly, she reported that writing was her strongest skill. It should also be noted that it is difficult if not almost impossible for even an English speaker to read an article, internalize it and then rewrite it within a two hour span.

One pattern did emerge from the think alouds and the tracker data. Bluepig accessed the glossary more than once for twenty-one different words and with only one exception (at the beginning of the session), the first glossing format was pictorial. Otherwise, each successive referral involved an image followed immediately by a definition. Although only six paraphrases were made based on this dual activity, four were correct suggesting that images and a complete textual definition do promote understanding.

It does appear that Bluepig's exposure to this text has made a minimal impact on her perceptions about reading, what she reads., but not necessarily how she reads. Firstly, it has increased her interest in using the computer to read academic texts, particularly those that offer multimedia components such as video clips, sound, and animated images to explain

selected words or ideas. As she stated earlier, images help to make texts that might otherwise be boring more interesting so what she reads may very well change according to how it is presented. Rather than skimming through an article simply to get an overview of what it is about, Bluepig may invest more time into it to get a deeper and more meaningful understanding of it.

During this session, she took the least amount of time of all of the participants to read the article and write the summary (Table 73). While it is not known if this is her typical behaviour or if she was simply in a rush to complete the session, it is possible that she may spend more time reading a text that is glossed, particularly since the glossary is so accessible. The ease in which a word could be explained may help to change some of her existing reading patterns.

Session Two Alles Gute

Alles Gute is a Korean woman between 25-28 years of age. Her native language is Korean and English is her second international language. She began studying German prior to beginning her English studies. She has been studying English since high school and has had two to three years of English at the university level as well as one semester in the ELPI program at the University of Victoria. She has been studying English in Canada in the hope that it will lead to career opportunities with international companies in Korea.

When asked what her strengths and weaknesses are in English, she responded that her writing and reading skills were stronger than her listening and speaking skills. As reported in the first student's profile, much of the focus of Alles Gutes English language instruction was text based and thus she believes that her oral and aural skills did not develop concurrently with her reading and writing skills.

While not a frequent reader, reading only one to two times a week in English, she concentrates on information texts in both her native language and in English. Her difficulties in comprehending the texts that she is reading arise from a lack of background knowledge of the subject.

Alles Gute never consults a dictionary while reading, preferring to guess from the context. She uses one only as a last resort when her overall comprehension of a section is impeded by a complete lack of understanding of a particularly important lexical item. She commented that dictionaries disturb her flow of reading and that she does not enjoy using them. However, she does on occasion look up words while reading on the Internet.

She is an avid computer user who accesses the Internet five to six times a week to read the news, search for school-related information, and email family and friends. While she enjoys reading on the Internet she finds it a little more difficult than reading from a book as

concentrating on the screen for any extended period of time (over one hour) bothers her eyes.

Observations made while Alles Gute was reading

Alles Gutes read the complete text twice prior to accessing any of the glosses. She requested to be uninterrupted so that she could focus on the text and get a general idea as to what the article was about. It was during her third reading that she first accessed any of the glosses. When questioned as to how reading it for a third time was helping her to understand it, she replied, "I am organizing how to summarize." She frequently paused on words that she did not understand, reread the sentence in which they were in and then continued to move through the text. Only once did she return to a word that she did not initially comprehend. She did not take notes while she read, nor did she relax between readings.

Tracker Data

Data collected from the tracker supports her earlier statement that she never consults a dictionary while reading and that she relies on guessing through the context to understand difficult words or expressions. As is shown in Table 14 below, Alles Gute spent a total of three hours reading the text and of this time, only two minutes and twenty-five seconds were spent accessing the glossary. She looked up a total of sixteen items; however, there were five words for which she consulted the glossary twice, thus excluding repetitive look-ups, the total number of words that she looked up was only eleven. Nouns accounted for 55% of this total, with verbs and adjectives each accounting for 18% and adverbs 9% (Table 15).

Although she claimed to be a visual and textual learner, she resorted to her text based reading style of guessing through the context and accessed only three Picture + Definition glosses. However, the number of glosses accessed was evenly distributed in that eight definitions and eight pictures (including Definition + Picture) were used during her reading of the text (Table 14). It should be noted that she consulted the definition + picture gloss for 'singsongy tones' twice, which suggests that she had difficulties understanding it the first time.

Table 14
Data Collected from On-line Tracker
Tabulation of Time Spent on Task and Number and Types of Glosses Accessed by Alles Gute

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Picture + Definition Glosses
3 hours	135 sec. 2 min. 25 sec.	16	8	5	3

Table 15
Number and Grammatical Categories of words Looked Up Alles Gute

Number of Words Looked Up (without repetitions)	Nouns	Verbs	Adjectives	Adverbs
11	6	2	2	1

Think Alouds

Alles Gute was very quiet during the think aloud session and had to be prompted to provide any feedback. Only fifteen inferences were made during the reading, fourteen of which originated directly from the text, which again substantiates her earlier claim about comprehending what she reads through contextual clues (Table 16).

Text Drawn Inferences

As is shown in Table 17, ten of the fourteen inferences that originated directly from the text were paraphrases (71% of the total) and of these, nine were correct. Explanations accounted for two, inferences and associations for only one. She also made one prediction and was only one of two participants involved in the study to do so.

Paraphrases

Four of her paraphrases were derived from 'Body Talk', which was not glossed and is the title of the article. As is shown in Table 17, she was correct in three out of her four attempts. 'Intention cue' and 'blade of grass' were the only other paraphrases made about a specific item, for the remaining paraphrases encapsulated main ideas found in the article. For example:

> Shari: Are you looking for the main idea in each section?
> Alles: Because in the first part, they mention about a man who take pictures secretly.
> How people and how interrupt somebody, when they do, how they behaviour.

Her only association verified that she had knowledge of the word 'desynchronizing', which she understood because she knew what 'synchronize' meant.

Table 16

Number of Inferences Made and Types of Glosses Used By Alles Gute During Reading and After Accessing Glosses (Trabasso and Magliano, 1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	After Accessing Two Kinds of Glosses	After Accessing All three Glosses	Total Number of Inferences Per Category
Paraphrase	10	1					11
Association	1						1
Explanation	2						2
Prediction	1						1
Total Number of Inferences	14	1					15

Table 17

Number of Correct (0) and Incorrect (X) Inferences Made During the Think Aloud Protocols

Think Aloud Categories	During Reading (Text)		Definition		Picture		Picture + Definition		After Accessing Both Picture and Definition Separately		After Accessing All Three Glosses	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	9	1	1	-	-	-	-	-	-	-	-	-
Association	-	1	-	-	-	-	-	-	-	-	-	-
Explanation	2		-	-	-	-	-	-	-	-	-	-
Prediction		1	-	-	-	-	-	-	-	-	-	-
Total Number of Correct and Incorrect Inferences	11	3	1	-	-	-	-	-	-	-	-	-
Total Number of Inferences	14		1		-		-		-		-	

Table 18
Examples of Paraphrases Made Directly from the Text

Original Text	**Correct Paraphrases**	**Original Text**	**Incorrect Paraphrases**
Body Talk	How they behaviour to get attention to the opposite sex. They categorize in five step and then first how to get attention from somebody and then how to let someone recognize it and then talk. How to talk.	Body Talk	How do people behaviour before they help service from the opposite sex.
Intention Cues	Something the way to express or show something.	Blade of grass	Maybe the, it's a kind of touch.

Alles made only one inference from a gloss and that was a simple reiteration of the definition for 'synchronize'.

Metacomments

Although she made relatively few comments about the glosses, those that were made indicate the importance she places on having a general understanding of what she is reading as opposed to a more in-depth comprehension of it. As is indicated in the brief dialogue below and in Table 19, Alles was overtly focused on general meanings and how best she could achieve them.

Shari:	How are you trying to understand this? You said that you didn't understand parts of it. What are you doing to try and understand what you don't understand?
Alles Gute:	I am looking for what the answer is in this paragraph.
Shari:	The human skin is like a blade of grass. Do you understand what that is telling you?
Alles Gute:	Maybe the, it's a kind of touch.
Shari:	It is important to know do you think?
Alles Gute:	Not important because I have to find more general idea and I think it's a kind of example. So it's okay to understand general idea. I don't need to have many details.

At no time during the session did she make a specific reference to any of the glosses, even though she made a total of 28 metacomments (Table 20), fifty-four percent of which were positive. As her comments were general, it was difficult to separate the positive from the negative remarks, however the majority of the latter were metacomments made about not understanding main ideas and having difficulties understanding the text. Only one statement was made about a word that she did not understand (intriguing). Her general statements did, however provide some insight as to how she chose to understand the article and explained why even after three hours of reading the text she obtained a low score on her retelling of the article.

Table 19

Examples of Metacomments made by Alles Gute

Gloss Type	**Positive Metacomments**	**Negative Metacomments**
Textual (made directly from the article)	I understand just the general idea.	Now I am confused because if I see the title Body Talk, it could show how important body language is.
	Although I don't know exactly, I think it doesn't matter to summarize this article.	Intriguing: This word is not clear to me
	I am looking for what the answer is in this paragraph.	
Definition	I think if I take a real test, the time is limited so I have to understand more quickly so definition is more clear for me.	
Pictures (Made from the pictorial glosses)	It is easier to get picture.	
	Picture is more comfortable.	

Table 20

Total Number Positive Verses Negative Metacomments Made by Alles Gute
(Including those made on the text)

Text		**Definitions**		**Pictures**		**Definition + Picture**		**General Comments About Glosses**		**Total**	
Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
9	12	-	-	-	-	-	-	6	1	15	13
Totals 21		0		0		0		4		28	

Summary Results

Alles wrote her summary in approximately fifteen minutes. It was one hundred and twenty-eight words long and included, for the most part, only the main ideas of the article. As such, her accumulated score for her retelling based on the teacher-generated checklist was only 13.75. She successfully identified all four of the stages involved in the flirting process and received partial marks (1.25) for her reiteration of the concluding remarks: "However, although this behavior is not definitely true to all people, it is quite universal". She did recall four supporting ideas, "a German man took pictures of women, flirting and he found they have the same behavior", "young people are different from older people", "two men searched how men and women flirt to each other in a bar", however did not draw upon any of the glosses to do so. One might surmise however, that her recall of Eibl-Eibesfeldt, the German ethnologist, may have been the result of her interest in and ability to speak German. Two key words from the article were included in her retelling (flirt/flirting, universal), but she had not consulted the glossary for either of them. Three un-glossed words were included in her summary, 'signal', 'keeping time', and 'older', however only 'keeping time' was presented in the same context and way as it was originally written in the article. As can be seen in the examples of her paraphrases of the text (Table 21), Alles quite successfully generalized the main ideas and did draw upon several key points in the article. The glosses, however, do not appear to have played a role in her retelling of the text.

Overall, however, her retelling was very general and lacked the supporting details needed to achieve a higher score.

Table 21

Paraphrased Words/Ideas from the Text Included in Alles Gute's Final Summary

Original Text	Written Paraphrases	Glossing Format Used During Reading
…Irenaus Eibl-Eibesfeldt, a German ethnologist, noticed a curious pattern…used a camera with a secret lens..taking pictures to the side….	A German man took pictures of women, flirting,	Directly from text
…a universal pattern of female flirting emerged.	…he found they have the same behaviour	Directly from text
…both scientists have spent several hundred hours in American cocktail lounges watching men and women pick each other up	Two men searched how men and women flirt to each other in a bar	Directly from the text
…I shall divide them into five	…they organized in five steps	Directly from the text
The first is the "attention-getting" phase.	First they try to get attention to the opposite sex	Directly from the text
Older men use different props…	Young people are different from older people	Directly from the text
…but all of these signals can be reduced to one basic, three-part message…	…they use a certain signal to let them recognize	Directly from text
…there is a great deal of secondary evidence to suggest that at least some of these patterns are universal to humankind.	However, although this behavior is not definitely true to all people, it is quite universal.	Directly from the text

Richness of the Retelling

Alles Gutes achieved a richness score of 2.5 on Irwin and Mitchell's (1985) retelling scale. Although she successfully identified the key points in the article, they were too general to award her a five in that category, but they were strong enough to justify a score of four. Her next highest marks were in the coherence and comprehension categories. Her use of sequential markers (first, second, next, fourth, and the last) did provide an organizational base to her summary and enhanced its overall comprehensibility. Her basic sentence and grammatical structures were sound and did not impede the reader's understanding of what she had written but were not strong enough to provide the reader with a clear sense as to the specific points she was trying to make. Thus she was awarded a 3.5 in both of these categories (Table 22).

Having failed to include additional supporting details that might have augmented the retelling of her story and providing only a very general outline of the article, she was awarded only a 3 in the category for completeness. Additionally, her thesis summarizing statement was vague and did not accurately define what the article was about and thus she was also given a low score for this category. Her retelling was completely lacking in supplementations, did not include generalizations beyond the text, and was weak in supporting details and she achieved a level one in each of these areas. Alles Gute did however, provide an excellent overview of what the article was about and had she taken more time to write her summary, she may very well have included more details. However, given her emphasis on obtaining the general gist of the article, it is not difficult to understand why her retelling was as general as it was. It is believed that she did in fact understand more of the article than her score suggests that she did.

Table 22
Richness of Retelling

Criteria for establishing criteria	**Level**				
	5	4	3	2	1
Generalizes Beyond Text					X
Thesis Summarizing Statement			X		
Major Points		X			
Supporting Details					X
Supplementations					X
Coherence		X			
Completeness			X		
Comprehensibility		X			

Final Oral Interview

Alles Gute's responses to the final oral interview questions validated much of the data collected through observations, the on-line tracker, and free recall summary. She is text-dependent , preferring to understand what she reads through context or by using textual definitions. As indicated earlier in this study, she does not believe in reading for details, preferring instead to understand the general idea of the text. When asked by the researcher how she completely understands what she reads, she responded, "First I think it is the most important to make sure what the main idea. Sometimes I don't know, although I read many times what the main idea is, but I have to find what the main idea is". She was then asked if the details are important to her and she answered, "Not too much. I generally. Sometimes if I read the last paragraph, it helps me summarize. Usually at the end of the context, they usually tell us the opposite opinion, using however."

During the interview, she professed to have used English definitions more than other glosses to understand the text and found them to be the most useful of the few that she accessed in helping her to understand it and to recall its main and supporting ideas for her free recall summary. They were, however, only minutely effective for she later admitted that she understood the article by guessing from the context. The glosses did not assist her in organizing her retelling or in remembering any vocabulary from the text. She informed the researcher that how and what she recalled was more a product of how interesting the sentences were than how effective the glosses were. The images, she claimed, did not help her in any way with the text and any of the glosses that she did access interfered with her reading speed. She added that only if she did not understand a textual definition would she use an image. If this were an actual test, she would have to read quickly and thus the definition would be faster and clearer for her to use than a picture would be. If she was not

being timed, then she might first access the picture then the definition and then return to the textual gloss, but only if the image was not clear to her.

She recommended that only verbs be glossed using situational examples that provide her with a base as to how to use it in the real world. "Although I know the meaning clear, I couldn't make a sentence properly using the word. It's better to give me some situations they make me understand". She reaffirmed that she did not enjoy using images as she found them to be confusing. If pictures were to be used as glosses in future articles, she suggested using cartoons as she finds them to be easy to concentrate on even though they carry cultural content that she may not be familiar with.

She claimed to have understood 65-70% of the article and 70% of the vocabulary. There were several words that she did not look up as she did not believe that they were important and simply added too many details for her to understand and remember. There were also items that she had been exposed to and had forgotten but did not feel inclined to look them up again.

Her instructors have taught her how to read for main and supporting ideas and thus she is very comfortable in doing so, but not on a computer. She would instead, prefer to read from a text because it is easier to read and to underline important points. Alles Gute admitted that she didn't really enjoy reading on the computer but that it did change how she felt about it. "Yeah, I felt pressure because if I read newspapers on the Internet, I can glance what is happening, but when I read this one, I have to continue to think if I finish with this, I have to summarize." She claimed that even if she were not required to write a summary, she would find reading on the computer to be stressful. However, if she were provided with a print-bound text and asked to read it and then write a summary, she would be more relaxed because she could underline items as she progressed through the text. She would

also be able to take notes while she was reading, have more time to think about what the main idea was, and then read it again to look for the supporting details. She would read the article several times more if it were print-bound.

She was asked how it might be possible to make it easier for her to use the computer for the purposes of reading and Alles Gute suggested creating a program that allowed her to highlight important words and for those items to remain highlighted so that she could either look them up or use them to summarize what she was reading, without having to reread the text to locate them. This would negate the need to read the text three times, as is her existing standard procedure. Additionally, the examples could remain beside the words that they were defining for easy reference. She noted that when she was first learning to read in English, she was taught to underline important ideas and it has become an important part of her reading practices.

Instructors should only use the computer for academic reading if the students are familiar and comfortable with it. This session, she claimed, was difficult and she was uncomfortable using the program because she was not accustomed to using a MacIntosh computer, but she assured the researcher that with practice it would become easier for her.

Overview

The tracker data indicates that Alles Gute most frequently referred to textual definitions to help her comprehend the text. However, as has been shown throughout this report, the glosses did not play an important role in her understanding of it as she prefers to use the context of the sentence or paragraph that the unknown item is in to determine its meaning.

Although the number of think-alouds was low, they do confirm her dislike of using glosses and stress her preference for textual clues to help her decipher what she is reading. Her summary and her final interview support comments made during the think-alouds that it is only necessary to have a general understanding of the text.

Overall, this experience of reading on-line changed her perception of what reading from a computer entailed for prior to this session, she had only skimmed and scanned for information from on-line newspapers and other selected sites for school and for personal reasons. She found that having to read from the computer and give a detailed account of what she had read was stressful and the experience did in fact confirm her preference for print-bound books for academic studies. Given the opportunity to highlight on the computer as she does from a book, would however change what and how she reads on-line.

Session Three Muse

Muse is a Chinese student, between 18-20 of age. Her native language is Chinese and English is her only second language. She studied English for over five years during high school, for a half a year at the university level, and for an unspecified amount of time at a language school in China and Vancouver, B.C. She is aspiring to continue her post-secondary education at an English university.

She purports that her writing (including grammar) and speaking skills are stronger than her listening and reading abilities. When reading in English, she focuses on informative texts but finds them difficult to understand because of the content specific vocabulary. However, only occasionally does she refer to a dictionary while reading because it disrupts her concentration and she finds the definitions to be too short to be of any use. She claims to read for pleasure three to five times a week; however she did not identify any other kind of texts other than those associated with information.

Muse believes that she is a visual learner and is very comfortable using a computer, having had three years experience on-line and using a word processor. She admits however, that the English keyboard does create some difficulties for her, as she has not yet become accustomed to it. She uses her home computer everyday to email friends and family and collect information for school. She also uses it as a source of entertainment and to read the news. Her instructor assigns exercises on the computer or Internet approximately once or twice a week. This includes information gathering and word processing. She claims that there are no differences between reading on the computer as opposed to reading from a print bound text and as in the case of reading from a book, she occasionally looks up words while she is on the computer.

Observations made while she was reading

Muse read aloud as she moved her way through the article and used the mouse to assist her in keeping her place on the screen. She initially accessed only the image and then definition glosses but eventually included the third glossing format, definition + picture. On only four occasions when all three glossing formats were available did she access the definition glosses first. Unlike the first two participants, Muse did not read the text in full prior to accessing the glossary, but referred to it as soon as she began to read the article. She did not however, rely on it as a means to understand unknown vocabulary items but instead guessed the meaning of the words and used the glossary as a method to confirm her interpretations. Particularly notable was her almost consistent use of either picture or the definition + picture glosses prior to textual ones. Unlike the first two participants she did not reread the text once she completed it but went directly to writing her summary of the article.

Tracker Data

Muse spent a total of two hours and sixteen minutes reading the article and accessing the glosses. Only fourteen minutes of that time period was used to refer to the glossary, which supports her earlier statement that she only occasionally consults a dictionary. Including repetitive look ups, her total number of referrals was fifty-nine, twenty-seven of which were textual definitions, eighteen were picture glosses, and fourteen were from the picture + definition glossary (Table 23). While these numbers suggest that she was more dependent upon textual definitions than on images, thus refuting her earlier admission of being a visual learner, the reverse appears to be true when one examines the number of words that she looked up more than once and the order in which the glosses were accessed. Muse referred

to the glossary more than once for eighteen items and in all but three cases, she selected either picture or definition + picture glosses prior to accessing the textual definitions (Table 24). This suggests that her preference was image based, but that either the visuals were not clear in their meaning or that she was confirming her interpretation of them, as was noted in the above observation of her reading behaviour. She later confirmed that both of these hypotheses were correct.

Her total number of look ups excluding repeats was only thirty-five, with nouns and verbs accounting for approximately 71% of the total number of words accessed (Table 25).

Table 23

Data Collected from On-line Tracker
Tabulation of Time Spent on Task and Number and Types of Glosses Accessed By Muse

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Picture + Definition Glosses
2 hrs. 16 min.	852 sec. 14.2 min.	59	27	18	14

Table 24
Number of Words and Gloss Types of Items Looked Up More than Once by Muse

Number of Words Looked Up More than Once	Definition Glossary	Picture Glossary	Definition + Picture Glossary
18	3	11	4

Table 25
Number and Grammatical Categories of Words Looked Up by Muse

Number of Words Looked Up (not including repeats)	Nouns	Verbs	Adjectives	Adverbs
35	14	11	8	2

Think Alouds

Muse was very comfortable speaking aloud during the entire session, although it was necessary at times to prompt her with questions to ascertain what she was thinking when she hesitated while reading the article. She made a relatively low number of inferences (seventy-three), the majority of which (fifty-two or 74%) occurred while she was reading the article (Table 26). Only twenty-one inferences originated from the glossary, sixteen of which originated from picture glosses. Two inferences were made after she accessed an image and then a definition gloss for each.

Text-drawn inferences

The greatest proportion of inferences made during Muse's reading of the article was in the form of paraphrases and explanations. Twenty-eight paraphrases and sixteen explanations were made directly from the text with an accuracy rate in each category being thirty-two and fifty percent (Table 27). Although only slightly lower in number, all nine of her associations were correct. When compared to the total number of inferences made in each of these think-aloud categories, her accuracy rate was twenty-three, thirty-two, and ninety percent respectively.

