CHAPTER THREE

METHODOLOGY

The purpose of this study is to gain a deeper understanding of the reading process when ESL readers read printed text and hypertext. In other words this study seeks to identify the type of metacognitive and cognitive reading strategies ESL readers employ to comprehend while reading a text in print and hypertext. This chapter describes the research design of the study, research sample, instruments used, and the procedures followed in carrying out this research. This study adopts both a qualitative and quantitative approach to gather data and to analyze it.

These areas are covered in the following sub-sections:

- Research Design
- Research Sample
- Research Instruments
- Data Collection Procedures
- Data Analysis

3.1 Research Design

Given that reading strategies are internal mental processes and therefore, not directly observable behaviors, their identification has always been problematic and has relied heavily on learners' self- reports (Cohen, 1998). Many L2 researchers agree that observation yields extremely limited and unreliable information on students' mental processes (Cohen, 1998; O'Malley & Chamot, 1990; Wenden, 1991).

The most common methods of data collection in reading strategies research are questionnaires and interviews, which provide retrospective information on students' recollections of the strategies they have used for particular tasks and, often, of the frequency (sometimes, often, usually, etc) with which they use the strategy. Two obvious limitations of such retrospective data collection are students' ability to remember accurately the strategies they have used and their willingness to respond truthfully. Nonetheless, questionnaires and inventories have been favored by many reading strategy researchers because information can be collected from a large number of participants and analysis is straightforward (Cohen, 1998; O'Malley & Chamot, 1990; Oxford,1990;1996).

Relatively few research studies have used think-aloud procedures in which individual students are asked to recount their thoughts while working on a language task, perhaps because this method of data collection is extremely labour-intensive (individual interviews with verbatim transcription) and complex to analyse. Concurrent verbal procedures also have potential limitations, such as participants reporting only some of their actual thoughts and strategies and not being able to verbalize their mental processes. In addition, the presence of the interviewer may affect their thinking processes and strategies. In spite of these potential limitations, think-aloud procedures in this and other studies (Cohen, 1998; Feng & Mokhtari, 1998; Cromley & Azevedo, 2004; Gill, 2002; Neil. Anderson, 1991) have provided rich descriptions of students' mental processing and reading strategies that are not accessible in any other way.

The research design of this study involved two different types of text, one linear and the other hypertext. The research subjects read a printed text and then a hypertext. Think-aloud verbal protocol methodology (Pressley and Afflerbach, 1995; Ericsson and Simon, 1993) was used to identify reading strategies used by 10 Law students from MARA University of Technology, while reading text in print and hypertext. This method was selected because think-alouds "provide a more direct access to the learners' processes and knowledge" (Faerch and Kasper, 1987:9). In contrast to other methods like questionnaires, interviews or observations, that attempt to infer the learners' thoughts, Faerch and Kasper explain that introspective methods of data collection generate verbal report data that comprise the subjects' own statements about the ways in which they process and organize information. Furthermore, Smagorinsky (1995) points out that think-alouds have the potential for yielding significant information about the internal structures of cognitive processes. In addition, the data elicited through think-alouds is untainted by subsequent rationalization and interpretation by the subjects as retrospective verbalizations are often prone to be (Cohen, 1987).

During concurrent protocols, also called the think-aloud method, participants read and simultaneously verbalize their thoughts. Studies using concurrent protocols reveal details of sequences of information processes reflecting the reader's short-term memory (STM). It is claimed that readers can be involved with concurrent protocols without altering their cognitive processes (Ericsson and Simon, 1993). Retrospective Interviews were used to help clarify statements made as well as provide details that have been omitted. During retrospective interviews participants

may be able to retrieve the trace of preceding cognitive processes and reveal information preserved partially in STM and partially in long-term memory (LTM). Therefore, in this study a combination of both concurrent protocol and retrospective interviews was used to identify the different metacognitive and cognitive reading strategies used by ESL learners while reading printed texts and hypertext. This was to ensure that the think aloud protocol analysis was thus capable of providing powerful insights into the cognitive and metacognitive processes that drive the working of this mechanism in reading events.

3.2 Research Sample

The sample of this research comprised 10 students, both male and female of Malay origin. The students