Table 26

Number of Inferences and Types of Glosses Used By Muse During Reading and After Accessing the Glosses
Trabasso and Magliano's (1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	After Accessing Two Kinds of Glosses	After Accessing All three Glosses	Total Number of Inferences Per Category
Paraphrase	28	1	7	2	1	-	39
Association	9	-	1	-	-	-	10
Explanation	16	-	8	-	1	-	25
Prediction	-	-	-	-	-	-	-
Total Number of Inferences	53	1	16	2	2	-	74

Table 27

Number of Correct (0) and Incorrect (X) Inferences Made During Think Alouds as an Indication of Comprehension

Think Aloud Categories	**During Reading (Text)**		**Definition**		**Picture**		**Picture + Definition**		**After Accessing Both Picture and Definition Separately**		**After Accessing All Three Glosses**	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	9	19	1	-	3	4	2	-	1	-	-	-
Association	9	-	-	-	1	-	-	-	-	-	-	-
Explanation	8	8	-	-	4	4	-	-	1	-	-	-
Prediction	-	-	-	-	-	-	-	-	-	-	-	-
Total Number of Correct and Incorrect Inferences	26	27	1	-	8	8	2	-	2	-	-	-
Total Number of Inferences	53		1		16		2		2		-	

Paraphrases

As is indicated in Table 27, Muse was not very successful in paraphrasing items from the text being correct in only nine out of her nineteen recorded paraphrases. Although few in number, there were occasions in which it was possible to identify how she determined the meanings of selected items. For example, her paraphrases of 'staged', 'singsongy', and 'single's bar' indicate that she drew from her knowledge of prefixes and base words to help her to understand their meanings (Table 28). She correctly pointed out that the 'un' in front of 'stage' indicated that it was not a platform and thus was able to identify that the action meant the opposite of 'staged', unrehearsed actions. Muse was also able to break down 'singsongy' and 'single's bar' to identify key words that in turn helped her to interpret their meanings, however in the case of 'single's bar', her interpretation was incorrect.

Other paraphrases could not be as readily explained, however, her occasional intermixing of explanations and/or associations with her paraphrases provided some insight as to how she determined the meaning of these items. She did, for the most part, use contextual and grammatical clues to help her understand them.. Shown below in Table 29 are some examples.

Table 28
Examples of Correct and Incorrect Paraphrases Made Directly from the Text

Original Text	**Correct Paraphrases**	**Original Text**	**Incorrect Paraphrases**
Staged	I see this (points to 'un'), it's not platform. It means a normal like living life.	Flirting	…but I think it is a little crazy and not very very pay attention to herself.
Pitch and roll	I think it's like this. (demonstrates)	Cocktail lounges	Maybe just pay attention or spend a lot of time in café.
Single's bar	I know it's not no lover of somebody have no lover. (referring to 'single')	Single's Bar	The things that grown persons together have some class.
Singsongy	Like sing song, like that, very musical… I think it's a little like a mom talk with her baby.	Extinguish	Like to light the match, no?

Table 29
Examples of Inference Intermixing from the Text by Muse During Reading

Original Text	Student's Statement	Statement Category
Hearty laughter	I know laughter.	EX (o)
	I don't think it's important because I think the next sentence is to explain this one.	EX (o)
	It may be a more formal word because this (points to next sentence), you understand the explanation.	EX (o)
Mellifluous	It's just some gentle and high pitched.	PA (o)
	I think maybe it's to describing sentence so it's not necessary.	EX (o)
Grooming talk/idle	So it's the same grooming talk and idle.	PA (x)
	Because you have a 'which' and the which sometimes in the structure and grammar to describe the same, describe this one.	EX (x)
Climax	So special circumstances so maybe one of them climax.	PA (x)
	...at first I saw insignificant	EX (x)
Exhibits	Exotic	PA (x)
	...It means show?	PA (o)
	I know exhibition, like museum.	EX (x)

PA: Paraphrase (Restatements of the text)
AS: Associations (Information from background knowledge)
EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
(o): Correct inferences
(x): Incorrect inferences

Explanations

The explanations provided by Muse indicate that contextual clues played an important role in her interpretation of the article and of unknown items within it (Table 30). Her success rate was low at thirty-six percent and while fewer in number she was more accurate using grammatical indicators than in using context to assist her in her understanding of the article.

Table 30

Think-Aloud Category: Explanations Made During Reading
Total Number of Correct and Incorrect Inferences According to Grammatical and Contextual Categories

Total Number of Explanations	Based on Grammatical Inferences		Based on Contextual Inferences	
16	O	X	O	X
	4	1	4	7
	5		11	
Percentages	80	20	36	64

Examples of these inferences are shown below in Table 31. In two of the examples, Muse reported that understanding the items was not important for other words or ideas were either more relevant than the words that she had been questioned about or were the ones that carried the information of what she needed to understand. The examples provided suggest that many of her decisions were made based on grammatical clues such as what part of speech the word belonged to as well as whether it reappeared in the text.

Table 31
Examples of Grammatical and Contextual Explanations

Original Text	Student's Statement	Explanation
Cocktail lounges	I think we have a word and a verb and only and adjective describes the word of some other noun.	EX (x) Grammatical
	...meaning not necessary we can feel the whole article and understand.	EX (x) Contextual
Employed in hearty laughter	...I don't think it's important because I think the next sentence is to explain this one.	EX (o) Contextual
	...because this (points to next sentence), you understand the explanation.	EX (o) Contextual
Grooming talk/idle	...because you have a 'which' and the 'which' sometimes in the structure and grammar to describe the same, describe this one.	EX (x) Grammatical
Intonation	...but I don't think it's very important because at the end we have inflection.	EX (x) Contextual
Insignificant	I know because 'in'.	EX (x) Grammatical

EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
(o): Correct inferences
(x): Incorrect inferences

Associations

The data suggests that Muse was very successful in using associations to further her understanding of selected words and ideas from the article. However, four of her nine inferences were simple acknowledgements of having been exposed to the word or idea before. The remaining five were drawn from real life situations that she was already familiar with. For example, in the case of 'pitch and roll' she stated that she understood the meaning because she could visualize the shoulder movement and also because of how men in her country behave in a bar. Although few inferences were made, it would appear that Muse did use background knowledge in her comprehension of the article.

Glossary Use

Muse made twenty-one inferences from the fifty-nine glosses that she accessed, sixteen of which were drawn from images, two were made after she accessed the definition + picture glossary, and one originated from a definition (Table 27). Two inferences were made after she consulted a picture followed by a textual definition.

Pictures

Explanations

Explanations and paraphrases constituted the largest number of glossary-based inferences made by Muse while she read the article (Table 27). Her accuracy rate was low with only fifty and forty-three percent correct in these categories respectively. These were derived from images. As was discussed earlier, these low scores can be attributed to her misunderstanding of the pictures (hence the high number of textual definitions accessed) as well as her inability to draw any connections between the text and what the images were

portraying. For example, in the case of 'risky', a still image that portrayed a mouse wearing a helmet attempting to take cheese from a mousetrap, she surmised that the word was a noun that described how the mouse would get the cheese. It may have been that as the image was not context specific, it was difficult for her to extrapolate any meaning from it.

Unfortunately, her explanations did not provide any clear insight as to how she came to her conclusions about her understanding of the images and her responses seem to suggest that she may have, on occasion, been making simple guesses as to their meanings. Examples of her explanations are shown below in Table 32. It should be noted that six out of her eight image-based explanations originated from video clips, four of which were correct and of the two still images accessed, one was correctly explained. Her successful video-based explanations included three verbs and one noun. She was unsuccessful in explaining one verb and one noun that were illustrated using the video formatting. She also had difficulties in understanding one noun and one adjective that were depicted using still images. While low in number, her explanations do suggest that the videos were more successful in helping her understand action words than they were for other parts of speech.

Table 32
Examples of Correct and Incorrect Explanations from the Pictorial Glosses

Original Text	**Correct Explanation**	**Original Text**	**Incorrect Explanation**
Inflection (video)	I think first one is just like a statement	Inflection (video clip)	Ah maybe has some other meaning, it's a kind of relation.
		Flinches (video clip)	It's because he can realize a shame of some others people.

Paraphrases

Similarly, her paraphrases originating from the images were also brief but do provide evidence as to the success or lack thereof in conveying their intended meanings (Table 33). What does become apparent in the incorrect paraphrases shown below is that in all four cases, the images that were misinterpreted were all video clips, two of which were nouns and one an adjective. This again supports the argument that Muse was far more successful in identifying verbs illustrated with video clips than she was in understanding those that depicted other parts of speech.

Table 33
Examples of Correct and Incorrect Paraphrases from the Pictorial Glosses

Original Text	Correct Paraphrase	Original Text	Incorrect Paraphrase
Demarche (still image)	Is that way to play this game and we must do the process, one step another?	Inflection (video clip)	With more emotion.
	So it's like a chess game?	Clipped (video clip)	Similar to gentle, very soft.
		Body synchrony (video clip)	This means the relationship between the two guys have more closer
		Withdraw (video clip)	This one is like is going ignore.

Metacomments

Muse produced a total of thirty-one metacomments, including fourteen from the text, fourteen picture glosses, two definition + pictures, and one textual definition (Table 34.). Her metacomments ranged from a simple confirmation of understanding or an indication of confusion to a brief comment as to why she did or did not comprehend the text or glosses.

Several examples are provided below (Table 35). Overall, there were eight positive metacomments , five of these were made about the glosses she accessed and three originated from the text. As few comments were made during the reading, it is difficult to infer that any one glossing format was more problematic than another based on numbers. However, her feedback does suggest that the textual segment in the definition + picture gloss caused some confusion and that the pictures did not successfully convey their intended meanings to Muse. Similar images and the same characters were used in the live portrayal of 'flirting sequence', 'flirting', and 'body synchrony', which caused some confusion as to their meanings. A total of only three video clips and two still images were the catalyst of the negative metacomments made about the picture glosses and thus it is not possible to concretely determine from the metacomments alone, which of the two formats she found to be the most problematic in her understanding of these glossed items. It should be noted that more than one negative comment was made about two of the videos.

Table 34
Total Number Positive Verses Negative Metacomments
(Including those made on the text)

Text		**Definitions**		**Pictures**		**Definition + Picture**		**General Comments About Glosses**		**Total**	
Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
3	11	1	-	4	10	-	2	-	-	8	23
Totals 14		1		14		2		0		31	

Table 35

Examples of Metacomments made by Muse

Gloss Type	**Positive Metacomments**	**Negative Metacomments**
Textual (made directly from the article)	As if stirring mud: So I think I know that.	…as if stirring mud: I don't know stir.
	Demarche: I think it's very easy to understand because this article this kind of article it's very easy to make a guess at that time.	Unstaged facial expressions: I know this word but I don't know together what this means.
Pictures (Made from the pictorial glosses)	Perceptual onslaught: INTERESTING!	Perceptual: I don't know.
	…numerous flirting sequences: It's like a painting!	Flirting: Because the picture looks these two guys, their behaviour is not so very clear.
Definition + Picture		Intonation: Definition is so quickly.

Summary Results

Muse hand-wrote a one hundred and eighty-five word summary in approximately forty minutes. Her low score of 12.5 can be attributed to an absence of supporting ideas for throughout the majority of her retelling, she provided only one or two supporting details for each section. Additionally, her main ideas were too general to receive full marks and in one case (recognition), she did not identify the stage correctly, having labelled it as "aims", which is "finished by connected with each other's eye-light". Her introductory statement did not correctly encompass the main idea of the article and her use of generalizations to encompass several ideas found in the text, resulted in a weak retelling. For example, she identified the actions carried out by men in a bar when attracting attention as "meaningless activity". The supporting details concerning how they dress using expensive clothing, jewellery, and other accoutrements were described as "some older men dress themselves, which make themselves look like successful." She summarized the supporting ideas regarding the third stage, Talk, as "meanlingless but this is a very important step". Had the task been to provide a general overview of the article, she would have received a higher mark.

Although she consulted the glossary for thirty-five words, only nine of those items were paraphrased in her summary (Table 36). What is notable is that in each case, excluding 'withdraw', 'gaze', and 'repel' she used a combination of textual and pictorial glosses and in each case, the images were in video format. This suggests that the video clips were more effective than were still images in helping her to comprehend and recall the items, but some caution should be exercised in making such a judgment for as indicated earlier in the study, the number of videos and stills images are not proportionate to each other and there is a greater likelihood that she would access more videos than stills.

Table 36
Examples of Paraphrased Words from the Glossary Included in Muse's Final Summary

Original Text	Written Paraphrases	Glossing Format Used During Reading
…opens her eyes wide to gaze at him.	…connected with each other's eyelight.	Definition + Picture
Grooming talk	One of them will be ice-breaker	Picture Definition
This idle and meaningless conversation…	Actually, most conversation is meanlingless.	Definition (idle)
…grazing her hand along her suit's body…	…it is possible they will touch each other gently	Definition Picture
If he flinches, the pickup is over…	…somebody will refuse…	Definition Picture
If he withdraws, even barely, the sender may never try to touch again.	…or escape to stop the whole process.	Picture
repel	refuse	Definition
Body synchrony	…the fourth step, they will keep time…to do same thing in the same time.	Definition + Picture Definition
…but after awhile the man and woman begin to move in tandem.	They begin to effect each other.	Definition + Picture

Note: '____' denotes glossed word from the text.

Muse also included six un-glossed items from the text (Table 37). Three were taken directly from the text and of these only one (socially available body parts) was used as it was presented in the article. The remaining three words were paraphrased. The results of her summary suggest that the glosses did play a role in helping her to understand and recall the text, however, given the infrequency of references that could be linked to gloss use, it would appear that many of her ideas for her retelling emerged directly from the text.

Table 37

Paraphrased Items from the Text Included in Muse's Final Summary

Original Text	Written Paraphrases
...American single's bar courtship	The study shows: in single-bar, people...
...a universal pattern of female flirting emerged.	...male or female, how nearly the same bar behaviour...
Typically establish a territory – a seat..	...suitable place to stand
Older men often use different props...expensive jewelry, clothing, and other accoutrements that spell success.	Some older men may dress themselves, which make themselves look like successful
...or some other socially available body part.	And just very social available body parts.
The icebreakers are as varied as the human imagination.	One of them will be ice-breaker.

Richness of the Retelling

Muse's final written summary scored a 2.4 on Irwin and Mitchell's Retelling Scale (Table 38). Her thesis summarizing statement and major points were broad in scope and did result in a retelling built upon more generalizations than supporting ideas. However, she did include the main ideas in the order in which they were written in the article and included transitional sequencing (first, second, third, fourth, at the end), which established a clear

organizations structure to the retelling. While her sentence structure was not exact, it did not interfere with the reader's ability to understand it. She thus achieved a 3.5 for her major points, coherence, and comprehensibility. She did not elaborate beyond the text, provide many supporting details, nor did she offer any supplementations and as a result received low scores in these categories. Her retelling was complete in that in the way that it was told and the ideas that it included did support each other.

Table 38

Richness of Retelling

Criteria for establishing criteria	Level				
	5	4	3	2	1
Generalizes Beyond Text					X
Thesis Summarizing Statement			X		
Major Points		X			
Supporting Details			X		
Supplementations					X
Coherence		X			
Completeness			X		
Comprehensibility		X			

Final Oral Interview

Muse professed to have understood a great deal of the article but only some of the vocabulary. While vocabulary may be an important component in learning a language, she believes that when reading, it is possible to ascertain the meaning of select items from the context in which they are found, from grammatical clues, and through common knowledge. She claims for example that if one knows that the word in question is an adjective, than

knowing its exact meaning is not important. It is only necessary to have a general gist of what it means. This may explain many of the generalizations found in her summary as she reads to have a general understanding of the text.

She found the article to be interesting and was very comfortable using the program, aside from having to scroll back to where she had been prior to accessing the glossary. She believed that she accessed the images more often than the definitions (which was not the case) and claimed that for overall comprehension of the article, she preferred to first access the image glossary and then the separate textual definition for the same items. The images, she claimed, helped her to remember and understand the article. The definitions + image glosses were not as effective for it was difficult for her to look at the two occurring simultaneously.

> "Some of this ones is too quickly. Because it's difficult enough to see at same time. But I think in this one the definition is always on the picture and it covers the picture. And when I look at the definition and the picture is gone. What is the picture?"

She suggested having the video clip in a separate side window and the definitions and still in another window.

The definition followed by the image glossary was also the most helpful of the three formats in her recall of the supporting ideas and her organization of the free recall summary. It was the video clips however, that she found to be the most useful in helping her to comprehend the text. She did stipulate, however, "not all the new vocabulary it is better. Only some of them for example you know that movie the man and woman finish drink at the same time, it's not very exact." She recommended that cartoons be used in the glossary.

Muse: Cartoons I think would be better because some are very activity. It's better than real scene.
Shari: So if we had animation character...
Muse: Yeah. What is attract about the common life, I think video is better but sometimes cartoons.
Shari: So you like the video or otherwise a cartoon, animated cartoon.
Muse: Yeah, you can get cartoons like from a newspaper.

Overall, she found the program to be very useful in helping her understand the text and enjoyed reading on-line because of the ease of copying and pasting information, the savings accrued in not having to purchase print bound texts, and the enjoyment of being in fashion. However, for the purposes of academic reading, she prefers print bound texts "because it's a traditional way to read...sometimes if I read I can make some (shows flipping pages) and here is the content that we want, but with an e-book, I must pick, pick, pick to find the, that chapter I want." There were some contradictions in her responses however, for when asked if she were given four articles to read with an option to read on or off-line, she admitted to preferring computerized texts, particularly in the sciences where images play an important role in conveying meaning. She also recommended that nouns and verbs carrying the main ideas of the text be glossed to enhance overall comprehension.

It is her belief that instructors should use more multimedia technology to help students with their academic reading as it is the trend of the future and that such programs simplify searching for meanings of unknown words because they provide immediate access to context specific definitions. Reading via the computer provides access to information from the Internet, which she attests to being 'very popular' today.

She was questioned as to whether her reading style or what she reads changes depending on whether she is using a book or a computer and she affirmed that if the task required of her were the same in both mediums, that her style would remain the same. She would take notes on paper and include new vocabulary and ideas, highlighting the topic sentence, main

ideas and relevant vocabulary. She did not elaborate as to how she selected which items were important.

Overview

The data collected during Muse's session indicates that images and definitions were not only the glosses most frequently referred to but were also the most useful in helping her to comprehend the text. She claimed that using one immediately after the other was an effective way of confirming the new vocabulary and to clarify any possible misinterpretations of the images.

The pattern that emerged from her look up behaviour shows that where all three glossing formats were available, in all but three cases Muse's first selection was either an image or a definition + picture gloss. Although her summary does not include verbatim any of the items that she did access, her overall generalization of the main ideas and the organizational structure of her retelling suggest that they did play a role in her understanding of the article. Her positive feedback on the glossary supports this claim.

Muse's exposure to the program has not really altered her perceptions of reading on the computer or how or what she reads. She prefers using the computer because of its ease of use, speed, and 'fashion'.

Session Four Taka

Taka is a Japanese woman who is between the ages of 25-28. English is the only foreign language that she speaks. She studied it for three to five years in high school and prior to her arrival in Canada, she resided in Australia for two years attending a language school for the most part of her stay. She aspires to attend an English university as a full time commerce student.

She believes that her reading and listening skills are stronger than her writing and speaking abilities. She typically reads information texts in English but for pleasure, prefers to read novels in both English and her native language. She reads for pleasure only 1-2 times a week, having very little time to do so given her school schedule. She claims that she finds novels the most difficult books to read in English because of the vocabulary and as a result, she frequently consults a print-bound dictionary while she reads. She finds it to be laborious as it is time consuming, but finds it difficult to skip words whose meanings she does not comprehend. Adjectives, in particular, prove to be the most problematic for her.

She professes to be a visual learner and is only a little comfortable in using a computer having had only a moderate amount of experience using one. As she is now studying in Canada, she most frequently uses a computer 3-4 times a week to access her email and to search for information for school. Her instructor assigns computer-based exercises once or twice a week and while researching for information for class and word processing, she occasionally looks up words using either a print-bound or on-line dictionary. She also accesses on-line sites for entertainment purposes and to read the news, particularly news from her home country.

Observations made while Taka was reading.

While Taka was reading the article, she hand wrote approximately two and a half pages of brief notes about the glossed items that she accessed as well as a simple outline of what each of the stages were in the flirting behaviour discussed in the text. She also read aloud for the most part of the session and practiced pronouncing new vocabulary items. When confused as to how to say them, she consulted the researcher to assist her with her pronunciation.

She had a very methodological reading pattern that remained consistent throughout the session. She first left the mouse pointer on items that she was having difficulty understanding and proceeded to read through to the end of the paragraph in an attempt to determine their meanings. When this strategy proved unsuccessful, she then referred to the glossary, using the definition glosses frequently followed by an image gloss. She then reread the sentence before continuing on. Once she finished the article, she did not return to the beginning to reread through it.

Tracker Data

Taka completed reading the article in approximately two hours. During that time she accessed the glossary one hundred and ninety-seven times (Table 39). Approximately fifty-five percent of the total glosses consulted were textual definitions, thirty-five were pictorial, and the remaining ten percent were definition + picture glosses.

Sixty-three items were looked up more than once and in forty-nine of these cases, the first gloss that she consulted was a definition. She accessed textual definitions followed immediately by images for forty-five of these words (Table 40). Twenty-two items were looked up three or more times using both definitions and images and of these, seventeen followed the distinctive glossing pattern of an image gloss sandwiched between two textual

definitions. Her reliance on the glossary confirms her earlier profession of being a frequent dictionary user.

Excluding repeats, she looked up ninety-six words, which included forty-four nouns, thirty-two verbs, seventeen adjectives, and three adverbs (Table 41).

Table 39
Data Collected from On-line Tracker
Tabulation of Time on Task and Number and Types of Glosses Accessed by Taka

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Picture + Definition Glosses
2 hours	2820 sec. 47 minutes	197	108	70	19

Table 40
Glossing Formats Used in Multiple Look Ups of the Same Items

Number of Multiple Look Ups	Number of Multiple Look Ups Beginning with Definition Glosses	Number of Multiple Look Ups – Definitions Followed by Images	Number of Items Looked Up Using Three or More Glossing Formats	Number of Multiple Look Ups Definition, Image, Definition
63	49	45	22	17

Table 41
Number and Grammatical Categories of Words Looked up by Taka

Number of Words Looked Up (without repeats	Nouns	Verbs	Adjectives	Adverbs
96	44	32	17	3

Think Alouds

Taka provided few inferences, having made only twenty-eight in total. Thirteen of these were made directly from the text, ten from the picture glossary, three from definition + picture glosses and one after accessing a textual definition. There was one additional category and that was the inclusion of one inference made after separately consulting a definition and image for the same item (Table 42). Text drawn inferences comprised 46% of the total, with paraphrases being the dominate think aloud category during reading as well as after accessing the definition + picture glossary. Fifty percent of all inferences made after consulting picture glosses were also paraphrases

Text Drawn Inferences

Paraphrases, Explanations, and Associations

Taka's paraphrases from the text were very brief and as only one association and two explanations were made during the reading, it was difficult to ascertain how she came to the conclusions that she did. It could be surmised from the table below (Tables 43 and 44) that those items that she correctly identified were words that she was already familiar with. Her incorrect paraphrases do provide more of an insight as to what clues she used to determine the meanings of unknown words. 'Tend to' appears to have been derived from an understanding of the word 'intend' and she associated the word 'clipped' with hair, suggesting a background knowledge of one use of the word

Table 42

Number of Inferences and Types of Glosses Used by Taka During Reading and After Accessing Glosses
Trabasso and Magliano (1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	Definition and Picture looked at separately	After Accessing All three Glosses	Total Number of Inferences Per Category
Paraphrase	10		6	3			19
Association	1						1
Explanation	2	1	5		1		9
Prediction							
Total Number of Inferences	13	1	11	3	1		29

Table 43
Number of Correct (0) and Incorrect (X) Inferences Made During Think Alouds

Think Aloud Categories	**During Reading (Text)**		**Definition**		**Picture**		**Picture + Definition**		**After Accessing Both Picture and Definition Separately**		**After Accessing All Three Glosses**	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	3	7			4	2			2	1		
Association	1											
Explanation	2			1	3	2			1			
Total Right/Wrong for each section	6	7	0	1	7	4	0	0	3	1		
Total Number of Inferences Per Text/gloss	13		1		11		0		4		0	

Table 44
Correct and Incorrect Paraphrases Made During the Reading

Original Text	Correct Paraphrases	Original Text	Incorrect Paraphrases
To lean	Like this. (shows the action)	Men tend to…	…like to intend to?
Resting one's arm towards the others.	So this position. (shows the action)	Pitch and roll their shoulders.	Kind of stretch.
Climax	The highest.	…whereas a clipped, low…	To cut hair.
		Inflection	…intonation changed right?

Her two explanations (courting cues and potential), both of which were correct, were contextually based. As is indicated in the brief discussion below, she used information presented earlier in the text to help her with the two items.

Courting Cues:

Shari: Do you understand courting cues.
Taka: Including all of the – the same as before, sequential flirting cues.

Potential:

Taka: Same meaning as prospective.

Her only association was derived from an un-glossed item, 'signals', and was a simple acknowledgement of having understood the word. As few inferences were made, it is difficult to determine how much of a role association played in the conclusions that she made about items that she interpreted directly from the text.

Glossary Use Paraphrases and Explanations

Taka accessed the glossary one hundred and ninety-seven times but made only sixteen inferences about the glossed items (Table 42). Eleven were made after she consulted the picture glossary, four after accessing both a picture and definition separately, and one was made after looking up an item using a textual definition. The most prevalent think aloud categories were paraphrases and explanations, both of which originated from pictorial glosses. Four of her pictorial paraphrases and three of her image-based explanations were correct (Table 43). Shown below are examples of some of these image-based paraphrases.

Table 45
Examples of Correct and Incorrect Paraphrases from the Pictorial Glosses

Original Text	Correct Paraphrase	Original Text	Incorrect Paraphrase
Singsongy (video clip)	His voice is singsongy tones?	Elaborate (video clip)	Over-gesture
Bobbing (video clip)	His head moves	Bobbing (video clip)	Agree with somebody
Intangible (Still image)	So invisible?		

It was not apparent from her responses as to what glossing format was the most effective in relaying the meaning for the different parts of speech. Three of the four correct paraphrases originated from video clips, two of which were nouns and the third was a verb. One adjective, 'intangible' was presented in a still cartoon. Both of her incorrect paraphrases were videos, one a noun and the other a verb.

Taka had to be prompted to give explanations as to how she understood the images. It is not clear whether these prompts did in fact direct her to the appropriate interpretation of the video clips from which all of her explanations originated.

Example One

Bobbing

Shari: He's not agreeing, he's just talking right? How is he moving his head?
Taka: Just a little, small.

Example Two

Inflection

Taka: That one is inflection (after looking at the video)
Shari: Do you know the difference between the two? In the first one, what is she saying? Is she serious? (referring to the video that shows how the inflection changes to show interest)
Taka: Not so, atmosphere is more dark.
Shari: The second one"
Taka: Is more like including kidding, is more serious?

Example Three

Clipped

Shari: Is it a verb, a noun, an adjective?
Taka: An adjective?

As in her image-based paraphrases, Taka's explanations did not reveal whether the videos were more effective in illustrating one grammatical feature over another. Overall, her pictorial paraphrases and explanations did not provide many interpretable findings.

Metacomments

A total of fourteen metacomments were made during the reading session and of these only two originated from the text. Eight were made after accessing pictorial glosses, four from definition + pictures, and two came directly from the text (Table 46). Overall, 75% of the gloss-derived statements were negative, indicating that for those that Taka made responses about, she had difficulties comprehending what the images were conveying. As is shown in Table 47, there were four nouns and two verbs whose meanings she did not understand and of those, one noun was illustrated using a still image and the remaining items were presented in video format. Three of the four positive image-based metacomments originated from video clips and only one from a still image. This suggests that for Taka, verbs and nouns were best understood through a video format, albeit caution should be exercised in making generalizations from such a small sample. Additionally, Taka's responses to the definition + picture glosses indicate that the combination of textual definitions with videos was confusing. As is shown in the examples of her metacomments (Table 47), she found that was too much movement occurring simultaneously.

Table 46

Total Number of Positive and Negative Metacomments Made by Taka
(Including those made about the text)

Text		Definitions		Pictures		Definition + Picture		Total	
Pos.	**Neg.**	**Pos.**	**Neg.**	**Pos.**	**Neg.**	**Pos.**	**Neg.**	**Pos.**	**Neg.**
1	1	0	0	3	5	1	3	5	9
Totals 2		0		8		4		14	

Table 47
Examples of Metacomments Derived from the Glosses

Metacomment Type	Original Text	Positive Metacomments	Original Text	Negative Metacomments
Pictorial	Extinguish (still image)	It makes sense.	Best leads (video)	I can't hear, he speaks too quickly.
	Intonation (video clip)	Yeah, Yeah	Prospective mate (still image)	I don't understand.
	Perfunctory (video clip)	Yeah, Yeah		
			Idiosyncracies (still image)	Doesn't work well.
			Suitor (still image)	It's not really clear.
			Desychronize (video clip)	Not clear.
Definition Plus Picture	Etches into (video clip)	AH, THAT KIND OF ACTION!	Etches into (video clip)	The definition plus picture is sometimes confusing.
			Withdraw (video clip)	Definition and picture is coming at the same time.
				I cannot concentrate which one I should concentrate.

Summary Results

Taka handwrote her two hundred and thirty word summary in approximately one hour. Her accumulated score based on the teacher-generated checklist, was low (14.75). It was not however, truly indicative of her understanding of the article. She did in fact provide a few supporting details, although they originated from the glosses and not the text and paraphrased ten glossed vocabulary items from the article (Table 48). What is most notable about the inclusion of these words is that in every case, excluding 'universal' and 'smoothes his hair, she smoothes hers' where only an image was used, she accessed both a definition and an image gloss in video format to help her comprehend the items. The paraphrases themselves included actions that she saw occurring in the videos. For example, in her retelling of 'territory', she wrote that "a man or woman take a seat in a bar or nightclub, and he or she looks around people who are in bar or nightclub". The video depicts two people entering a bar, looking for a place to stand or sit, and then choosing their 'territory' for the evening. Similarly, in her paraphrasing of 'in tandem' she provided the example of the couple drinking beer at the same time that occurs in the video clip, but is not included in the textual definition. She did not use any synonyms or expressions found in any of the definition glosses.

Table 48

Paraphrased Words from the Glossary Included in Taka's Final Summary

Original Text	Written Paraphrases	Glossing Format Used During Reading
Universal Pattern	People so same things.	Still Image
	Beahviour are also universal.	
Territory	Taking territory.	Definition Video Clip
	…a man or woman take a seat in a or nightclub…	
Place to lean	He or she action something by himself or herself.	Definition Video Clip
Lean	…such as leaning her or his arm on the table.	Definition Video Clip
Mellifluous	…their voice is usually high, soft…	Definition Video Clip
Singsongy	…singsongy tone.	Definition Video Clip
Graze	He or she touches the person's hand, shoulder or army softly, but it's not long time, only a moment.	Definition Video Clip
In tandem	…he or she act something same as the person. They drink a glass of beer at the same time….	Definition Video Clip
	…they hold a glass at the same time.	
Smooth her hair	…they smooth their hair at the same time.	Video Clip
Body Synchrony	Their action synchronate like theirself in mirror.	Definition Video Clip

Although she took 2 ½ pages of notes during the session, only three items that appeared in her summary were clearly identifiable as having originated from them. These included 'grazing', 'mellifluous', and 'desynchronize'. While this suggests that the videos were effective in helping her to understand the text and ideas in it, it is not clear as to how her notes contributed to this understanding and whether they helped her recall the text and organize her retelling of it. Taka did include a general outline of all stages of the flirting

process in her notes, but only successfully identified three (talk, touch, and keeping time) in her summary. Additionally, she confused the order in which two of the main ideas occurred in the text, even though she had them correctly written down in her notes. Although she initially identified the final stage as 'some actions' it is believed that it was a typing error for she correctly paraphrased it later in her retelling as well as provided examples of it. Even though there is no conclusive evidence that note-taking facilitated comprehension or recall, it is possible that it contributed to it. The question lies as to whether she would have understood and recalled less if she had not taken any notes at all.

The main reason that her marks were low was because she did not correctly identify all of the main ideas in the article in the order in which they occurred (including the conclusion) and because the supporting ideas that she presented were not those identified on the checklist as being important. Overall however, it was well organized and it did indicate a good understanding of the article. Her results suggest that the checklist used to evaluate the retelling may have been too detailed for such a testing process.

Richness of the Retelling

Taka was awarded a mark of 2.8 on Irwin and Mitchell's (1985) retelling scale. Although her checklist summary score was low, her incorporation of supplementary ideas retrieved from the video clips into her summary (as discussed above) and the coherent and structured organization of her retelling, added to its overall richness (Table 49). For example, she sequenced the main stages in the article by using "In the first stage...in second stage... in third stage... at that time... in fourth stage... in fifth stage... in conclusion". She did incorrectly place one action, "attracting attention, act something by himself or herself such as leaning her or his arm on the table" as being in the second stage of the flirting process, but was otherwise correct in her organization of information. She was awarded a 4 and not a 5 in each of these categories because the transitions between actions were weak within each stage and were simple in nature. Overall, her writing was both comprehensible and coherent.

Taka received a 2.5 for her thesis summarizing statement, major points, supporting details, and completeness and only a 1 for generalizations made beyond the text. She did include a summarizing statement but it did not clearly and definitively encapsulate the main idea of the article. She included only three of the six major points but did include some supporting details, most of which originated from the video clips. As they were few in number, it was difficult to score her any higher for these ideas. This absence of details, lack of generalizations made beyond the text, and a weak conclusion resulted in a low completeness score (Table 49).

Table 49
Richness of Retelling

Criteria for establishing criteria	Level				
	5	4	3	2	1
Generalizes Beyond Text					X
Thesis Summarizing Statement			X		
Major Points			X		
Supporting Details			X		
Supplementations		X			
Coherence		X			
Completeness			X		
Comprehensibility		X			

Final Oral Interview

Taka's responses to the final interview questions support earlier interpretations of the data collected through observations, the on-line tracker and free recall summary. She attested to having read sentences two or three times as well as continuing on to the end of paragraphs to help her identify the meanings of unknown words. If this strategy proved unsuccessful, she then used a combination of definitions and images to help her understand the items. She confirmed that for overall comprehension of the text, it was this mix of text and pictures that she used the most frequently and while they also helped her to comprehend the article and organize and recall the main and supporting ideas in her free recall summary, it was the images that were the most instrumental in helping her to understand and retell it.

Shari: How do you remember what the article is about? How do you manage to understand it and remember it?
Taka: Just image.
Shari: Images in your head?
Taka: No because I pick the new vocabulary in image and definition so the vocabulary and the image is connected in my mind. I don't know I can recognize the vocabulary in which stages, the attention stage. I think just image.

Her interplay between definitions and images recorded by the tracker and her use of video images in her summary support these claims.

When asked what kind of images she would use to illustrate other on-line or computer-generated texts, she responded that she would use videos to gloss verbs and adjectives. Otherwise, textual definitions could be used to explain "root words, words that are similar."

Taka professed to have understood 60% of the article and vocabulary found in it, even though she accessed the glossary for every word that she could not comprehend. She did not find that the glosses interfered with her reading pace for she regularly consults a text-

bound dictionary and rereads sentences and paragraphs after doing so when she is reading from a book. Normally, however, she reads the text in its entirety first and then proceeds with the aforementioned look up pattern. She did find, however, that the computer glosses were more convenient than searching for definitions in a print dictionary and thus found the glosses very useful in helping her to understand the article. The only difficulty that she had with the program was that she had to use the scroll bar to return back to her location on the screen after she had consulted the glossary.

If she were to be tested on a text that she had to read, Taka claimed that she would rather read it on-line, providing that she had access to a glossary similar to the one used in this program. However, if she were required to read for an extended period of time, it would be easier for her to read from a print-bound text, for using a computer for long periods of time 'tires her eyes'. It is also easier to take a book home and read it at her leisure as opposed to having to remain at school in the computer lab where there are time constraints. Overall, however, she believes that if she had access to programs similar to the one used in this experiment, she would read more and use the computer more often than she currently does. Teachers, she claims, should use more multimedia technology to help students with their academic reading and rather than simply assigning work to be done, they should give students the opportunity to select topics that they are interested in.

Taka was also asked whether she normally takes notes or underlines important ideas or vocabulary in books or articles that she is reading. She claimed that she regularly underlines new vocabulary, refers to a dictionary, and then writes down the item along with its definition. She does not highlight main or supporting ideas, instead remembers the article by connecting images with vocabulary after rereading the section or text several times.

> "When I read in my own language, when I read the sentence I can image the situation, but in English I cannot image. It's difficult to image, imagine. I don't know why it happens. It's difficult to imagine. Maybe one is English is not first language and I don't have much vocabulary so I cannot connect the sentences in English, that's why I cannot imagine quickly. So I read many times. And then ahhh, maybe like this and image. Image is very important to me."

Overview

Information collected from the on-line tracker indicate that Taka referred most frequently to textual definitions to assist her in understanding the article; however, given that there was only a ten percent difference between textual and pictorial gloss use, it is possible to claim that she referred to both to help her with her comprehension of the text. She also reported that both were instrumental in assisting her during the reading tasks and in understanding the text but emphasized that images, particularly videos, helped her the most in understanding, remembering and connecting ideas found in the text.

There were patterns that emerged between her look up behaviour and her comprehension as indicated more so by her written summary and final interview than by her think alouds. Examples of actions taken from several separate video clips accessed during the reading session were included in her retelling suggesting that videos played an important role in her comprehension and recall of the article. She also stated during the final interview that images helped her to understand, organize and recall the text.

As indicated in her final oral interview, her exposure to this program has changed how she feels about reading. If she had access to textual and pictorial on-line glosses, she would be more interested in reading than she presently is. Observations made during the reading session and information obtained from her tracked on-line behaviour, and final oral interview suggests that there were differences between how she read on the computer and

how she typically reads from a book. As reported in the final interview, she typically reads the entire article and then rereads it, stopping to look up unknown words, and then rereading the sentence or paragraph that they were in. During this session, she did reread sentences and paragraphs, but only after accessing the glossary. Once she finished the article, she did not read it again, which as she claims, is her typical reading style.

Session Five Apple

Apple is a UAPC student at the University of Victoria and is hoping to one day attend an English university as a regular full-time student. She is Japanese and is between the ages of 21-24. English is her only international language and she has been studying it since high school and has had more than five years of university English. She also studied English in a conversation school in Japan. She has had little exposure to the language outside of her home country, having vacationed in an English country for only a brief period of time.

Apple claimed that writing and reading were her strongest skills, even though it became quite apparent during the experiment that she was as proficient, if not even more so in her aural and oral abilities than she was in her print-based skills.

She reads mostly for pleasure in both her native language and in English, reading romance novels and travel and beauty magazines in Japanese, and only beauty magazines in English. She claims to have difficulty comprehending science texts because of a lack of knowledge in the area and problems with science-specific vocabulary. She is however, an infrequent reader not only of information texts, but also of English books in general, reading on average, only one to two times a week. Although she claimed that vocabulary inhibits her ability to understand what she is reading, she infrequently refers to a dictionary while reading. Apple claims that dictionaries, particularly electronic ones, do not usually provide her with the appropriate word for the context in which it is needed. Additionally, she has difficulty returning to her place in an article after consulting a dictionary and thus it is easier for her to guess at what the meaning of the word is or to simply skip it than to look up its meaning.

Apple believes that she is a visual and textual learner and is most comfortable learning in an environment in which information is presented in both formats. She has had limited exposure to computers, only having access to one here in Canada. Although she uses the computer five to six times a week to email family and friends and to search for school related information, she is uncomfortable stepping beyond these boundaries because of her lack of experience and knowledge about computer programs and how they operate. Her classroom instructor has not given any computer-based exercises to the class. She also claimed that it is more difficult to concentrate on what she is reading on the computer because of the light that radiates from the screen.

Observations made while reading

Apple initially skimmed quickly through the text prior to accessing any of the glosses. During her second reading, she slowly progressed through the first three paragraphs and then returned back to the beginning of the article to look up vocabulary items that she did not understand. She typically read to the end of each sentence in an attempt to determine the meanings of unknown words through context or through grammatical associations.

Occasionally, she would complete the entire paragraph and return back to those items that she could not understand, refer to the glossary and then reread only the sentence that the word or words were in. She confirmed that she did indeed use this strategy during the reading to help her understand the item(s).

Shari:	You looked up repel and it looked like you read it all first and then you went back and clicked on some of the words.
Apple:	Yes, my habit.
Shari:	And then after you clicked on the word did you read the sentence again that the word was in…?
Apple:	Yes.

She also admitted that she did reread sentences because she hadn't been paying attention to what she had been reading. Other times she did not return to the sentence that the glossed item was in because it was a word that she was familiar with but had forgotten it.

Shari:	So here you clicked on intangible and idiosyncracies and then repel. Did you reread the sentences once you understood the meaning of the words?
Apple:	Yes. I think I am reading and sometimes I just didn't, don't read.
Shari:	So you look it up and then don't look at it.
Apple:	No, don't look.
Shari:	And then other times you do reread it.
Apple:	Mmmhh.
Shari:	How come you make the difference, what's the difference?
Apple:	If I am clearly understand and if I know before and I just forget now and I look up and I found it, it's very easy to understand a lot if don't look up again.
Shari:	You mean you don't read the sentence again?
Apple:	Yes

She informed the researcher that she rarely reads aloud and so found the think aloud protocol a very difficult and rather uncomfortable task. It was necessary to prompt her several times during the reading to uncover what it was that she was doing for unlike the other participants she did not use the mouse to guide her throughout the entire article, so it was often difficult to decipher where she was in the text until she referred to the glossary.

Overall, Apple did not appear to be nervous or uncomfortable while reading and was able to navigate very easily through the program and stopped on occasion to take notes.

Tracker Data

Information from the tracker data indicates that Apple was more inclined to determine the meaning of unknown vocabulary items through contextual and grammatical associations. As is shown in Table 50, she spent a total of two hours and fourteen minutes reading the text and only 8.75 minutes of that time was used in accessing and reading the glosses provided in the on-line glossary. The total number accessed while reading the text

was sixty, including twenty-nine definitions, seven pictures and twenty-four definitions + pictures (Table 51). There was almost an equal division between the number of definitions and images that were used during the session (twenty-nine to thirty-one when the picture and picture plus definitions glosses are combined together), which supports her claim of being a visual and textual learner.

Where all three glossing alternatives were available (eighty-nine out of one hundred and eleven), Apple consulted the textual definitions prior to the images in only ten cases (excluding repetitions). Four of the items that she did not understand had only textual definitions and in sixteen of the thirty items that she looked up, she first accessed the definitions plus pictures prior to any other glossing type.

Excluding repetitions, she accessed the glossary for only thirty words (Table 51). When organized according to parts of speech, those items that proved to be the most problematic were nouns and verbs, which accounted for 80% of her number of look ups. Adjectives and adverbs accounted for only six (or 20%) of the vocabulary items that she did not understand. There were seventeen words for which the glossary was used more than once to help her understand their meanings, including six nouns, five adjectives, four verbs, and two adverbs.

Table 50
Data Collected from On-line Tracker
Tabulation of Time Spent on Task and Number and Types of Glosses Accessed by Apple

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Picture + Definition Glosses
2 hrs. 14 min.	525 sec. (8.75 minutes)	60	29	7	24

Table 51
Number and Grammatical Categories of Words Looked up by Apple

Number of Words Looked Up	Nouns	Verbs	Adjectives	Adverbs
30	13	11	4	2

Think Alouds

Apple provided relatively few inferences (twenty-one), all, with the exception of one that originated from the glossary as a definition-based paraphrase, were made while she was reading the article (Table 52). Her accuracy rate was high with twenty out of the twenty-one inferences being correct.

Text Drawn Inferences

As is indicated above and in Table 53, Apple relies heavily on the text to decode unknown lexical items and she was highly successful in doing so. Ten or 47% of her inferences were explanations drawn from the text. What is most notable is that all were correct. Three out of five paraphrases and five out of five associations derived directly from the reading were also correct. Thus the overall accuracy of inferences made from the text was 90%.

Explanations

Apple's explanations can be broken down into two grammatical and eight contextual – based inferences (Table 54). Although the number of explanations is quite low, it does suggest that while she is equally successful using both, she is far more dependent upon contextual rather than grammatical clues. What becomes apparent in the examples of contextual and grammatical explanations shown below in Table 55, is that Apple is not concerned with identifying the exact definition or meaning of words that she does not automatically comprehend. She is instead satisfied with a more general understanding of them.

Table 52
Number of Inferences and Types of Glosses Used by Apple During Reading and After Accessing Glosses
(Trabasso and Magliano, 1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	After Accessing Two Kinds of Gloss Types	After Accessing All three Gloss Types	Total Number of Inferences Per Category
Paraphrase	5	1					6
Association	5						5
Explanation	10						10
Prediction							
Total Number of Inferences	21						21

Table 53

Number of Correct (0) and Incorrect (X) Inferences Made by Apple During Think Aloud Protocols

Think Aloud Categories	**During Reading (Text)**		**Definition**		**Picture**		**Picture + Definition**		**After Accessing Both Picture and Definition Separately**		**After Accessing All Three Glosses**	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	3	2	1									
Association	5											
Explanation	10											
Prediction												
Total Number of Correct and Incorrect Inferences	18	2										
Total Number of Inferences	20		1									

Table 54

Total Number of Correct and Incorrect Inferences Made During Reading Divided into Grammatical and Contextual Categories

Total Number of Explanations	Based on Grammatical Inferences		Based on Contextual Inferences	
	O	X	O	X
10	2		8	
	2		8	
Percentages	100		100	

Table 55

Examples of Grammatical and Contextual Explanations

Original Text	**Student's Statement**	**Explanation**
Eons ago	…because I know ago, so I thought something ago, ago, just ago.	EX (o) Contextual
Pitch and roll	It's because I can understand here (point to other verbs of action: stretch, stand tall, shift from foot to foot) I understand here, because I think I know here.	EX (o) Contextual
Bobbing	…the reason I don't know, but I know smiling, swaying, a kind of those things I know. …because it is a lot of ordering like same delut, delut, delaw…. If I know some of them, it's enough I thought.	EX (o) Contextual
Pivot, swivel	I did until shoulders become aligned so I think I know here.	EX (x) Contextual

EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
(o): Correct inferences
(x): Incorrect inferences

Paraphrases

Only five attempts were made to verbally paraphrase unknown lexical items in the article, two of which were incorrect (employ and aligned). She mistook the meaning of 'employ" to be employer and 'aligned' to mean close. As is obvious in her interpretation of 'employ', she guessed its meaning by using a word that she was already familiar with. She did not elaborate as to how she determined the meaning of 'aligned' nor as to why it was unnecessary for her to understand other items in the paragraph, in particular 'pivot' and 'swivel'.

Shari:	You didn't look up pivot and swivel.
Apple:	I didn't. Just I skipped.
Shari:	What made you decide to skip it?
Apple:	I did until shoulder become aligned so I think I know here.
Shari:	What does that mean then?
Apple:	Their shoulders close.
Shari:	Is that what you thought when you were reading it?
Apple:	(nods in agreement)

Associations

Five associations were made directly from the text Table 52, four of which were words that she had previously been exposed to and one, jukebox, is written in Katakana and its pronunciation is almost identical in English and Japanese. It is not possible to draw any conclusions from her associations other than to claim that background knowledge appears to have played a role in helping her to understand selected words in the article.

Although the number of inferences made by Apple was quite low, her success rate in using the immediate text from which to draw her inferences was high (90%). Unlike many of the other participants in the study, Apple did not intermix her inferences to the extent that the others did. She generally made a brief statement about the item and then continued on with her reading. This may be attributed to the fact that she was not overly comfortable with the think aloud protocol.

Metacomments

Apple made eleven metacomments, seven of which originated directly from the text and four from the glosses (Table 56). Four of her negative responses can be attributed to difficulties that she had in understanding words found directly in the text and three originated from problems with definition + picture glosses. Overall, 70% of her negative metacomments were text based which was expected given that very few glosses were accessed during the session. Examples of these metacomments are show below in Table 57.

Table 57

Examples of Metacomments Made By Apple

Metacomment Type	Original Text	Positive Metacomments	Negative Metacomments
Textual	**Human Mating** Could these courting cues be part of a larger human mating dance?		But I don't understand human mating dance.
			I know mating but I don't know mate like this.
	Eons ago ...a human courtship ploy that evolved eons ago to signal...	I didn't (look it up) because I thought it's not important.	
	Flinches If he flinches, the pickup is over.	I don't really understand but I want to read on to find meaning.	
Definition + Picture	**Prospective mate** If a prospective mate laughs more than necessary...		I don't understand prospective, the picture is not clear.
	Intangible ...but also reveals your background, education, and intangible idiosyncrasies of character...		It's nothing to me.
	Stroking ...if both persons are standing or stroking one's own arm...		The definition is too fast.

One metacomment that stood out from the others concerned the use of visuals and sound. She claimed that she normally takes notes while reading; however, she found it difficult to do using glosses that combined video with textual definitions.

> "So I will just keep everything so when I look up my notes, normally anything, nothing else I think I should write more, so reading I think I cannot choose listening and reading both, I'm very bad poor.

Summary Results

Apple took approximately one hour and thirty-eight minutes to complete her one hundred and ninety-eight word summary. Her score, 19.75, was the highest of all of the participants, largely because she included several supporting ideas from the introduction and the first four stages in the flirting process. However, she did not elaborate on or clearly identify the fifth stage and completely omitted the conclusion. It is possible that she was better able to concentrate on what she was reading earlier in the text and thus remembered more details from these sections than from latter ones. It is also possible that her omissions may be attributed to her pattern of reading for a general understanding of the article as opposed to a more in-depth comprehension of it and in part as a result of her reliance on contextual clues to comprehend unknown words. For example, she explained that the reason that she did not look up 'bobbing' was that it was included in an ordering of words. She claimed "if I know some of them, it's enough I thought." Apple's retelling score was also low for she was only moderately successful in identifying the main idea of the article and was only given one point for her attempt.

As can be seen in Table 58, Apple included six items in her retelling for which she had consulted glosses to help her identify their meanings. She accessed the textual glossary for four of the six items, and with the exclusion of 'anthropologist' and 'ethnologist', Apple also referred to the definition + picture glossary. Although few glosses were used in the

summary, there does appear to be a pattern in that of those items that she included, three had been looked up using definitions as well as definition + picture glosses. This suggests that this glossing format may have contributed in her understanding and ability to recall these words.

Table 58
Paraphrased Items from the Glosses Included in Apple's Summary

Original Text	**Written Paraphrases**	**Glossing Format Used During Reading**
…anthropologist	Anthropologist	Definition
…ethnologist	Ethnologist	Definition
…women's flirting behaviour	…women's reaction of flirting…when women are flirted…	Definition Definition + picture
…if a prospective mate laughs…	…first people try to get atteition by a prospective partner	Definition Definition + picture
…acknowledges the demarche with a smile…	…hundreds of men and women demarching each other at bars…	Definition Definition + picture
…grazing her hand along her suitor's body…	…people start to touch softly and gradually	Definition + picture

Given that Apple relied upon the text itself to understand the article, expectedly her retelling of it incorporated more vocabulary items and ideas from the actual text than from the glossary. Her paraphrases were, for the most part, accurate, aside from some difficulties in presenting the information in the correct order and in the correct grammatical form. Examples are provided below in Table 59. One point should be noted. It is unclear as to whether three of her paraphrases did not arise from having accessed the glossary for 'flirting' and 'frame by frame', both of which show the woman's flirting behaviour that is described in her summary. It is possible that the images did reinforce this information.

Table 59

Examples of Paraphrased Words Taken Directly from the Text and Included in Apple's Final Summary

Original Text	**Written Paraphrases**	**Glossing Format Used During Reading**
Universal	Shown in common in some different countries.	Directly from text. Not accessed.
Opens her eyes wide to gaze at him	Opening widely their eyes.	Directly from text. Not accessed.
Lifts her eyebrows in a swift jerky motion	Moving eyeblow.	Directly from text. Not accessed.
…covers her face with her hands, giggling nervously	…sometimes smiling coverling their mouth with their hands.	Directly from text. Not accessed.
Several hundred hours	Hundreds of men and women.	Not glossed.
Distinctive	Distinct.	Directly from text. Not accessed.
When eyes meet eyes	They recognize and contact by each other's eyes.	Not glossed.
…what you say often matters less than how you say it	The important thing here is not what you talk, but how you talk.	Not glossed.
	voice is very significant.	Not glossed.

Richness of the Retelling

Apple scored a 2.5 on Irwin and Mitchell's retelling scale (Table 60). She received her highest marks for her retelling of the Major Points in the article and for the overall comprehensibility of the summary. She achieved a 3 in the coherence and supporting details categories. Her omission of the fifth stage in the flirting process as well as the conclusion reduced her score in these areas and lowered her completeness mark. Additionally, although her summary was coherent and easy to understand as she did include transitional markers to guide the reader through it, they were not strong or consistent enough to create the fluidity needed for a higher score in this category. As indicated earlier, Apple did include several supporting details but again, not a sufficient enough number to warrant a score greater than three.

Table 60
Richness of Retelling

Criteria for establishing Criteria	**Level**				
	5	4	3	2	1
Generalizes Beyond Text					X
Thesis Summarizing Statement			X		
Major Points		X			
Supporting Details			X		
Supplementations					X
Coherence			X		
Completeness			X		
Comprehensibility		X			

Had she been requested to provide a general overview of the article, she would have received a higher score. However, one must also consider the fact that it is very difficult to reiterate a story or an article immediately after reading it, particularly in any great detail.

Final Oral Interview

Apple's responses to the questions during the final oral interview were suprising for she claimed that the glossary was an effective means to help her with her overall comprehension of the text as well as in her organization of her free recall summary. More specifically, she stated that although she had referred most often to the English definitions, she believed that the definitions + pictures glossary was the most useful in helping her with her overall comprehension, even though she felt that the text moved too quickly for her to comfortably read. The image glosses were constructive in helping her to recall the article's main and supporting ideas. However, it was the English definitions that proved to be the most useful in organizing her retelling.

The images that proved to be the most effective in promoting comprehension and recall were stills and she noted that these would be preferable to videos in other texts as they are 'easier for me to get in my head'. She made no distinction as to what kind of stills she would prefer, nor which parts of speech would be best portrayed through pictures. She did report however, that the items that she would gloss in a text would be nouns and cultural expressions but she did not give any explanation for her suggestion.

She professed to having understood a great deal of the article and most of the vocabulary (approximately 70%) upon completing the reading, even though she admitted to having skipped several words. "It's my habit, I'm lazy. I try to understand the word from the sentence." She also claimed that "I don't look up as many words, almost always skip and

if I don't know, I reread it..." because she felt that the glosses interfered with her reading pace and did not wish to be slowed down. Another point that should be noted is that Apple was uncomfortable reading with anyone beside her and the researcher's presence affected how quickly she read as well as her note taking.

Shari: When you normally make notes, if you were reading on paper, do you make the same kind of notes that you just made?
Apple: If I am alone and I have to read carefully, I will be fine. I know I have to read I would take more notes more carefully, but now I am kind of I must read faster.
Shari: Do you want to read faster because of what time it is or because you are on the computer, or because I am sitting here?
Apple: All three, but mainly because I am with you.
Shari: You are reading faster because I am sitting here.
Apple: I am trying to.
Shari: So if I wasn't sitting here would you read more quickly, would you read faster?
Apple: I will read more carefully but carefully, but faster.
Shari: What's the difference between carefully and slower for you? Some people believe that if they read more slowly than it is more carefully.
Apple: Concentration, just I cannot concentrate when somebody is here.

Her concentration was also affected by the light emanating from the screen for it caused eye-strain. In addition she was uncomfortable using the mouse to navigate between windows and found it distracting to have to use the scroll bar to return to her position in the text after having accessed the glosses. She also cited these reasons for her preference to read academic information from a book and suggested that teachers offer reading on-line as an option as opposed to making it a mandatory requirement. Conversely, she also claimed that this program did change how she felt about reading on-line. She stated that she preferred reading a text such as the one used in this study from the computer as it was interesting, but acknowledged the fact that this may be because of the novelty of the program. If the number of on-line reading assignments were limited to once a week or as a means to retrieve information from the Internet as opposed to an everyday activity, then working on the

computer would not become monotonous. Apple concluded the oral interview by giving a positive review of the glossary as a means to improve one's reading comprehension but believes that using one definition is better than offering a variety of options. It is a useful means by which one can understand a text, however the most effective way to improve one's English, she claimed, is to refer to an English dictionary.

Overview

Data collected from the questionnaires and the on-line tracker suggest that Apple found the definition + image glossary to be the most useful glossing format to help her with her overall comprehension of the text. She did not elaborate as to why she believed that it benefited her more than the textual definitions did, other than to declare that she was a textual and visual learner. Data from the tracker indicates that there was an almost equal use of both the textual and the definition + image glossaries and in a little more than half of her choices (seventeen), her first choice when she used two different glossing formats, was a definition + picture gloss. She reported that images were also conducive in helping her recall the main and supporting ideas of her free recall summary; however, it was the textual definitions that helped her organize it. Again, she did not explain why she believed there was this difference between gloss use and how she recalled and organized her retelling.

There were no distinctive patterns that emerged from her think-alouds that indicate a relationship between those items that she looked up and her comprehension of the article. The association that does emerge is her reliance upon the text itself as a means to understand and organize her retelling. The glossary may have augmented her understanding of the text but given her low frequency of gloss use and inclusion of items from the glossary in her summary, it is difficult to draw any definitive conclusions from it.

Additionally, her low score for both her summary and richness of its retelling, does not support her positive response to the effectiveness of the pictorial glosses or the definition plus image glosses in her comprehension of the article. One might attribute her positive response regarding the images to the novelty of the program.

As in Bluepig's case, Apple's exposure to this program had a minimal effect on her perceptions about reading and how and what she reads. Her overall perception changed minutely in that she believes that she now has more of an interest in using the computer for reading than she had before, but stipulated that it would become tedious if it became a daily requirement. Her interest in the program was in part due to the ease of accessibility to the glossary and the novelty of the program. She did confirm that she did read more quickly on the computer than she does from a book but that was because she skipped words so that she could finish the text as quickly as possible so as not to tire her eyes. She maintained that searching for information was still preferable to having to read prescribed texts on-line and that academic readings should continue to be in print form.

Session Six: Jessie

Jessie is a Taiwanese woman between twenty-one and twenty-four years of age. Her first language is Mandarin and English is her only second language. She studied English throughout high school and for three years at the university level. She also studied in a language school outside of the regular school system. Jessie is a 500 level academic student who is attending UVic to improve her English skills and to experience life in a foreign country. Although she did not indicate that she aspired to attend an English university in the future, she is incredibly self-motivated and an extremely dedicated student who is determined to become proficient in the English language.

Like Caya, Jessie believes that her listening and speaking skills are stronger than her reading and writing skills, which may be attributable to the fact that she reads, on average, once every two weeks in English. For the most part, she reads novels in both English and in her native language. When reading information texts, she has difficulty comprehending subject specific vocabulary items, however only occasionally does she refer to a dictionary while she is reading. Jessie attributes this lack of use to a dislike of dictionaries, which as she claims, have "lots of meanings which are confusing. That's why I would rather guess as have to look in dictionary".

She claimed to be a visual and textual learner and is only moderately comfortable using a computer even though she is an avid user who accesses the Internet everyday to email family and friends, read the news and search for information for school. Entertainment and other purposes were listed as the fourth and fifth reasons why she uses the computer. As her instructor rarely provides them with any computer-based lessons or activities (only once a month) her computer usage is based solely on her needs and interests. She equates reading on the computer as being the same as reading from a printed text and

thus any discomfort that she experiences in using the computer arises from a lack of knowledge about programs and how they operate.

Observations made while she was reading

Prior to beginning the session, Jessie requested that she be uninterrupted during her initial reading. She informed the researcher that she normally skims and scans through the text first to get the main idea and either guesses at or skips any words or paragraphs that she doesn't immediately understand. She added that she constructs the meanings of unknown segments or words through a general understanding of the situation via background knowledge of the subject or through the context of the paragraph or sentence. She claimed that is it possible to "guess at it by the word before or after".

Once she completed reading the text, she returned back to the beginning to review any sections that she did not comprehend and to look up vocabulary items that she did not understand during the initial reading. She typically paused on these words, read to the end of the sentence and on occasion, to the end of the paragraph that they were in and only if the meanings were not clear to her, would she access the glosses. Upon completing each paragraph, she made notes that included the main idea, supporting details and any vocabulary items that she felt were important in the article.

Tracker Data

Information from the tracker supports her earlier statement that she occasionally consults a dictionary while reading and that she relies on guessing through the context to understand difficult words or expressions. As is shown in Table 61 below, Jessie spent a total of two hours and fifty-four minutes reading the text and accessing the glossary. Seventeen minutes of this time were spent on the glosses and including repetitive lookups of the same word/phrase, her total number of lookups was forty-eight. Out of a possible one hundred and ten glossed word/phrases, she selected only thirty, which included ten nouns, eleven verbs, seven adjectives and two adverbs. Nouns and verbs accounted for 70% of the total number of items that she accessed (Table 62).

Fifteen words were looked up more than once and in ten cases, she used the textual definitions prior to accessing the images. She used pictures and definitions + pictures for two of the remaining five words and a combination of pictures and definitions for three of them. When later asked why she was dependent upon the textual definitions, she responded that,

> "Images, sometimes with the pictures, I couldn't understand so I had to look up the definitions. I felt more safety when I look at the words to describe directly. Some of the pictures are like art, they didn't show the elaborate means".

She also claimed that her curiosity as to what the images might look like for some of the words prompted her to refer to the pictorial glosses.

Table 61

Data Collected from On-line Tracker
Tabulation of Time Spent on Task and Number and Types of Glosses Accessed by Jessie

Total Time Spent Reading the Text	Time Spent on Glosses	Total Number of Glosses Used by Student	Definition Glosses	Picture Glosses	Picture + Definition Glosses
2 hrs. 54 min.	1,020 sec. 17 min.	48	25	19	4

Table 62
Number and Grammatical Categories of Words Looked up by Jessie

Number of Words Looked Up (not including repeats)	Nouns	Verbs	Adjectives	Adverbs
30	10	11	7	2

Think Alouds

Jessie was extremely comfortable with the think aloud protocols which resulted in one of the most in depth examinations in this study as to how students processed and understood what it was that they were reading. As in the earlier profiles, tables are organized according to think aloud and glossing categories and several sections from the transcript are included to provide the reader the opportunity to follow her behaviour as it unfolds.

As is shown in Table 63, Jessie made two hundred and thirty-nine inferences and of these, two hundred and nine (87%) were made while she was reading the text. Only thirty inferences (12.5%) originated from the on-line glossary, with definitions accounting for 50% of all glosses, pictures 37%, and definitions plus pictures and a combination of definition and images for approximately 6.5% of the total number .

Text-drawn inferences

Jessie's reliance on the text itself as a means to decode unknown items is substantiated during the think alouds and what is most notable are the high number of paraphrases and explanations made directly from the text. One hundred and twenty-two paraphrases and fifty-three explanations were given during the reading. Seventy-one of these paraphrases and thirty-four of these explanations were correct (Table 64). When these figures are compared to the total number of correct paraphrases and explanations made per think aloud category, her accuracy rate was 51% and 59% respectively.

Table 63
Number of Inferences and Types of Glosses Used by Jessie During Reading and After Accessing the Glosses
(Trabasso and Magliano, 1996)

Think Aloud Categories	During Reading	Definition	Picture	Definition + Picture	After Accessing Two Kinds of Glosses (Definition and Picture)	After Accessing All three Glosses	Total Number of Inferences Per Category
Paraphrase	122	12	4	1	-	-	139
Association	33	2	5	-	1	-	41
Explanation	53	1	2	1	1	-	58
Prediction	1						1
Total Number of Inferences	209	15	11	2	2	0	239

Table 64
Number of Correct (0) and Incorrect (X) Inferences Made by Jessie During Think Alouds as an Indication of Comprehension

Think Aloud Categories	**During Reading (Text)**		**Definition**		**Picture**		**Picture + Definition**		**After Accessing Both Picture and Definition Separately**		**After Accessing All Three Glosses**	
	O	X	O	X	O	X	O	X	O	X	O	X
Paraphrase	71	51	6	6	2	2	1	-	-	-	-	-
Association	27	6	2	-	5	-	-	-	1	-	-	-
Explanation	34	19	1	-	-	2	1	-	1	-	-	-
Prediction	1											
Total Number of Correct and Incorrect Inferences	133	76	9	6	7	4	2	-	2	-	-	-
Total Number of Inferences	209		15		11		2		2		-	

Paraphrases

What was interesting about Jessie's paraphrasing attempts made directly from the text were the ways in which she verified whether she was correct or not. One of her tactics was to read the selected word or sentence, paraphrase what it meant and then finish the section to confirm whether she had interpreted it correctly. For example:

(Reads aloud)	For every human culture have some codes.
Paraphrase:	Codes is like a...a number.
	I know secret codes is like a secret number so I think in this part like
(Reads aloud):	For every human culture has some codes to indicate that...
Paraphrase:	Ever has a different rule to say what kind you can touch, who, when, where, and how.

(Reads aloud)	Older men often use different props.
Paraphrase:	Okay so I think props is a kind of different ways, yeah.
(Reads aloud)	clothing and other ...accoutrement
Paraphrase:	So luxury items, valuable things.

More frequently than not, her paraphrases were intermixed with either explanations or associations or a combination of both, all a part of the process that she underwent to either confirm or refute her initial interpretation of selected items.

Her successful paraphrasing of 'best leads', 'withdraw', and 'lifts her eyebrows in a swift, jerky motion' shown below (Table 65) are perhaps the best examples as to how she constructed meaning through the use of background knowledge and the application of logical analysis. For example, even though she misinterpreted the word 'withdraw' in her original paraphrase, she eventually drew an association between the actions of withdrawing money with that of withdrawing one's body away from another person. Similarly, knowing what eyebrows are and how they move led her to understand the action described in the article.

Table 65

Construction of Meaning Through the Intermixing of Paraphrases

Original Text	Student's Statement	Statement Category
The best leads	The best way that you can continue to lead, the best way to lead the conversation, like sometimes we can talk about lots of things.	PA (o)
	If I start to talk about my work maybe people wills starts to talk about work.	AS (o)
	So I think that means that the best leads are either compliments or questions.	PA (o)
	Like the best way to start with a conversation you should talk about, ahh, your hair looks very nice today, ohh I like it.	AS (o)
	So peoples will talking that area or some questions not ask for job but maybe, is that the first time that you come here, do you know anybody here, did you come with friends.	AS (o)
Withdraw	Withdraw means ahhh, okay…yeah so maybe.	MC (o)
	Withdraw means, I'm taking something.	PA (x)
	We withdraw money means we take money out.	AS (o)
	So if he withdraw that means he back up that they'll never do it again.	EX (o)
…lifts her eyebrows in a swift, jerky motion…	Lift your eyebrow in a swift, may like, like winking, like winking the eyes ...eyebrows is this part so maybe it is like this one (shows the action)	PA (o)
	Because eyebrows you can nothing about eyebrows except this one.	AS (o)

PA: Paraphrase (Restatements of the text)
AS: Associations (Information from background knowledge)
EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
MC: Metacomments
(o): Correct inferences
(x): Incorrect inferences

Further examples of her ability to apply logical analysis by connecting items or ideas in the text with background knowledge and real life scenarios are presented below in Table 66. As can be seen, Jessie is a risk-taker, readily testing her hypothesis and making errors work for her rather than against her.

As what was occurring while she was reading the text was voiced through her think alouds, it lessened the need to interpret where the paraphrases may have originated and made it possible to obtain a first hand account as to how she came to understand what she was reading. However in some cases, such as in her interpretation of the word 'jukebox' it was a little more difficult to draw any definite conclusions as to why she assigned certain words a particular meaning. For example, she initially began by claiming that a 'jukebox' is a type of bar where you can sit at table or by the dance floor, but insisted that it was not a dance floor or table but a type of bar.

Jessie: ...but I think its maybe bar. (Paraphrase)

> ...Because I know in bars that normally people...have you went to a bar like this in bar tenders place you can sit on this that kind of place, on tables and the dance place. (Association)
>
> So I think it is not dance place but its not table. (Explanation)

It is not clear whether she associated the word 'box' with sitting or whether the earlier segment of the article lead her to believe that 'jukebox' might be a term for a particular bar. It would appear that she understood the word 'box' but how she reached her conclusion is unclear.

Table 66

Examples of Paraphrases Made by Jessie Directly from the Text

Original Text	**Correct Paraphrases**	**Original Text**	**Incorrect Paraphrases**
Ahh. Humans have evolved from being...	evolution of mankind	...each with distinctive escalation points	tentive
Eons ago	a long time ago	Cocktail lounges	Maybe it's a party, a kind of party that men and women can met each other so that is the reason that they can study.
Social available body part	So means, well if you touch not breast, not butt, shoulders		
... touch has been called the mother of the senses.	So touch maybe is the most important final sense you eat you smell, and touch is the most important	Men and women employ...as stirring mud	it means they are stirring the mud.
They move in perfect rhythm, rhythm is like this (snaps her fingers in time)	They move in perfect rhythm, rhythm is like this (snaps her fingers in time)	Elaborate shaking	maybe like this one

Explanations

As indicated earlier, Jessie's explanations provided a wonderful opportunity to gain an insight as to how she identified unknown words without the use of the glossary. They can be broken down into fifteen grammatical inferences and thirty-eight contextual explanations (Table 67). Nine, or 60% of the nineteen grammatical inferences and twenty-five or 66% of the thirty-eight contextual inferences were correct. This suggests that although she relies more so on the context of the sentence than on grammatical structures, she is almost equally successful using both grammatical and contextual clues.

Table 67

Think-Aloud Category: Explanations Made During Reading
Total Number of Correct and Incorrect Inferences According to Grammatical and Contextual Categories

Total Number of Explanations	Based on Grammatical Inferences		Based on Contextual Inferences	
53	O	X	O	X
	9	6	25	13
	15		38	
Percentages %	60	40	66	34

Examples of her explanations are presented below in Table 68. They demonstrate that Jessie is very capable not only of using her own grammatical competence to construct meaning, but is also very competent in establishing associations between ideas presented in the text.

Table 68
Examples of Grammatical and Contextual Explanations

Original Text	Student's Statement	Explanation
Anthropologist	So I think this word, I don't know the front part but I know logic so maybe a kind of professional.	EX (o) Grammatical
	Maybe they study in this kind of field, like how creatures attract their partners.	EX (o) Contextual
Unstaged facial expressions	'Un' means the opposite and stage normally if we are on stage means we are acting or performance so on stage action and facial expressions.	EX (o) Grammatical
Human skin is like a field of grass, each blade a nerve ending…	Each blade a nerve ending so I think it is that the slightest graze… so maybe they are something on our skin, they place they can feel it the touch is very sensitive.	EX (o) Contextual
Courting	So think this part means the way the way this person describing in front to this paragraph are kind of a natural thing for a woman to do.	EX (o) Contextual
Perfunctory	I know that it means the same meaning to the last sentence (mellifluous hello).	EX (x) Contextual
Distinctive	I think that dis means clear.	EX (x) Grammatical
Jerky motion as she opens her eyes to gaze at him	Jerk is like it describes sometimes.	EX (x) Grammatical

EX: Explanations (Inferences that link events in the text, including contextual and grammatical explanations)
(o): Correct inferences
(x): Incorrect inferences

Associations

Throughout the session, Jessie was quite successful in drawing from her previous experience with a given word or idea and connecting it with the context in which it was being used in this article. For example, although she did not understand the meaning of the word 'retreat' she did know what palms were and thus she was able to determine the meaning of the sentence: 'frequently she covers her face with her hands, giggling nervously as she retreats behind her palms'.

Because I know palms, it means this part...	(Association)
But I know behind her palms.	(Association)
So something behind her palms,	
so I think that they are talking about face.	(Explanation)
So it must be maybe this one.	(Explanation)
(she correctly mimicked the action)	(Paraphrase).

Frequently, as in this example, the combination of associations and explanations helped the researcher understand how she assigned meaning to a particular word or sentence.

Thirty-three associations were made during the reading,, twenty-seven of which were correct (Table 64). Associations ranged from direct statements such as "I know..." to a full explanation as to how she knew the word or idea. For example:

Example One

Jessie: This one, signal sexual interest...this one signal sexual interest, I know this word.

Example Two

Jessie: I know flirting.
Shari: From...?
Jessie: Ah, because host mother's boss sometimes he phones because he has a very good relationship with my host mother..
Sometimes he talks to me so my host mother always say he is flirting so she was just kidding...
So I remember the word.

Three of Jessie's incorrect associations originated from words that had more than one meaning including the phrasal verb 'pick each other up', 'codes', and 'jerky'.

> "Pick each other up means pick each other up like sometimes I like you I ask for you and maybe pick you up and have a date."
>
> "For every human culture have some codes, codes, is like a number, "I know secret codes is like a secret number."
>
> "Jerky motion... jerk is like sometimes you ignore, some people do things that you don't like so you call them jerk.

Her paraphrase of the item 'jerky', "So maybe jerky is like tricky', implies that she was aware of the word class change that occurred when the inflectional ending 'y' was added to the noun 'jerk'. These associations, albeit incorrect, demonstrates how important both background life experience and grammatical knowledge was in her analysis of the meanings of selected words.

Glossary

Thirty inferences were made after Jessie accessed the glossary, fifteen of which originated form definitions, eleven from pictures, and two from both definitions + pictures and the combination of textual and pictorial glosses (Table 63).

Definitions

Paraphrases

The most prevalent think aloud category was again, paraphrases, twelve of which were made after accessing textual definitions. She was successful in paraphrasing six of the words that she looked up. There was no pattern that emerged from either her correct or incorrect paraphrases, as they were comprised of a combination of nouns, verbs, and adjectives illustrated using different picture formats. For example, three of her correct paraphrases originated from 'escalation point', which was depicted using a still image and of the remaining three 'exaggerate', 'mud', and 'mellifluous hello', only the latter was illustrated using a video. Those that she was unsuccessful in paraphrasing included 'clipped', 'mellifluous hello', 'suitor', 'anthropologist', and 'innate' and of these, video clips were used to illustrate the first two words.

After consulting the definitions, Jessie tested her hypothesis by reading to the end of the sentence or paragraph to confirm that she was correct. For example:

Paraphrase: So it means no matter if you say hello with a very nice voice
you say hi like you should do it or you didn't meant to
purpose to attract anyone just a normal greeting.
It really is to love.

(Read to the end of the sentence)
Metacomment: Okay, sorry I think I'm wrong.
Explanation: You said hello with a very nice voice.
Paraphrase: You say hi like you should do it or you didn't meant to
purpose to attract anyone, just a normal greeting.

Associations and Explanations

Very little information was obtained through either associations or explanations as Jessie made only two associations and one explanation from textual definitions both of which were correct. This suggests nothing more than these definitions were effective in helping her to understand the words that she looked up.

Pictures

Associations

Associations was the most prevalent think aloud category originating from the pictorial glosses. While all five were correct, it should be noted that three were made after viewing the video for one item (stroking) so in fact only two separate words were accessed using the pictorial glossary. One of her most interesting associations was made about a key point addressed in the introduction, that the flirting gestures exhibited by women were believed to be innate.

Paraphrase:	So it is potential, it is a gift.
Shari:	No, it is something we do naturally, like babies crawling.
Association:	(Looked at it again) Ah, just like some kinds of bird, like salmon when they have even they went to other places, other oceans or other seas, rivers to live when pregnant they will come back to original when they were babies.

Although it was expected that she might include this point in her summary, no mention of it was made. It is difficult to infer whether it was a conscious choice on her part to exclude it, or whether in fact she simply did not recall this point. All five associations originated from video clips.

Paraphrases

Only four paraphrases originated from pictures and one from a definition + picture gloss. An equal number of correct and incorrect paraphrases were made after consulting the image annotations (Table 64) and her only picture + definition-based paraphrase was correct. All five paraphrases were made after viewing video clips illustrating verbs. Again, Jessie's resolve to test her hypothesis and to determine the correct meaning of the words that she did not understand was apparent in her attempt to paraphrase the video for 'flinches'.

Jessie: Flinches is like this one, right? (shows action of walking away)
Shari: No, that is withdraw.
Jessie: So if I do this, I just pull my hand away I am withdrawing my hand and if I do this, it's a flinch. (showed quick pulling away of her hand)

Explanations

Explanations accounted for only three inferences, two of which indicated a lack of understanding of the video clip for 'flinches' and one that demonstrated her understanding of the still image for 'exaggerate'.

An overall evaluation of the think alouds indicates that Jessie's inference success rate was marginally higher when she used the glosses as opposed to when she drew inferences from the text (64% as opposed to 66%). However, given that only 14% of all inferences given were gloss-based, one could question the validity of such a claim. One could argue that the likelihood of error was greater from text-based inferences given the greater number of inferences that originated directly from the text.

Metacomments

Many of Jessie's metacomments indicate an understanding or lack thereof of lexical items or ideas presented in the text or in the glossary. She produced a total of eighty-two metacomments, the majority of which (sixty-two) were derived from the text. (Table 69). As was indicated by the tracker data and the think alouds, very few glosses were accessed, which accounts for the lower number of comments generated from the glossary (nineteen). Forty-six negative metacomments originated directly from the text and sixteen metacomments were made during or after viewing the picture glosses (twelve positive and four negative). What is notable is that the picture-based metacomments, while fewer in number, generated a far more positive response than did any of the other glosses or text . Only three images did not convey the intended meaning to Jessie. They included the picture for 'forearm', 'flinches', and 'mud'. Both 'forearm' and 'mud' were still images and although she understood the latter, she could not draw an association between the meaning conveyed in the image and the context in which it was being used in the text. The still picture used for 'forearm' was a poor choice in that it did not accurately demonstrate what the forearm is. The video clip showing the act of withdrawing was also confusing to her, but was the only video out of fourteen that was accessed that she did not understand indicating that overall, the videos were very effective in conveying their intended meanings. Some examples are provided below in Table 7.

Table 69
Total Number Positive Verses Negative Metacomments
(Including those made on the text)

Text		Definitions		Pictures		Definition + Picture		General Comments About Glosses		Total	
Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
17	45	1	1	12	4	-	-	2	-	36	46
Totals: 62		2		16		-		2		82	

Table 70
Examples of Metacomments

Gloss Type	Positive Metacomments	Negative Metacomments
Textual	**Grooming talk** So I want to check grooming talk because here grooming talk become important part so I want to check it.	**Courting Episode** I really don't know that so I will check.
	I know this word, but maybe I can know this word, which part.	**Retreats behind her palms** I don't know what retreat, what retreat really means.
	Flinches Flinches is important word because if the pickup is over.	**…as if stirring mud** Mud, I don't know what mud is so I will check.
Pictures	**Escalation point** Yeah, okay, clear.	**Retreat** I don't know what retreat, what retreat really means.
	Grazing Yeah, yeah, nice nice. You learn from this part, from the videos.	**Flinches/withdraws** I don't understand flinches and withdraws. (the difference between the pictures)
	Extinguish a match picture, ahh.	**Forearm** It's an ugly picture. (forearm)
	Resting one's arm toward the other's If I don't have any cue then I will look it up (discussion about eons)	**…as if stirring mud** Mud, I don't know what mud is so I will check.

Her metacomments also provided some insight as to why she targeted certain words in the text as being important. Such was the case for the item 'grooming talk':

> "So I want to check grooming talk because here, grooming talk become important part so I want to check it. In the kind of situation I will check. If the first time I didn't think the word is important. But I saw it the second time and third time and it shows quite often then I will check the word."

Two statements were not included into the metacomments for they were not directly related to the text or the glossaries but do in fact support her earlier statement about glossary and dictionary use. "Normally I don't check the specific meaning. If I really don't know idea of what talking about, then I will check".

Summary Results

Jessie submitted a two hundred and twenty-four word summary, which took her approximately a half an hour to write. Her accumulated score based on the checklist created by the instructors was 18.5. As can be seen in the example below, Jessie made several attempts to include main ideas and supporting details, however her opening statement did not capture the overall idea of the article. She successfully paraphrased the main idea of the first and second stages and included each successive stage in the order in which it appeared in the text. Additionally, she incorporated several words and ideas from the article into her summary including, 'attention', 'jukebox', 'big movement', 'laughter', and 'when eyes meet'.

> " This article describes how men and women catch their future lover's attention...First they have to catch people's attention, they goes to a obvious position like jurkbox (music box) or dance place and try to use big movement or voice like laughters to attract people's attention. Secod they starts to show a single that they are along or pass information to the person who they feel interesting in by using eye contact."

Had Jessie been required to write a summary of the main ideas and provide a general outline as to what the article was about, she would have received a very high mark. Unfortunately, this was not the task that was assigned and therefore, her overall score was low as she provided few supporting details.

It is interesting to note that of the eleven words that she paraphrased from the text she accessed the definition and pictorial glosses for four of them, the definition and pictorial gloss for one item, two were taken directly from the text and four were not among those items which were glossed. All of her paraphrased words from the article are shown below in Table 71. A total of six of the eleven items were derived from the glossary, which

suggests that it may not have been as conducive to helping her to understand and recall the article as was the text itself.

Table 71

Paraphrased Words Included in Jessie's Final Summary

Original Text	Written Paraphrases	Glossing Format Used During Reading
Jukebox	Jurkbox (music box)	Definition Picture
Exaggerate	Big movement	Definition
Hearty laughter	Laughters	Directly from text
…when eyes meet eyes	Eye contact	Not glossed
Mellifluous	Lovely voice	Definition Picture
Compliments	Compiliment	Not glossed
Questions	Questions	Not glossed
Benign statements	Comfortable subject	Directly from text
Grazing	Touch gentely in a casual way.	Definition Picture
Socially available body part	…and still keep the social manner.	Not glossed
Body synchrony	…and they start to have the same movement.	Definition Picture

Additionally, Jessie wrote down notes as she progressed through the article. Ten items that appear in these notes were included in her summary, and of these five were looked-up using both a definition and a picture gloss. This suggests that the combination of note-taking and two glossing formats may have played an important role in assisting her to understand and retell the article.

Richness of the Retelling

Jessie's scored a 3.0 on Irwin and Mitchell's retelling scale (Table 72). She was awarded a level of five in the category of Major Points. She included all five stages in her summary as well as the concluding ideas and while she did not provide many supporting details, those that she did include were relevant to the major points that she was presenting. Her summary was complete in that it was organized and included an introduction, body, and a conclusion bound together with transitional markers and thus received a 4 in both Coherence and Comprehensibility. She did not incorporate enough supporting details to score any higher than a 3, which in turn also affected the completeness of her retelling. She provided almost no generalizations beyond the text, her thesis statement was weak and there were no supplementations included in her summary and thus she received her lowest marks in these categories.

Table 72
Richness of Retelling

Criteria for establishing criteria	**Level**				
	5	4	3	2	1
Generalizes Beyond Text				X	
Thesis Summarizing Statement				X	
Major Points	X				
Supporting Details			X		
Supplementations					X
Coherence		X			
Completeness			X		
Comprehensibility		X			

Final Oral Interview

Jessie's responses to the questions during the final interview were contradictory at times but very informative. She was aware of her dependency on the textual definitions as a means to comprehend the text, but readily admitted that the images helped her to understand it, recall the main and supporting ideas as well as organize her recall summary. She also added that because dating is a natural occurrence, it was relatively easy for her to organize the behavioural steps of flirting outlined in the article. "Because it is dating, normally it's the thing that happen in consequence. Pictures too because they reflect the real life." However, she also noted that certain pictures were difficult to understand so she felt safer referring to the definitions than in using the images to help her with the text and write the summary. "Images, sometimes with the pictures, I couldn't understand so I had to look up the definitions. I felt more safety when I look at the words to describe directly. Some of the pictures are like art, they didn't show the elaborate means." She also claimed that grammatical structures were instrumental in helping her to comprehend the article and write the summary.

When asked what kind of images would be the most useful in other texts, she responded that video clips would best portray movement and still images would best convey the meanings of selected nouns.

> "Still images is only one picture right, so sometimes it is not short for what you are trying to express but if you think video that people have movement so you know like...when you show something you will pay attention to his right hand, I can focus on what it means but if it is only a picture it is hard for me to identify which part what you are trying to show me....noun, maybe still image, still image would be more suitable for a noun."

She was also asked what vocabulary items or expressions she would gloss and she suggested that adjectives and cultural expressions should be included in the glossary as 'they need movement to show".

She professed to understand most of the article and vocabulary but admitted to having skipped several items.

Jessie:	I don't think it's important in the article.
Shari:	How do you decide if it is important?
Jessie:	If I read the sentence and I think that I understand the whole sentence meaning, then I'll check it out. Otherwise I think that I can know it by the former sentence or after one that I'm speaked.

Jessie admitted to the researcher that when she is reading and she cannot understand a particular item that she believes is pertinent to her understanding of a sentence or paragraph, she guesses at its meanings using the sentences prior to and preceding the word and then goes as far as to read the entire paragraph to understand it. She claimed that once she ascertains its meaning, she continues on, but if the item in question interferes with her comprehension of the entire section that it is in, she refers to a dictionary. She then rereads the sentence to ensure that she understands the item in the context in which it is presented.

However, she claimed not to have reread sentences that included images in the glossary that clearly depicted the meanings of the words they represented. "Sometimes I don't, not every time I will do that. Because it is very specifically describes it so if decide I found what I want so I not." She also claimed to have accessed the pictorial glossary for the fun of it.

Although Jessie claimed not to enjoy reading on the computer because of the need to scroll through the text and move from page to page, she found the glosses very useful

and reported to prefer reading such a text on-line as opposed to a book. "Prefer to read it on computer because computer has video. In a book because I think you are design is more suitable for a computer, yeah." She also answered that in the future she would prefer to read other academic texts from the computer, providing that she could obtain a paper copy of the article. Instructors could augment such on-line learning by including a variety of examples in the form of sentences to demonstrate how each glossed item could be used in real speech.

Overall, Jessie found reading on the computer a positive experience and stated that she would prefer texts such as the one used in this experiment over print-bound articles regardless of what the purpose was for reading them.

Shari: If the purpose for reading the article is to be tested, would you rather read it on the computer or from an article or from a book?
Jessie: But I can go back to look the article, can I check? This computer helped me to check the vocabulary but I don't think book can.
Shari: If this was a real test, you would rather read the article on the computer first? You have a choice. I can let you read it from the computer or you can read it from a book.
Jessie: If I chose computer, will I have test on computer?
Shari: No you can hand-write it.
Jessie: Ohh, I think the book doesn't has this kind of program to help me get the vocabulary right so I think I use computer.
Shari: If you were going to be tested on the text, would you rather have a glossary or would you rather have a dictionary?
Jessie: Glossary
Shari: What if I had you read it for fun?
Jessie: Computer.
Shari: What about if it was to improve your English? Would you rather read it from the computer or from a book?
Jessie: If it was very hard, because book I need to check the dictionary right, but in computer I don't because I am lazy.
Shari: So do you think you would use the computer again?
Jessie: Yeah, I think I'll check the computer. If they have words like you can directly check then I'll use computer, but most of the computers don't right, so I prefer books.

Shari: If you were going to do academic reading, would you prefer to read on or off-line?

Jessie: Can I keep them as a copy? Because on-line means that I can only read them on the computer and maybe I wish to have the article again and not use the computer every time. If I can have the copy then I would chose the computer. Also for the test.

She believes that although we should continue to include print-bound texts in schools, it is necessary for everyone to change and become more accustomed to reading from the computer.

She was also questioned as to how she recalls information such as what was presented to her during this session. She continued to emphasize the need for a print copy of the article so that she could include notes in the margins beside important paragraphs, but was quick to point out that it is how interesting the topic is that most greatly affects whether she remembers it or not. In the case of this particular text, the subject matter and the videos are what she claims will help her recall it in the future.

Overview

As indicated by the tracker data, Jessie made equal use of both the textual and pictorial glosses to help her understand the article. However, during her final interview, she reported that images (in particular the video clips) were the most useful in helping her to comprehend the text, recall the main and supporting ideas, and organize her final summary because they depicted real life situations.

Her inclusion and organization of all of the main ideas in her written summary supports this statement, as there appears to be a pattern between her look-up behaviour and her understanding, organization, and recollection of the article. While reading through each stage of the flirting process, Jessie consulted the glossary at least once for both a

textual and a visual definition. She included five of these items in her summary and placed them in the order in which they were found. However, one must be cautioned against placing too much emphasis on the glosses alone for Jessie did state that it was relatively easy to organize her retelling because it was a subject with which she was familiar and one that has its own natural and readily identifiable pattern. She also spent over two hours reading the article and did take notes about each section which included key points as well as vocabulary items, although some of these words were looked up in the glossary.

Jessie's exposure to this program seems to have had a very positive effect on her perceptions of on-line reading. Although she initially admitted to being only moderately comfortable using a computer, she professed that she would prefer to read other academic texts from a computer, providing that she could access paper copies of the same articles. The glossary in particular seems to have been the catalyst for her interest in on-line reading for it not only offers her the opportunity to readily access context-specific definitions, but it can include video clips that depict real life situations.

CHAPTER FOUR

This chapter interprets the findings reported in Chapter 3. As this is a heuristic approach, an overview of the findings from each data collection procedure is provided to help identify common patterns that exist from each case study. These results are then applied to the research questions and the theories upon which they rest. The chapter concludes with implications and recommendations for education and research, and a brief discussion of the limitations of the study.

The Research Questions and Findings

Background Information and Summary Comparison

All participants included in this report were women of Asian descent with an average age of 24. Four of the volunteers studied English in high school for 3-5 years and two of the volunteers had over five years of high school English. All had studied English outside of the regular school system, four having attended a language/conversation school and two having studied independently. One student Jessie, has had more than four years of university level English, three have had 2-3 years experience and only one, Muse, has had less than one year of university English.

Only one participant, Taka, has had any extensive English experience outside her home country, having resided in Australia for two years. None speaks English at home in their native countries.

When listing their strengths, two volunteers, Taka and Alles, reported that reading was their strongest skill and only Alles asserted that writing was her next strength. As can be seen in Table 73 these two volunteers achieved the highest scores for richness in their

retelling of the article, which suggests that their perception of their expertise was reflected in their performance. Apple, who reported that writing was her strongest skill, followed by reading, had the highest overall summary score. The richness of the retelling was weaker than that of the other participants however, indicating that she was better able to reiterate information in quantity than she was in quality. Bluepig and Muse also professed to have strong English writing skills but neither had high summary scores, nor did they receive high marks for the richness of their retellings. In Bluepig's case, this contradicted her initial claim that writing and reading were her two strongest skills. Nowhere is this contradiction of beliefs in one's abilities more notable than in Jessie's case. She claimed that her two strongest skills are speaking and listening and that she is far weaker in the other two areas, yet she received the second highest summary score (18.5) and was the most successful of all of the students in the richness of her retelling of the article. Given that she provided the greatest number of inferences of all of the participants, it could be concluded that discussing the text may have contributed to her comprehension of the article.

In examining the time it took for each volunteer to read and write the summary, Jessie and Apple had among the highest recorded times (Table 73) having spent over two hours reading the article and approximately an hour and a half writing their retelling. Taka, who had the third highest mark on her summary and the second highest richness of retelling score, also spent two hours reading the text and an hour writing her summary. All three also took notes from the article and the vocabulary items that they looked up during the reading session, which indicates that time and written reinforcement facilitates comprehension and recall.

While it was believed that their reading histories may also help to provide some insight as to their existing reading patterns and abilities, no such correlation could be drawn. Five of the students read information texts in English on a regular basis, excluding Jessie who typically reads novels. The majority of the reading done is for school purposes and, as the students were not asked what books they read for pleasure, only how often they read in English, it was not possible to determine whether their purpose for reading (pleasure or school) affected how they read and how they understand what they are reading. Jessie, for example, who reads for pleasure only twice a week, achieved the highest richness of retelling score and Muse, who reads 3-5 times a week had a lower overall score.

However, Jessie's long-term experience studying English literature at a post secondary level and additionally, Muse's immersion into an English environment, may have played an important role in their ability to comprehend and thus recall a text that presented predominantly western ideologies. Similarly, Muse's experiences in Vancouver and her strong verbal skills may have helped her in her understanding of the article and in her retelling of it. Experience may also have assisted Taka, who is also an infrequent reader, in her understanding and recall of the article. All three participants have had more experience in reading and operating within the confines of an English environment than have the other students. Thurs, although reading histories could not be directly correlated to their performance during this study, experience with and knowledge of English writing and lifestyles could have affected their understanding of and ability to recall the article.

Table 73
Group Tabulation of Time on Task and Summary Scores

Student	Time to Read Article	Length of Summary (Number of words)	Time to Write the Summary	Summary Score Out of Forty	Richness of Retelling
Bluepig	55 min.	124	1 hr	11	1
Alles Gute	3 hrs.	128	15 min.	13.75	2.5
Muse	2 hrs. 16 min.	185	40 min.	12.5	2.6
Taka	2 hrs.	230	1 hr.	14.75	2.8
Apple	2 hrs. 14 min.	198	1 hr. 38 min.	19.25	2.5
Jessie	2 hrs. 54 min.	224	1 hr. 30 min.	18.5	3.0
Overall Average	2.2 hr	181.5	1 hr.	15	2.4

Dictionary use

Dictionary use was reported by all of the participants to be a distraction as it disturbs their concentration while reading, is time consuming, and can cause confusion because of the number of different definitions provided for any given item. However, each volunteer, excluding one, indicated that they used a dictionary while reading English and within this group the frequency of use ranged from never to quite frequently. Overall that pattern was reflected in gloss use among the participants. Alles Gute, who never consults a dictionary while reading accessed the fewest number of glosses and Taka and Bluepig, who quite frequently refer to a dictionary, accessed the glossary the greatest number of times (Table 74). The remaining three students did occasionally refer to glosses while reading the text indicating that their habitual pattern of reading was transferred from a print to a computer-based medium.

Three of the volunteers (Apple, Alles, and Jessie) affirmed that they were visual and textual learners and, as recorded by the tracker data, there was an almost equal division between the overall number of textual and pictorial glosses that they accessed (Table 74).

Taka and Muse claimed to be visual learners, however both volunteers used a combination of text and images during their sessions. As this was the first time that any of the participants had been exposed to a text glossed with images, it may be that their use of definitions was a natural response developed through years of accessing dictionary definitions.

Table 74
Group Tabulation of Time on Task and Number and Types of Glosses Accessed by the Participants

Student	Total Time Spent Reading the Text	Time spent on looking up words	Total Number of Glosses Accessed (includes repeats)	Item type Definition	Item Type Picture	Item Type Picture + Definition
Bluepig	55 min.	1,014 sec. 16.9 min.	73	32	40	1
Alles Gute	3 hrs	135 sec. 2.25 min.	16	8	5	3
Muse	2 hrs., 16 min.	852 sec. 14.2 min.	59	27	18	14
Taka	2 hrs.	2,820 sec. 47 min.	197	108	70	19
Apple	2 hrs. 14 min.	525 sec. 8.75 min.	60	29	7	24
Jessie	2 hrs. 54 min.	1,020 sec. 17 min.	48	25	19	4

The Computer and Computer Experience

All participants, with the exclusion of Taka, use a computer at least 5-6 times a week, and within this group, Apple and Taka, who have limited computer experience, are the least comfortable in using one. The most commonly cited reasons for using a computer in order of importance was to email friends and family and to search for information for school, although all of the participants do read the news and use it for entertainment purposes. Three of the volunteers, Muse, Jessie and Taka, find no difference between reading on a computer from a print-bound text and two, Apple and Alles, find it more difficult. Bluepig was not asked this question. As was expected, both Alles and Apple were the least comfortable using the program, citing difficulties in using the mouse and problems in focusing on the screen for extended periods of time because of the light. Alles also found that taking notes while reading from the computer was more difficult for her to do than if she were reading from a book. It is not possible to generalize and make any claims that their comfort and their ability to comprehend the text were in any way linked, for if comprehension is based upon the richness of the retellings and their summary scores, Apple should have received one of the lowest marks of any of the participants. While the richness of her retelling was not high, she did achieve the highest summary score in the group. Alles, on the other hand, who was the least comfortable of all of the volunteers in using the computer as a reading medium, scored higher than Bluepig who has had a lot of computer experience and is very comfortable reading from a screen and operating a mouse and keyboard.

Think Alouds

Text Drawn Inferences Paraphrases

Seventy-nine percent of all inferences made during the reading session originated from the text and of these 63% were correct (Table 75). Paraphrases were the dominant think-aloud category, followed by explanations, associations and predictions. All of the participants involved in the study paraphrased vocabulary items and/or ideas directly from the text with an overall accuracy rate of 54%. This percentage lowers to 44% when paraphrases originating from glosses are included in the total.

Individually, the greatest percentage of correct paraphrases were made by Alles Gute, who had a 90% accuracy rate followed by Apple (60%), and Jessie (58%). However, Alles Gute made only fifteen inferences, ten of which were paraphrases, and thus the percentages may inaccurately skew her overall accuracy rate much as they do in Apple's case. Apple also had few paraphrases (five), which does not provide a strong argument to support her ability to generate them from the text. Jessie made the greatest number of paraphrases, one hundred and twenty-two, seventy-one of which were correct, which gives a better picture as to how effectively she is able to understand and then retell or explain the vocabulary items or ideas taken from the article.

Excluding Muse, all of the participants were relatively successful in paraphrasing directly from the text. Additionally, all but Apple had more paraphrases than other think-aloud inferences. The tracker data and the information collected from the interviews support the argument that the students did, for the most part, transfer their typical text-bound reading strategies to the computer. Further evidence of this behaviour can be seen in the explanations that were given during the reading sessions.

Table 75
Number of Correct (0) and Incorrect (X) Inferences Made by the Group Directly from the Text According to Trabasso and Magliano's (1996) Categories

Student	Paraphrases		Associations		Explanations		Predictions		Totals	
	O	X	O	X	O	X	O	X	O	X
Bluepig	13	11	3	1	13	4	-	-	29	16
	24		4		17		-		45	
Alles Gute	9	1	-	1	2	-		1	11	3
	10		1		2		1		14	
Muse	9	19	9	-	8	8	-	-	26	27
	28		9		16		-		53	
Taka	3	7	1	-	2	-	-	-	6	7
	10		1		2		-		13	
Apple	3	2	5	-	10	-	-	-	18	2
	5		5		10		-		20	
Jessie	71	51	27	6	38	19	1	-	137	76
	122		33		57		1		213	
Totals:	108	91	45	8	73	31	1	1	227	131
	199		53		104		2		358	

Explanations

As can be seen in Table 76, sixty-seven of the seventy-seven explanations that were made during reading were derived from contextual clues, the majority of which (38) were made by Jessie. In every case, excluding Bluepig's, the number of contextual-based explanations were greater than those derived from grammatical clues and with the exception of Muse, the students were also the most successful with context-derived explanations (Table 76). Muse had a higher success rate using grammatical inferences than contextual clues with an accuracy rate of 50%. Bluepig, Apple, and Jessie had a greater than 64% accuracy rate. Alles Gute and Taka made too few explanations from which any conclusions could be drawn. However, the data suggest that the majority of the students did draw the meanings of unknown words from the context more so than from grammatical clues.

Associations

A total of fifty-two associations were made from the text, forty-four of which were correct (Table 75). Jessie provided the most associations (thirty-three) and was highly successful in doing so. As can be expected by the overall number of inferences made during the reading, Alles Gute and Taka made the fewest number, however all of the volunteers were very successful in the associations that they made indicating that background knowledge plays a role in text comprehension.

What is most notable about these think alouds, are the differences between them. They range from simple proclamations of having learned the word to more elaborate connections to the real world. For example Jessie was able to associate the action of withdrawing money from an automated teller to the physical movement of withdrawing away from someone. Unfortunately, no strong correlations could be drawn between the number of associations

made directly from the text and the recall protocols. This indicates that while background knowledge did assist them in understanding the article, they did not draw on it to the same extent when writing their summaries.

Two students, Alles and Jessie, made one prediction each and thus from this information, it could be suggested that prediction does not play an important role in the reading process.

Table 76
Correct (0) and Incorrect (X) Explanations Made by the Group Divided Into Grammatical and Contextual Categories

Student	Based on Grammatical Inferences		Based on Contextual Inferences		Total	
	O	X	O	X	O	X
Bluepig	5	2	5	2	10	4
	7		7		14	
Alles Gute			1		1	
					1	
Muse	4	1	4	7	8	8
	5		11		16	
Taka			2		2	
			2		2	
Apple	2	-	8	-	10	-
	2		8		10	
Jessie	9	6	25	13	34	19
	15		38		53	
Totals	20	9	45	22	65	12
	29		67		77	

Glossary Use

Inferences

Gloss use among the participants ranged from sixteen to one hundred and ninety-seven referrals (Table 77). Taka and Bluepig, both of whom professed to frequently use a dictionary while reading, accessed the greatest number of glosses. Jessie, Apple, and Muse, all occasional dictionary users, referred to 48-60 glosses during their sessions and Alles Gute who never consults a dictionary accessed only sixteen. In each case, the students transferred their typical reading behaviour in looking up words in a dictionary while reading from an English text to reading an article and consulting the glossary on the computer. The glossing format that elicited the greatest number of inferences was pictures. A total of fifty-eight were made by the group as a whole, thirty-four of which were correct (Table 78). While it was hoped that a correlation could be made between their oral feedback from the images and their final summaries, the relationship between the two was weak for what they uttered aloud did not necessarily appear in their written recalls.

Table 77

Number and Types of Glosses Accessed by the Group

Student	Total Number of Glosses Accessed (includes repeats)	Item type Definition	Item Type Picture	Item Type Picture + Definition
Bluepig	73	32	40	1
Alles Gute	16	8	5	3
Muse	59	27	18	14
Taka	197	108	70	19
Apple	60	29	7	24
Jessie	48	25	19	4
Totals	453	229	159	65

Table 78

Total of Correct (0) and Incorrect (X) Inferences Made by the Group from the Glosses

Student	Definitions		Pictures		Definition + Pictures		Totals	
	O	X	O	X	O	X	O	X
Bluepig	4		12	8			16	8
Alles Gute	1		0	0			1	
Muse	1		8	8	2		10	8
Taka	0	1	7	4			7	5
Apple	1		0	0			1	0
Jessie	9	6	7	4	1		17	10
Totals	16	7	34	24	3		53	31

Pictures

Paraphrases

A closer examination of the students' success rate within the different think aloud categories indicates however, that the participants were not as successful in interpreting and paraphrasing the pictures as they were in explaining or connecting them to background knowledge (Table 79). A total of twenty-eight paraphrases were derived from images, 50% of which were correct, suggesting that the pictorial glosses were, for those participants who accessed and attempted to orally paraphrase their meanings, not highly successful at conveying their meanings. At an individual level, Taka was the most successful in paraphrasing ideas and/or specific vocabulary from the images. Notably, she was the least successful of all the participants in paraphrasing directly from the text. The two volunteers who were the most successful with text-based paraphrases (Alles and Apple) did not generate any paraphrases or any other inferences while consulting the picture glosses. Between them, they referred to only twelve pictures.

The low success rate in pictorial-based paraphrases can be attributed to two factors. The first is that the images did not successfully convey their intended meanings and the second is that the paraphrases themselves were for the most part, guesses. In almost every profile, paraphrases, explanations, and associations were intermixed. Associations and explanations may very well have been the method by which the participants tested their original hypothesis about the glosses and thus the paraphrases that they made from them.

Explanations

Explanations were the second largest think-aloud category generated from images. These inferences indicated how the volunteers did or did not understand the pictures, for example, Muse, after watching the video clip demonstrating 'inflection', responded, "I think first one is just like a statement". She was referring to the difference between identical statements said in two different ways to demonstrate what inflection was and how the meaning of what one says changes depending on how it is said. They also included descriptions as to what was happening in the videos.

Eleven of the twenty-one explanations were correct, suggesting that the pictures did, to a certain degree, convey the actions or description of the items they were representing when the students used them as a means to explain rather than define their meanings. They unfortunately were not wholly successful in doing so. As discussed above, the explanations were a method by which the students could test their hypothesis or to help them arrive at one. As such, the students' overall success rate was lower than expected, but it is apparent that image-based explanations were a part of the process in understanding the article.

Table 79

Group Number of Correct (0) and Incorrect (X) Inferences Made from Picture Glosses
Trabasso and Magliano's (1996) Categories

Student	Paraphrases		Associations		Explanations		Predictions		Totals	
	O	X	O	X	O	X	O	X	O	X
Bluepig	5	6	3	-	4	2			12	8
Alles Gute	-	-	-	-	-	-	-	-	-	-
Muse	3	4	1	-	4	4	-	-	8	8
	7		1		8					
Taka	4	2	-	-	3	2	-	-	7	4
	6		-		5				11	
Apple										
Jessie	2	2	5	-	-	2	-	-	7	4
	4		5		2		-		11	
Totals	14	14	9	-	11	10			34	24
	28		9		21		0		58	

Associations

The two volunteers for whom the images triggered background knowledge more than once (Bluepig and Jessie), were successful in each association that they made. They were for the most part simple acknowledgments of having already learned the words or a means to clarify their understanding of it through real life scenarios. Two examples of the latter are shown below:

Table 80

Examples of Successful Associations from Pictorial Glosses

Examples of Successful Associations Made from Pictorial Glosses	
Bluepig	Jessie
Maybe a cultural problem or something, but if I look at everything, what she talk about. And maybe one group of people talk over there, what you talk about, I think I will have big problem, make mistake. (Gazing)	Ah, just like some kinds of bird, like salmon when they have even they went to other places, other oceans or other seas… (Potential mates)

What this and the above information suggests is that although the pictures did not always facilitate an immediate understanding as to what they were representing as was indicated through the students' oral representations of them, they were of some benefit to the participants during the reading session. It also provides some insight as to how the volunteers processed and interconnected the images not only with the text itself but also with real life situations. Overall, images generated more positive than negative inferences, which indicates that they were useful in helping the students understand the text.

Definitions

The total number of inferences derived from the definition glosses during the think aloud protocols was low (Table 81), but the overall accuracy rate was high at 70%. One must take into consideration, however, that the lower numbers also reduce the opportunity for error.

Paraphrasing was the most prevalent think aloud category, comprising 83% of the total number of inferences. Each participant, excluding Taka successfully paraphrased at least one textual gloss. Jessie had the greatest number of definition-based paraphrases with a success rate of 50%. Bluepig was accurate in each of her paraphrases, which indicates that her frequent look ups are an effective means by which she understands unknown words. The group accuracy rate for paraphrases derived from definitions was 68%. Only two associations, both of which were correct and two explanations of which only one was correct were elicited from this glossing format. It is difficult to draw any conclusions from these two latter categories, other than to suggest that they were moderately successful for those who used them.

Definitions + Pictures

Similarly, only four inferences, three paraphrases and one explanation, were made from definition + picture glosses (Table 82) making it difficult to make any sweeping generalizations as to their effectiveness in helping the students understand the text. Based on this minute database, it could be inferred that the combination of the two glossing formats may have been useful in helping the participants confirm the meanings of selected items and thus contributed to their comprehension of the text.

Table 81

Total of Correct (0) and Incorrect (X) Inferences Made by the Group from Definition Glosses
Trabasso and Magliano's (1996)

Student	Paraphrases		Associations		Explanations		Predictions		Totals	
	O	X	O	X	O	X	O	X	O	X
Bluepig	4									
Alles Gute	1									
Muse	1									
	1									
Taka						1				1
					1				1	
Apple	1									
	1									
Jessie	6	6	2	-	1	-	-	-	9	6
	12		2		1				15	
Totals	13	6	2		1	1			9	7
	19		2		2		0		16	

Table 82
Group Total of Correct (0) and Incorrect (X) Inferences Made by the Group from Definition + Picture Glosses
Trabasso and Magliano's (1996)

Student	Paraphrases		Associations		Explanations		Predictions		Totals	
	O	X	O	X	O	X	O	X	O	X
Bluepig	-	-	-	-	-	-	-	-	-	-
Alles Gute	-	-	-	-	-	-	-	-	-	-
Muse	2								2	
	2								2	
Taka	-	-								
Apple										
Jessie	1	-	-	-	1	-	-	-	1	
					1				1	
Totals	3				1				3	
	3		0		1		0		3	

Text-Based Metacomments

More than half of the metacomments generated by the students were text-based (Table 83) and ranged from comments made about an understanding or misunderstanding of specific words to more generalized statements about the text. Examples of more detailed accounts include, "I don't' know, I think I know what that one means", "I looked before, right", and "I thought it's not important". Generalized comments provided some insight as to how they understood the article and what their strategy was in working through it. Examples include, "I think it's very easy to understand because this article, this kind of article it's very easy to make a guess at that time", "If I really don't' know idea of what talking about then I will check", and "some of them I can't understand the meaning of some of them, but after I go through I'll check the definition".

Gloss-Based Metacomments

Overall, the number of gloss-based inferences was substantially lower in number than were those generated from the text. One factor that may have contributed to this imbalance is the students' unfamiliarity in using a glossary while reading and thus their discomfort in commenting on the glosses that they accessed. Another reason may have been the novelty of using the think aloud process. Additionally, four out of the six participants concentrated on textual and grammatical clues to help them comprehend the text so they did not access many glosses during the reading session.

Table 83

Group Total of Text and Gloss-Based Metacomments (Positive and Negative)
According to Trabasso and Magliano's (1996) Categories

Student	Text		Definitions		Pictures		Definitions + Pictures		General Comments		Total	
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.
Bluepig	15	9	3	-	11	13	-	-	1		30	22
	24		3		24		-		1		52	
Alles Gute	9	12	-	-	-	-	-	-	6	1	15	13
	21		0		0		0		4		28	
Muse	3	11	1	-	4	10	2	-	-	-	8	23
	14		1		14		2				31	
Taka	1	1	-	-	3	5	1	3	-	-	5	9
	2		-		8		4		-		14	
Apple	3	4	-	-	-	-	-	3	1	-	4	7
	7		-		-		3		1		11	
Jessie	17	45	1	1	12	4	-	-	2	-	36	46
	62		2		16		-		2		82	
Totals	48	82	5	1	30	32	3	6	10	1	98	120
	130		6		62		9		11		218	

Picture Glosses

The greatest number of gloss-based metacomments originated from images and they were either an affirmation of comprehension or an indication of misunderstanding. Examples of positive and negative metacomments include, "Yeah, it makes sense, it is very interesting", "Yeah I did right", "It makes senses", "It's like a painting", "Okay, I want the picture", "I don't think it's clear, it's not very clear", "I don't know", and "it's an ugly picture". When their metacomments are cross-referenced with the part of speech that the word belongs to and the glossing format from which the comments originated, it becomes apparent that prior to selecting either a video clip or a still image, careful consideration should be given to the grammatical role that the word is playing, for example whether it is functioning as a noun, verb, or adjective depending on the context of the sentence in which it is embedded. As can be seen below in Table 84, the students had more success in understanding verbs that were glossed with videos than they had with nouns that were presented in this format. It appeared to be easier for the participants to elicit the meanings of nouns when they were depicted by still images. It should be noted however, that videos outnumbered still images (Table 85) and the majority of nouns in the text were glossed with stills. There were three however, for which video clips were used but it was the sound that was the key to comprehension. 'Intonation', 'inflection', and 'mellifluous hello' were illustrated using video clips and it was the audio component that helped the volunteers understand their meanings.

The tabulation also includes metacomments that provided brief explanation as to why an image did or did not successfully convey the meaning of the glossed item. For example, "It's easier to get picture. It is more comfortable (than the definition)", "Maybe I will female attract very people as a princess but I won't think of a peacock", "Yeah, because

really the same picture', and "I can't hear, he speaks too quickly". More general metacomments regarding the pictorial glosses assist in identifying what effect the images had on the student and how she might compensate for her lack of understanding the gloss. For example Bluepig told the researcher, "Maybe I should switch, look at the definition first then picture" and "Maybe picture cannot let me know they look each other".

Table 84

Picture-Based Metacomments (Positive and Negative)
Organized By Glossing Format and Grammatical Category

Student	Stills		Video		Totals	
	Positive	Negative	Positive	Negative	Positive	Negative
Bluepig	3 nouns	9 nouns	7 verbs	1 noun 4 verbs	10	14
Alles Gute						
Muse	3 nouns	1 noun 2 adj.	1 noun	4 nouns 3 verbs	4	10
Taka	1 noun	2 nouns	2 nouns 1 adj.	1nouns 1 verb	4	4
Apple						
Jessie	4 nouns	2 nouns	8 verbs	2 verbs	12	4
Totals	11 nouns	14 nouns 2 adj.	3 nouns 15 verbs 1 adj.	6 nouns 10 verbs	30	32
	27		35		62	

One point that should be noted is that the above tabulations do include multiple metacomments originating from three of the same gloss.

Table 85
Group Total of Glosses Used to Annotate the Text
(including repeats)

Definition	Videos	Pictures (stills)	Items Glossed with only a Definition	Total Excluding Definitions
111	56	30	25	111

Definition + Picture

Eight metacomments were made about definition + picture glosses and indicate that there were difficulties with this glossing procedure. Two of the three verbs that were illustrated using video clips were cited as being problematic, two nouns also presented via a video were also confusing, and two adjectives depicted using still images were misunderstood. There was one general metacomment made by Apple that perhaps summarized what the inherent difficulty was with this glossing format. She reported, "I think I cannot chose listening and reading both, I'm very bad poor". Select metacomments indicate that video clips accompanied by text and audio proved to be confusing for the students could not watch, read, and listen simultaneously. The following examples support this finding: "Definition is so quickly", "The definition plus picture is sometimes confusing, that's why I use definition then picture", and "Both definition and picture is coming at the same time, so I cannot concentrate which one I should concentrate".

The metacomments provided during the session suggest that while the participants found the images to be useful, caution should be exercised when selecting pictures as a glossing format. Still images were the least successful in conveying their intended meanings, particularly when the item was a verb. Action is not readily portrayed or understood when presented without the actual movement being shown and thus videos

were far more successful in depicting movement. Additionally, images as well as text are interpreted more often than not, through a cultural lens. Background experience, imagination, and the universality of the topic being represented also play an important role as to how images and text are understood. All of these factors came into play during this study. The metacomments, although few in number, provided an opportunity to obtain a better perspective as to some of the reasons why the participants had difficulties in understanding them.

Recall Protocols

The students' performance on their summaries was far below the anticipated results, particularly in the scoring of the retelling. Apple, Jessie, and Taka were awarded the highest marks, however none of them passed the test. In the case of Alles Gute, Muse, and Bluepig, their belief that it is only necessary to have a general understanding of the article was reflected in their retellings of it and thus they received the lowest marks. As indicated in the individual case study reports, the predominance of low scores can be attributed to the absence of supporting ideas in their retellings and weak introductions or conclusions. It should be noted however, that the checklist created by instructors at the University of Victoria did include many supporting ideas, many of which would be difficult to recall immediately upon the completion of the text. This is perhaps why there is a discrepancy between their overall summary scores and the richness of their retellings. For example, one would expect that Apple would have scored higher on Irwin and Mitchell's retelling scale than did Jessie. However, it was not the quantity of ideas that was being scored in as much as the quality of the retelling of them. Jessie, for example, was far more successful than the other participants in her organization of her summary and her inclusion

of major points within it for she included transitional sequences to connect the stages and thus had a clearly defined introduction, body, and conclusion. The combination of these elements contributed to the creation of a coherent and very comprehensible summary.

Several factors played an important role as to how successful each student was in their retellings.

Time on Task

Data collected from the on-line tracker and from the summaries suggest that time on task played an important role in what the students comprehended and were able to recall (Table 73). The participants who had the highest summary and richness of retelling scores also spent the greatest amount of time reading the text and writing their summaries. The only exception to this was Alles Gute who spent three hours reading the article and did not have one of the top three scores. As indicated earlier, this can be attributed to her pattern of reading for a general meaning of the text and most notably, writing her summary in fifteen minutes. Apple and Muse were only separated by two minutes in their reading of the article but Apple spent an additional fifty-eight minutes writing her retelling. While her score was only minutely higher than that of Muse's, it was higher. An overview of the time spent reading and retelling the article does suggest that time on task played an important role in comprehension and recall.

Reading Patterns

A closer examination of how the students read the article brings in two additional factors that contributed to the way in which they understood and reiterated the text, rereading and note-taking. Jessie and Apple each read the text in its entirety once,

skimming and scanning for main and supporting ideas. It was during their second reading that both accessed the glosses. Both participants, after looking up selected items, reread the sentences that there were in and occasionally read to the end of the paragraph to ensure that they understood the words in the context in which they were being used. Jessie, however, reviewed entire paragraphs more frequently than did Apple and also took detailed notes of each section, and of the items or ideas that she recorded, ten were included in her summary. Similarly, Taka took notes while reading and also accessed the glosses and then reread the sentences and/or paragraphs that the words were in to verify their meanings. Her notes were not as detailed as Jessie's and were a little less organized. She did write down the five flirting stages perhaps as a reminder as to what they were and then included three of these as well as three other items from her notes in her summary. She also read aloud and rehearsed the pronunciation of new words. It should be noted that within the two hours that it took her to read the article, she did read it only once.

Bluepig also reread sentences in which words that she had looked up were in and took notes. However, she was less focused in doing so than were her counterparts and did so only when she believed that the item or idea was relevant to the general point being made. Additionally, she spent only fifty-five minutes reading the article and read it only once, which may help to account for her overall low scores. Alles Gute simply paused on items that she did not understand, reread the sentence and continued on. Only once did she reread a sentence after consulting the glossary and she did not take notes. What this information suggests is that note-taking and careful rereading of sentences and paragraphs contributed to comprehension and to the students' ability to recall the article.

Gloss Use and Summary

The foundation of this study was built upon the questions as to how effective computerized glosses are in promoting comprehension of on-line texts and which format would best serve the needs of the students using them. One of the methods implemented to answer these inquiries was to tabulate the number and types of glosses accessed and cross reference them with items or ideas used in their retellings. As is shown in Table 86, there were a total of sixty-three ideas or items taken either directly from the text or from the glosses, and incorporated into the students' retellings. A little more than half of this total originated from glosses. Most notable are the high numbers of definition + picture glosses and textual definitions intermixed with images accessed and then included into the summaries. This suggests that a dual format augmented comprehension and the student's ability to recall what she read. This evidence supports Pavio's dual-coding theory that posits that students acquire and retain information better if it is presented in both a visual and textual format.

The image format that was most frequently used to paraphrase items in the retellings was video clips (Table 87). This may be attributed to the 't.v. quality' that the videos brought to the text and also to the novelty of the program. Additionally, they may also have been remembered because they were written down in notes or were reinforced verbally. For example, Taka, after accessing 'mellifluous hello', responded "like came from melody?" It was also included in her notes.

When the students' behaviour during their reading session and information from their background interviews are triangulated with the paraphrased items in the summary, another pattern emerges. Taka, who professed to frequently using a dictionary while reading and attested to be a visual learner, accessed the glosses the greatest number of times and used

ten ideas/vocabulary items from the article in her summary, each of which originated from picture glosses. Additionally, she included many details from the videos in her retellings to support her main ideas. Three other participants' (Muse, Apple, Jessie) confirmed learning approaches could also be identified through their inclusion of paraphrased glossed items in their summaries. Each claimed to be visual and textual learners and all three constructed paraphrases from a combination of pictorial and textual glosses as well as from the text. The two exceptions to this were Bluepig and Alles Gute. Bluepig was not asked as to what kind of learner she is and thus no conclusion could be drawn. However, it would appear from the summary results that images did play an important role in helping her to understand and recall the text. Alles Gute was an anomaly in that she claimed to be both a visual and textual learner, however even when given the opportunity to use images to help her understand the text, she remained true to her habitual reading behaviour of determining the meaning of unknown words by using contextual and grammatical clues.

Overall, however, the students' learning styles are reflected in their retelling performances through the items they included in their summaries and how it was they came to understand them.

Table 86

Summary of Ideas/Vocabulary Items Paraphrased in the Retellings and the Gloss Types From Which They Originated

Student	Total Number of Ideas/Vocabulary Items Successfully used in Summary (Including those taken directly from the text)	Gloss Type Used for Each Paraphrased Item/Idea in the Final Retellings					
		Definition	Picture	Definition + Picture	Combination of Definition and Picture (order of selection not used)	Definition and Definition + Picture (order of selection not used)	All three Glosses
Bluepig	4	1	-	-	3	-	-
Alles Gute	8	-	-	-	-	-	-
Muse	14	1	1	2	3	1	-
Taka	10	-	2	8	-	-	-
Apple	16	1	-	-	-	4	1
Jessie	11	1	-	4	-	-	-
		4	3	14	6	5	1
Totals	**63**	**Total Number of Items from Glosses:**			**33**		

Table 87
Image Format Most Frequently Used to Paraphrase Items in the Final Retellings

Student	Glossing Format Used to Create Paraphrases in Retellings	
	Still Image	Video Clips
Bluepig		3
Alles Gute		
Muse		6
Taka	1	9
Apple	2	
Jessie	1	3
Total	4	21

Final Oral Interview

The final interviews assisted in confirming data collected from the observations during reading, background surveys, on-line tracker, and recall protocols. It also gave the students the opportunity to have a voice in helping teachers, researchers and programmers in the development of on-line reading programs.

As was observed and later confirmed, all of the students in this study made attempts to first understand unknown items through the context of either the sentence or the paragraph in which they were embedded. All but one participant (Alles Gute) reread the sentence after they had consulted the glossary for the word. Also with the exception of two students (Bluepig and Muse) their claims as to what glosses they used and reported being useful to understand and recall the text was substantiated through the tracker data and findings in the recall protocols.

Three of the students reported to have understood a great deal of the article (Jessie, Apple, and Muse) and one, Bluepig, claimed to have understood "almost all of it". It was expected that they would report that they comprehended most of the vocabulary; however, only Jessie and Apple attested to understanding a great deal of it, although Apple indicated that her understanding of the vocabulary was less than that of the text. Taka and Alles Gute comprehended between 60-75% of the text and the vocabulary. This suggests that for at least two of these participants, comprehension of the text does not hinge upon a complete understanding of all of the vocabulary in it.

This fact was also confirmed during the final interviews with Bluepig, Alles Gute and Muse, all of whom believe that comprehension does include the understanding and recall of many different details, but is instead an understanding of the general meaning and ideas of the article.

Overall, their reaction to the program and their experience was positive. Only one student, Alles Gute was uncomfortable using the computer and claimed that the glosses did not assist her in any way. Both on and off-line, pausing to consult a dictionary or a glossary proves to disrupt her reading process. The other participants found the glosses to be useful in helping them to comprehend and recall the text and claimed that they were preferable to a print-bound dictionary because they, unlike dictionary definitions, were readily accessible, context specific, and easy to use. The students claimed that their reading pace was more fluid when consulting the glosses than it is when they referred to a dictionary. The videos, were the most popular of all of the glossing formats and were purportedly the most useful of all of the annotations in helping the students to comprehend, organize, and recall the article. For visualizers like Taka , they were very effective for her regular pattern of reading includes creating visuals in her head to help her

comprehend and remember what she has read. However, there was one drawback in using the videos. Although items glossed with the definition + glossing format (usually a video) were the most frequently paraphrased words or ideas found in the students' written recalls, feedback from the participants suggests that the combination of video and a textual definition that either moves or stays stationary within the clip was confusing. It was difficult for them to concentrate simultaneously on listening and watching the video and reading the definitions.

Suggestions as to what types of glossing formats should be used were mixed and included videos with sound, animation in both still and video formatting, still images depicting real life scenarios, photographs, and textual definitions that provide one definition and several examples as to how to use the word. As to what parts of speech should be glossed and how that should be done, there was also a mixed reaction. Nouns, verbs, and cultural expressions were considered to be the most important items for they often carry main ideas. Only two students believed that adjectives should be glossed.

The participants recommended that verbs be annotated with videos, nouns with stills, and cultural ideas or expressions with either videos or definitions. One recommendation that Taka made was that root words or words that are similar within the text be glossed with textual definitions as opposed to videos so as to avoid confusing them. Apple also suggested using only one definition and not a variety of options for she found that having several choices could be distracting and time consuming.

The students also made several suggestions as to how teachers and programmers could make it easier for them to read academic texts on-line. While having to move back and forth between windows was not a major difficulty for them, the participants suggested that it might be easier to read the text and remember it if they could see the definitions, images,

and the text at the same time rather than move back and forth between the glosses and the text. This way they could read the definition, watch the video below it in a separate part of the screen and then reread the sentence in which the word was in, all without having to click the mouse. As all of the students complained about having to use the scroll bar to return back to their place in the text once they had accessed the glosses, these ideas would alleviate the problem.

They also wanted to be able to either highlight the items that they looked up on the screen so that they would not have to reread the text to find them or to be able to copy and past the words into a sidebar so that they had a readily available record of those words with which that they had difficulties. This would negate the need to move back and forth between on and off-line activities and enable them to transfer already established reading patterns to computer-based exercises.

Additionally, changing the screens and the type or amount of light that emanates from it would reduce eye-strain making it easier to concentrate for longer periods of time on the text. Instructors could also provide the students with computer instruction and time to practice using academic texts on-line so that they could become accustomed to manipulating the mouse, using the keyboard, and learning to do more than skimming and scanning for information on the computer. One of the most common complaints made during this study was that the students were uncomfortable using the computer because they had had little experience doing so for academic purposes and because of the physical strain that it placed on them.

While there was a range of responses as to how much this program has changed their perceptions of on-line reading and what and how they read, all of the students indicated that, they were now more interested, if even minutely, in using the computer for academic

reading. Two students, Taka and Bluepig acknowledged that how they read on the computer would change if such a program were available. For example, Bluepig claimed that she would invest more time in reading than she currently does to get a deeper meaning of the text by using the glosses. Other participants who found reading to be boring, also indicated that computer-generated texts with glosses are far more appealing and thus interesting than is reading from a book. However, if reading on the computer became part of a daily routine, it was suggested that it would become tedious, particularly if it were necessary to remain at school to do so. Print-bound books, while not as 'entertaining' as computer glossed texts are far easier for them to take home and reread and highlight when necessary. They are also difficult to move away from for they have been the means through which the written world has always come alive for them. While some are more interested in reading computer-generated texts than others, all of the participants made one strong recommendation: If teachers want to encourage them to read and develop their skills, give them something that they are interested in reading.

Findings in relation to the research questions

What forms of glossing (definitions, images, and text plus images) do students refer to (as indicated by the on-line tracker) when reading for comprehension?

As was found in Lomika's study (1998), there was a heavy reliance on English definitions, which suggests a dependence on word meanings to understand the text. This may be a habitual pattern transferred from one medium into another. However, as was noted in the individual case studies and summary of findings, more than one annotation was frequently accessed for one item, suggesting that where multiple annotations are available, students will use more than one gloss type.

What forms of glossing do students report as being useful in helping them during reading tasks and reading comprehension and what reasons do they give for their choices?

As reported by five of the six participants, the video glossing format proved to be the most useful for overall comprehension of the text and as a means to recall and connect the ideas found in it. The reasons given for this choice were that they depict real life scenarios and are more easily remembered because of the visual and audio components. However, textual definitions helped to clarify any images whose meanings were not clear and did for two of the participants play an important role in their organization of their retellings.

Do any patterns emerge in the students' think aloud protocols that suggest that there is a relationship between look-up behaviour (what glosses the students accessed) and comprehension (as indicated by their written summaries and final interview)?

As indicated in the above information, the greatest number of inferences was made directly from the text, which suggests that the students have transferred a habitual reading pattern from print-bound books to computer-based text. However, by triangulating the information and data from the think-alouds, on-line tracker, retellings and final interviews, a pattern does emerge. The greatest number of inferences from glosses originated from images and information obtained during the final interviews and from the written summaries indicate that of the images, the pictorial format that proved to be the most useful in helping them to comprehend and summarize the text were video clips. The image format from which paraphrases were the most frequently drawn and used in the written recall protocol also included video formatting. Background knowledge as is indicated through the number of associations made from images also suggest that videos are the most successful in activating prior knowledge.

The specific gloss type from which the participants incorporated vocabulary items or ideas into their retellings was the definition + picture gloss. Words and ideas were also best understood and remembered when the participants used multiple types of annotations for the same item. Additionally, a relationship could be drawn between their look up behaviour, what they reported using and what they incorporated into their retellings.

This evidence indicates that images were very useful in helping the students understand the article and recall and organize their retellings. It also confirms that recall protocols were higher for words and ideas that were visually annotated with video clips than for still images. Finally, it also proved that the recall protocol for vocabulary annotated with text

combined with images was also higher than for text alone, supporting Pavio's dual-coding theory.

How has students' exposure to on-line reading changed their perceptions of reading, how they read and what they read (as indicated by triangulating their initial Background Survey with their on-line behaviour and final interviews)?

Overall, the students read more quickly from the computerized text than they would normally do if they were reading from a book. Also, the number of times that they read the article was different than it is when they read from a print-bound text. This can be attributed in part to a habitual reading pattern of skimming and scanning while on-line. Additionally, there are affective factors that include eye-strain, discomfort in using a computer and an English keyboard, not being able to highlight main ideas or problem vocabulary, and unfamiliarity with such a study and the researcher. Three students did however, indicate that if they could read glossed texts on line, they would take more time to gain a more in-depth understanding of the reading as the immediate availability of context-based glosses to assist them with unknown words would not interfere with their reading speed in the same way that a dictionary does.

All but one participant indicated that they were now more interested as well as comfortable in reading a computer-generated text than they were prior to this experience. An increase in their comfort level may be attributed to the simple design of the program and an understanding of how to use it and what was expected of them. Additionally, they had someone to refer to if there were any problems in using it, which overall led to a positive experience for five members of the group. It also may be that the text itself proved to be interesting and thus was less awkward and difficult for them to read as it discussed a topic that is of great interest to this age group and it was not inordinately long.

Their increase in interest in computer-based texts is the result of the novelty of the glosses and the program and the speed and ease in using it. However, the majority of students claimed that while they enjoyed the session, only if other academic texts could be glossed in this manner, would they be interested in reading them. Additionally, if they were able to highlight key words or ideas within the text, view three windows simultaneously (one with the text, one with images and the third with definitions) , and they could obtain paper copies of the article, then they would become more avid on-line readers. It should be noted however, that for two of the students, there were minimal changes in their perceptions about on-line reading and how and what they would read. These two participants are the least comfortable in using computers and used the least number of glosses.

One final contributing factor should be taken into account for the participants' positive feedback about the program and their change in their perceptions of reading on-online. While this is a generalization about culture and sex and may not apply to everyone, it should be noted that very rarely do young Asian women respond negatively to questions whose answers may reflect poorly upon either themselves or the instructor. Although they were informed to be completely honest in their responses to questions about the program and reading on-line, it is possible that having known that the researcher created the program, they did not wish to offend her by responding in a negative way.

Implications and Recommendations

> Read not to contradict and confute, nor to believe and take for granted, not to find talk and discourse, but to weigh and consider. Some books are to be tasted, other to be swallowed, and some few to be chewed and digested; that is, some books are to be read only in parts; others to be read, but only curiously; and some few to be read wholly, and with diligence and attention. *(Francis Bacon, "Of Studies")*

Research Implications and Recommendations

The results of this study indicate when the objective of on-line reading is comprehension, media annotations, in particular video clips and definitions, augment understanding and assist in the recall of what was read. However, how useful computerized annotations are in promoting comprehension depends on who is using them and for what purposes and the types of annotations being used. Based on the data collected during this study and the fact that only a small component of on-line reading and glossing was investigated, the following recommendations concerning individual differences, the use and study of computer-generated annotations, design implications and suggestions for future research are proposed.

Individual Differences

Researchers need to address individual differences and the role that they play on annotated reading comprehension. These include:

- The students' backgrounds (educational, social, and cultural), and interests (as identified through questionnaires and/or interviews)
- Their knowledge and use of reading strategies such as pre-reading, skimming and scanning, determining meaning through context and cognates, and reading and careful rereading of texts (as identified and measured by think aloud protocols).
- How much prior knowledge they have of the information found in the reading (as measured through questionnaires and/or interviews).
- Their first and second language skills, including verbal, oral, and aural as identified by standardized testing (for example SLEP).
- Whether their verbosity affects their performance. No overall correlation could be drawn between the two during this study, although the richest retelling did originate from the student who had the greatest number of inferences and metacomments. Does verbal reinforcement help students to understand and recall the text?
- Their ability to take risks and how caution and risk taking affect the decisions the students make and the hypothesis they create.
- Their emotional well-being, self-confidence and their motivation to achieve the goals that they have set and how these affective factors affect their reading comprehension.
- How do students with different language/reading abilities understand a computer-generated text annotated with textual and pictorial glosses?

Annotations

With regard to the annotations being used and assessed, researchers need to investigate:

- How audio combined with either video or stills affect comprehension and assist in the students' ability to recall what they have read.
- How the combination of sound, image, and text assists different types of learners with different learning styles.
- What format of still imagery is the most effective means to convey meaning (photographs, cartoons, drawings).
- Which video format (animation, video depicting real life situations) best conveys meaning for which kind of learner.
- How much media is too much and thus proves to interfere with comprehension.
- How abstract ideas or non-concrete nouns can be best annotated.
- Whether one form of imagery is more effective than another in depicting different parts of speech.

Design Implications

Although the scope of this paper does not extend into the realm of computer annotation design principles, the following recommendations are suggested:

- The method in which information is presented needs to be based upon cognitive processes and the task that the student has been asked to perform. For example, while a still image may be beneficial in depicting a selected vocabulary item, a video may in fact better integrate one section of a text with another. If the task at hand is vocabulary acquisition, than the still image may be preferable to a video format. As was indicated by Taka's recall, the videos not only assisted her in understanding selected words but also inter-connected ideas found in the text
- Programmers must take into consideration the speed at which information can be identified and processed as measured by eye movement studies so that videos and other glossing formats are presented at a speed that is neither too slow nor fast for the students to take in.
- Designers must also consider the learners' different personality traits and learning styles so that they can either incorporate a variety of annotations to suit many learners, or create specific programs for specific learning styles and needs.

- As has been shown in this study, students, when they do not look up an item rely on context to understand it. Given the importance of understanding a word through its context, it is recommended that rather than providing dictionary definitions for items that are glossed, contextual explanations and examples are provided.

Suggestions for further research

Further investigation of on-line glossing and reading comprehension should be based on an integrative model, which posits that in order to understand how one reads, it is necessary to investigate lower and higher level reading processes at the individual level. It is further recommended that:

- Long-term studies on the use of computer generated glosses and text be conducted so as to confirm behavioural patterns and learning styles and how they contribute to comprehension in this environment so as to negate the effects of the novelty of the program.
- Additional multiple case studies on a larger scale be conducted so as to identify any possible patterns that may exist among on-line gloss users.
- Authentic learning environments be used to investigate on-line reading.
- Natural testing conditions be used over a longer period of time so as to obtain more authentic responses that show how students read and process the material over time.

Pedagogical Implications and Recommendations

Several pedagogical implications and recommendations have emerged from this study.

- The aforementioned findings indicate that exposing learners to a variety of annotations to enhance their reading comprehension produces a positive response and does with varying degrees help them understand and recall the text.
- It also appears that information presented both visually and verbally does augment understanding and promote recall.
- Assuming that annotations do assist in comprehension, it is necessary to give ESL students the opportunity to become familiar in using computers and annotated texts for the purposes of reading comprehension.
- It is important that instructors and students are able to identify which glossing formats are the most useful in helping them understand computer-glossed texts for different learning situations. As indicated by Chun and Plass (1997) different cognitive processes are augmented and supported by different media modes, thus knowing which formats are the most beneficial for specific learning tasks will enhance the student's performance.
- Students need to be instructed as to how to read for comprehension both on and off-line. This includes teaching them a variety of strategies such as pre-reading, careful reading, looking for cognates, and understanding through context that can be used when reading a computer or a print-bound text.
- Instructors should vary reading tasks in both textbooks and on-line so that students are better able to transfer strategies and skills between the two.

- Instructors need to provide students with computer-generated texts that develop critical thinking skills and ones that help them to make associations between separate ideas and concepts. Based on information obtained from the participants, they tend to read more quickly on the computer for a variety of reasons. Most importantly, they have become accustomed to skimming for information while reading on-line. It is important that students begin to view computer-generated text as worthy for in-depth comprehension as opposed to seeing them as texts that they should only skim and scan.
- It is important that the students and the instructors view annotations as important components in the reading process and not simply a form of entertainment.
- Findings in this study indicate that students believe that they should be involved in some of the decision -making as to what they should read. Therefore, instructional materials should accommodate the individual learner's needs and preferences. This supports Chun and Plass's (1997) recommendation that instructional materials reflect the learner's needs, preferences, and styles.
- It is important for instructors to ascertain what comprehension means to the students. As the test results indicate, the expectations of the researcher may have been different than those of the students. How they perceive what comprehension is affects how they read. Thus it is important for both instructor and student to understand what comprehension and the perceived task is.
- It is also it is recommended that instructors assist the students in understanding their own reading styles and strategies both on and off-line so that they can build upon them to become more effective and efficient readers.

Limitations of the Study

There were several limitations in this study that should be addressed. First, there is very little statistical significance that can be extrapolated from the data, as the sample size is small. Additionally, all of the participants are Asian women and the combination of the composition and size of the group disallows any broad generalizations.

As only one text was used in this study, it is also impossible to generalize as to how effective these glosses would be in other type of expository texts. For example, would video clips and still images be useful in helping students comprehend scientific or business articles, or alternatively would glossing be more beneficial when used in descriptive or narrative texts? Additionally, this is a topic that the participants are familiar with and interested in and is one that is not inundated with subject-specific vocabulary. Would different hypermedia modes contribute to a better understanding of more complex ideas and subject-specific texts or would they prove to be a distraction?

The think-alouds did not provide as much information about each of the individual's reading processes as was anticipated. The participants were unfamiliar with the process and had not had extensive practice using it prior to the study. Students, who are naturally quiet, found the combination of the think alouds and the recording of their comments somewhat uncomfortable, which may have contributed to their reluctance to speak while reading. Additionally, the volunteers did not have an opportunity to work and become familiar with the program prior to the sessions, which may also have affected how they responded to it. The novelty of the glosses may have prompted more interest in the program and in turn a more positive response to it than it might have otherwise received had the volunteers had more of an opportunity to experiment with it. They may also have been less enthusiastic about it had they not known that it was the researcher who was

responsible for its development. While it is difficult to cast a broad generalization about the cultural construction of polite interaction, there does appear to be a tendency among young Asian women (and women in general) to respond positively as opposed to negatively to a question that might cause discomfort or embarrassment on either the part of the person making the inquiry or the person responding to it. How much of a role this played in their responses is not known.

Another limitation is the environment itself. Although it is one in which the students are familiar with, for the CALL lab is where they do the majority of their emailing and research work for their classes, it is still an artificial environment. Normally, they are tested in their classrooms and very rarely are they asked to read an article and then told to immediately write a summary about it. Even though two of the students hand-wrote their retellings, all of the participants experienced some difficulties in using an English keyboard and concentrating in an environment and in a manner in which they would not normally be tested.

This also brings to light the inherent difficulties in scoring a summary written in the student's second language. In this case, is the summary more of a reflection of the participant's writing skills or of their comprehension? A better understanding as to their comprehension levels may have been obtained through first language recalls. There were also limitations created because of the subjective nature in marking a student's retelling. Although every attempt was made to alleviate any bias on the part of the researcher's evaluations, the checklist and the richness of retelling were inherently subjective. Additionally, the checklist contained too many supporting ideas to be recalled during such a short time period and there were difficulties in assigning marks for quantity as opposed to the quality of the retelling. This suggests that a more standardized testing format is

necessary. It should be noted however, that the students appreciated the opportunity given to them to write either on or off-line. By removing one of the stumbling blocks for participants who were uncomfortable using an English keyboard, it provided them with the opportunity to be more creative with their writing than they might have otherwise been.

Finally, there were limitations in creating glosses that would be cross-culturally understood and ones that were within the creative reach and ability of the researcher. Using the same actors and altered segments of the same video clips to depict a variety of items caused some confusion for although the changes were obvious to the researcher, they were not clear to the students. The interpretation of images is highly sensitive to culture, experience, background knowledge, and the universality of the topic and thus when creating pictorial glosses, it is necessary to use those which can be identified across cultures, are simple, and very specific to the items that they are depicting.

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Appendix A

Student Idea Sheet for a Topic for On-Line Reading

Good morning everyone

Listed below are some ideas of what some people may like to read about (in English). You may circle as many of the topics as you like, but please put a star (*) beside the one that you are the most interested in reading about. You can also add some ideas of your own.

This information is going to be used to help me select a text for a study that I would like to do on reading on the computer. You do not need to put your name on this sheet, just circle what you like to read about. If you have any other ideas, please write them down.

News
Sports
Religion
Nature Stories
Environmental Issues
Politics
War
Holidays
True stories of people's lives
Bibliographies
Educational issues
Fashions and fads
Travel
Life in other countries
Other cultures and customs
Science and technology
Art/music
Medical issues
Traditions
History
Unsolved mysteries
Entertainment
Lifestyles

Your own ideas/opinions:

Thank you for helping me ☺

Appendix B

Text Used During the Reading Session

Body Talk

Please read the text below. You can click on any of the highlighted words to get help from the pop-up glossary.

In the 1960's Irenaus Eibl-Eibesfeldt, a German ethnologist, noticed a curious pattern to women's flirting behavior. Eibl-Eibesfeldt had used a camera with a secret lens so that when he directed the camera straight ahead, he was actually taking pictures to the side. This way he could focus on local sights and catch on film the unstaged facial expressions of people near him. In his travels to Samoa, Papua, France, Japan, Africa, and Amazonia, he recorded numerous flirting sequences. Then, back at his laboratory near Munich, Germany, he carefully examined each courting episode, frame by frame.

A universal pattern of female flirting emerged. Women from places as different as the jungles of Amazonia, the salons of Paris, and the highlands of New Guinea apparently flirt with the same sequence of expressions. First, the woman smiles at her admirer and lifts her eyebrows in a swift, jerky motion as she opens her eyes wide to gaze at him. Then she drops her eyelids, tilts her head down and to the side, and looks away. Frequently she also covers her face with her hands, giggling nervously as she retreats behind her palms. This sequential flirting gesture is so distinctive that Eibl-Eibesfeldt is convinced it is innate, a human female courtship ploy that evolved eons ago to signal sexual interest.

Could these courting cues be a part of a larger human mating dance? David Givens, an anthropologist, and Timonthy Perper, a biologist, think so. Both scientists have spent several hundred hours in American cocktail lounges watching men and women pick each other up. According to these investigators, American singles-bar courtship has several stages, each with distinctive escalation points. I shall divide them into five.

Stage One: Attention Getting

The first is the "attention-getting" phase. Young men and women do this somewhat differently. As soon as they enter the bar, both males and females typically establish a territory-a seat, a place to lean, a position near the jukebox or dance floor. Once settled, they begin to attract attention to themselves. Men tend to pitch and roll their shoulders, stretch, stand tall, and shift from foot to foot in a swaying motion. They also exaggerate their body movements. Instead of simply using the wrist to stir a drink, men often employ the entire arm, as if stirring mud. The normally smooth motion necessary to light a cigarette becomes a whole-body gesture, ending with an elaborate shaking from the elbow to extinguish the match. And the whole body is employed in hearty laughter-made loud enough to attract a crowd. Older men often use different props, advertising their availability with expensive jewelry, clothing and other accoutrements that spell success. But all of these signals can be reduced to one basic, three-part message: "I am here; I am important; I am harmless."

Stage Two: Recognition

Stage two, the "recognition" stage, starts when eyes meet eyes; then one or the other potential lover acknowledges the demarche with a smile or slight body shift, and the couple move into talking range. This can be the beginning of the romance. But it is nowhere as risky as the next major escalation point: Stage three – talk.

Stage Three: Talk

This idle and often meaningless conversation, which Desmond Morris calls grooming talk, is distinctive because voices often become higher, softer and more singsongy-tones one also uses to express affection to children and concern for those in need of care.

Grooming talk starts with such benign statements as "I like your watch" or "How's the food?" The icebreakers are as varied as the human imagination, but the best leads are either compliments or questions, since both require a response. Moreover, what you say often matters less than how you say it. This is critical. The moment you open your mouth and speak, you give away your intentions with your inflection and intonation. A high-pitched, gentle, mellifluous "hello" is often a sign of sexual interest, whereas a clipped, low, matter-of-fact, or perfunctory "hi" rarely leads to love. If a prospective mate laughs more than necessary, she or he is probably flirting too.

Talking is dangerous for an important reason. The human voice is like a second signature that reveals not only your intentions, but also your background, education, and intangible idiosyncrasies of character that can attract or repel a potential mate in moments. Both Givens and Perper saw many potential love affairs go astray soon after conversation started. But if a couple get through this perceptual onslaught-and each begins to listen actively to the other-they often move to stage four: touch.

Stage Four: Touch

Touching begins with "intention cues" – leaning forward, resting one\'s arm toward the other\'s on the table, moving one's foot closer if both persons are standing or stroking one\'s own arm as if to stroke the other's. Then the climax-one person touches the other on the shoulder, the forearm, the wrist, or some other socially available body part. Normally the woman touches first, grazing her hand along her suitor's body in the most casual but calculated manner.

How insignificant this touching looks, yet how important this touching is. Human skin is like a field of grass, each blade a nerve ending so sensitive that the slightest graze can etch into the human brain a memory of the moment. The receiver notices this message instantly. If he flinches, the pickup is over. If he withdraws, even barely, the sender may never try to touch again. If he ignores the overture, she may touch once more. But if he leans toward her, smiles, or returns the gesture with his own deliberate touch, they have surmounted a major barrier well known in the animal community.

Touch has been called the mother of the senses. No doubt this is true, for every human culture has codes that indicate who may touch whom and when, where, and how. Imaginative and resourceful in their variety, these touching games are basic to human courting too. So if our pair continue to talk and touch-bobbing, tilting, gazing, smiling, swaying, flirting-they usually achieve the last stage of the courtship ritual: total body synchrony.

Stage Five: Keeping Time

Body synchrony is the final most intriguing component of the pickup. As potential lovers become comfortable, they pivot or swivel until their shoulders become aligned, their bodies face-to-face. This rotation toward each other may start before they begin to talk or hours into conversation, but after awhile the man and woman begin to move in tandem. Only briefly at first. When he lifts his drink, she lifts hers. They then desynchronize. In time, however, they mirror each other more and more. When he crosses his legs, she crosses hers; as he leans left, she leans left; when he smoothes his hair, she smoothes hers. They move in perfect rhythm as they gaze deeply into each other's eyes.

Is the five-part pickup universal to men and women? We do not know. Certainly not everybody in the world exhibits all of the behaviour patterns that Givens and Perper found in American singles joints. People in most societies do not meet in bars. Many do not even court one another openly; instead, their marriages are arranged. And few anthropologists have studied the postures, gestures, and expressions that men and women in other cultures use when they interact. But there is a great deal of secondary evidence to suggest that at least some of these patterns are universal to humankind

Appendix C
Background Questionnaire

Name: _____ Nickname:_____

Telephone: _____ Email: _____

1. What is your gender? Male Female

2. What is your age? 18-20 21-24 25-28 29-31 over 31

3. What is your native language? _____

4. Do you speak any other languages (other than English)? Yes No

5. If you answered YES to the above question, which other languages do you speak?

_____

6. What is your nationality? _____

7. How long did you study English in high school? 0-2 years 3-5 years over 5 years

8. How long did you study English in University? 1 year 2-3 years more than 4 years

9. Did you study English outside of the regular school system? Yes No

10. If you answered YES to the above question, did you study in:

A private school a language/conversation school independently with a tutor

11. Before arriving in Canada, have you visited any other English speaking countries? Yes No

If yes, for how long and for what reason_____

12. Does anyone else in your family speak English? Yes No

13. What do you think are your strengths and weaknesses in English? Please rank them from 1-4, with 1 being your strongest and 4 your weakest skill.

Reading__ Writing__ Speaking__ Listening__

14. For what reasons do you usually read in your native language?

Pleasure School Work Other_____

15. What kind of books do you usually read in your native language?

Novels (e.g. mystery, fiction, science fiction, romance, historical fiction)

Information texts (e.g. science, history, medical...books)

Magazines (sports, beauty, science, nature, other)

16. What kind of books/articles do you usually read in English?

Novels (e.g. mystery, fiction, science fiction, romance, historical fiction)

Information texts (e.g. science, history, medical...books)

Magazines (sports, beauty, science, nature, other)

17. What kind of books/articles do you find the most difficult to read in English?

Novels (e.g. mystery, fiction, science fiction, romance, historical fiction)

Information texts (e.g. science, history, medical...books)

Magazines (sports, beauty, science, nature, other)

18. What makes these books/articles difficult to read?

Cultural content Vocabulary No knowledge of the subject Other _____

19. How often do you read for pleasure in English?

1-2 times a week 3-5 times a week Every day Other_____

20. How often do you use a dictionary to look up words when you are reading?

Never Occasionally Quite Frequently Always

21. With what kind of words do you usually have the most difficulty?

Nouns Verbs Adverbs Adjectives

22. Is there anything you dislike about using a dictionary (electronic or textual) while you are reading?

23. I am a:
a. visual learner (images help me the most to understand what I am reading)
b. textual learner (numbers and text help me the most ot understand what I am reading)
c. visual and textual learner (both text and images help me understand what I am reading)

24. How comfortable are you in using a computer?

Not comfortable A little comfortable Moderately comfortable Very comfortable

25. How much experience have you had using the Internet/computer?

No experience Very little Some Quite a bit A lot

26. For what reasons do you se the Internet/computer? (Please rank them from 1-4)

School (searching for information) Email Reading the News Entertainment Other

27. How often do you use the Internet/computer?

Every day 1-2 times a week 3-4 times a week 5-6 times a week

28. How often do you look up words when you are reading on the computer/Internet?

Never Occasionally Quite frequently Always

29. How often does your instructor give you exercises on the omputer/Internet?

Every day 1-2 times a week 3-4 times a week 5-6 times a week

30. I find reading on the computer/Internet to be:

Easier A little easier The same A little more difficult A lot more difficult

than reading a book.

31. Can you please further explain your answer to the above question (#27). For example, if you answered that it is easier, why is it easier for you to read on the Internet/computer than from a book?

Appendix D

Oral Interview Questions Alias_____

Please circle one answer for the following questions or provide a short answer where required:

1. How comfortable were you in using this computerized program?

   Not comfortable A little comfortable Comfortable Very comfortable

2. Did you find it easy to navigate within this program? Yes No

   If not, what difficulties did you have?

3. For overall comprehension of the text, what kind of glossing did you use the most frequently?

   English definitions Images Definitions + Pictures

4. For overall comprehension of the text what kind of glossing did you find to be the most useful?

   English definitions Images Definitions + Pictures

5. What kind of glosses (if any) helped you recall the main ideas when you were writing your free recall summary?

   English definitions Images Definitions + Pictures

6. What kind of glosses (if any) helped you to recall the supporting ideas when you were writing your free recall summary?

   English definitions Images Definitions + Pictures

7. Did any of the glosses help you organize your free recall summary? Yes No

   If YES, which ones helped you the most?

8. If the glosses did not help you recall any of the main or supporting ideas when you were writing your summary, how did you recall the text?

9. Have any of your teachers (past or present) taught you about reading for main ideas and supporting details?

   Yes No

10. Did you find that looking up the glosses interfered with your reading pace (speed)?

    Yes No

12. What kind of images helped you the most with this text?

    Still images (gif/jpgs) Video Clips

13. What kind of images do you think would be useful for you in other texts?

Still images Video Other (e.g. Cartoons, other animation)

14. How much of the article did you understand?

Very little Some A great deal All

15. How much vocabulary did you understand?

Very little Some A great deal All

16. Were there any words that you did NOT understand that you did NOT look up? What did you skip them?

17. How much did you enjoy reading on the computer?

Not at all A little Quite a bit A lot

18. I found using the computer to gloss this text:

Not useful A little useful Moderately useful Very useful

in helping me understand the text.

19. If you were to gloss a text, what kind of vocabulary items/expressions/terms would you gloss? E.g. nouns, verbs, adjectives, adverbs, cultural expressions.

20. Did you have any problems or concerns about using this program (other than navigational problems)?

Yes No

If so, what were they?

22. I prefer reading a text like this: On-line From a book

23. Does this program change how you feel about reading on-line? Yes No

24. For the purposes of academic reading, would you prefer to read on or off-line?

Why/why not?

25. How could your academic teachers make it easier for you to use the computer for the purposes of reading?

26. Should teachers use more multimedia technology to help students with their academic reading?

Yes No Why/why not?

27. Please tell me what you liked or didn't like about this program/study/

Appendix E

Consent for Participation
A Study of Glossing Behaviour

Hello. My name is Shari Corbin and I am an elective teacher and a Masters student at the University of Victoria. I would like your participation in helping me study how on-line glosses (explanations of words/phrases specific to a particular text) help students with their reading comprehension.

I have taken a text and put it on a closed web site. What I need you to do is to read this particular text. Certain words are underlined and when you click on them, you can select a button for a definition, image, or definition + picture of that word. Not all words have images however. I am interested in seeing how images and textual definitions can helpy ou with on-line reading and how these types of glosses can help you improve your reading comprehension.

Your participation in this study is completely voluntary and you can withdraw at any time. I will ask you to fill out a background survey, read the text in the CALL lab, write a brief summary of the text, and then answer some questions after you have finished your summary. This should take between two to three hours of your time.

The benefits of your participation include: getting a better understanding of your own reading styles and strategies, helping you improve your vocabulary, and having the opportunity to explore new ways to present information for your own websites and presentations. Your identity will be completely protected as you will use an alias throughout the study. This alias will also be used in the final write-up of my report that will be presented to my committee and used to fulfill my requirements for a Masters in Language Arts.

I am really excited about this study and hope that some of you also share an interest in reading on-line and using video and still images to help understand on-line texts. If you would like to participate, please print out your full name and email address and put your signature in the spaces provided below this line. If you have any questions, please contact Shari Corbin at: corbes@hotmail.com
472-2973
You may also contact my supervisor at the University of Victoria at: 250-721-7838.
In addition to being able to contact the researcher and her supervisor at the above phone numbers, you may verify the ethical approval of this study or raise any concerns you might have, by contacting the Associate Vice President of Research at the University of Victoria (250-721-7968).

I understand the above conditions of this study and that my participation is completely voluntary. I may withdraw at any time. I understand that my identity will be completely protected and that ONLY my alias will be used in this researcher's final report and presentation to her committee.

Name:_____ Email:_____

Signature: _____ Alias: _____

Class/date: _____

Appendix F
Checklist
Main Ideas and Supporting Ideas

Introduction /2 /1 /1 /.25 /.25 /.25 /.25 /.25 /.25 /.25 /.25 /.25 /1 /1 **Total: 8.25**	**Main Idea:** • A universal flirting pattern of flirting is believed to exist **Supporting Ideas:** • E.E. used secret lens in many different countries to capture unstaged flirting behaviour. • Revealed a sequence of expressions believed to be innate - Smiles at admirer - Lifts her eyebrows in a swift, jerky motion - Opens eyes wide to gaze at him - Drops her eyelids - Tilts her head down - Looks away - Covers her face with her hands - Giggles nervously - Retreats behind her palms • Givens (an anthropologist) and Perper (a biologist) also spent time in American bars observing flirting behaviour. • Saw a pattern and divided it into five stages
Stage One /2 /1 /1 /.25 /.25 /.25 /1 /.25 /.25 /.25 **Total: /6.5**	**Main Idea:** • Stage One is about how men and women attract attention to themselves. **Supporting Ideas:** • Both men and women establish a territory • Men exaggerate their movements - They use large motions to stir their drinks - To put out a match - When laughing • Older men use expensive personal belongings to attract attention - Expensive jewlery - Expensive clothing - Other accoutrements

Stage Two /2 /1 /1 /1 **Total: /5**	**Main Idea:** • Stage Two, called the Recognition Stage outlines how the two parties acknowledge each other's presence. **Supporting Ideas:** - Eyes meet eyes - Smile of acknowledgement - Move closer together
Stage Three /2 /1 /1 /.25 /.25 /1 /.25 /.25 /.25 **Total: /6.25**	**Main Idea:** • Stage Three discusses the importance of grooming talk in the flirting process. **Supporting ideas:** • It begins with icebreakers such as compliments or questions • What is said is not nearly as important as how it is said - A mellifluous hello signals interest - A clipped/low/ matter-of-fact/perfunctory hello indicates disinterest • Talking can be dangerous - It reveals your background - Your education - Your idiosyncrasies of character

Stage Four /2 /1 /.25 /.25 /.25 /1 /.25 /1 /1 /1 **Total: /8**	**Main Idea:** • Stage Four outlines the role of touch in the flirting process. **Supporting ideas:** • There is a lead up to touching that involves different kinds of intention cues - Leaning forward - Moving their feet/arms closer towards each other - Stroking one's own arm • The climax is the actual touch - The woman usually initiates the touching • It will fail if one flinches or withdraws • If ignored, she may try again • If encouraged or reciprocated they move to the next step
Stage Five /2 /.25 /.25 /.25 /.25 **Total: /3**	**Main Idea:** • As they become more comfortable with each other, they unconsciously mirror each other's body language. **Supporting Ideas:** - Pivot towards each other until facing each other - Lift drinks at the same time - Cross legs at almost the same time - Smoothes hair at almost the same time
Conclusion /2 /.25 /.25 /.25 /.25 **Total: /3** **Score /40**	**Main Idea:** • It is not known if this five stage pattern occurs world-wide but it is believed that some of the aforementioned patterns are universal to mankind **Supporting Ideas:** - People don't always meet in bars. - Arranged marriages are common so there is no open courting - Little research has been completed on body language and interaction - Secondary evidence suggests that some patterns are universal

Appendix G

Checklist for Judging Richness of Retellings
Irwin and Mitchell, 1983

	5	4	3	2	1
Generalizes beyond text	X				
Thesis (summarizing statement)	X	X	X		
Major Points	X	X	X		
Supporting Details	X	X	X	X	
Supplementations	Relevant	Relevant	Relevant	Irrelevant	Irrevelant
Coherence	High	Good	Adequate	Some	Poor
Completeness	High	Good	Adequate	Some	Poor
Comprehensibility	High	Good	Adequate	Some	Poor

(From Irwin, P.A., and J.N. Mitchell, 1983. A procedure for assessing the richness of retellings. *Journal of Reading*, 26: 391-396.

Appendix H

Judging Richness of Retellings
Irwin and Mitchell (1983)

Level	Criteria for Establishing level
5	Student generalizes beyond text; includes thesis (summarizing statement), all major points, and appropriate supporting details; includes relevant supplementations; shows high degree of coherence, completeness, comprehensibility.
4	Student includes thesis (summarizing statement), all major points, and appropriate supporting details; includes relevant supplementations; shows high degree of coherence, completeness, comprehensibility.
3	Student relates major ideas; includes appropriate supporting details and relevant supplementations; shows adequate coherence, completeness, comprehensibility.
2	Student relates a few major ideas and some supporting ideas; includes irrelevant supplementations; shows some degree of coherence; some degree of completeness; the whole is somewhat comprehensible.
1	Student relates details only; irrelevant supplementations or none; low degree of coherence; incomplete; incomprehensible.

(From Irwin, P.A., and J.N. Mitchell, 1983. A procedure for assessing the richness of retellings. *Journal of Reading*, 26: 391-396.

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Title of Thesis:

A Study of Glossing Behaviour Among Second Language Readers

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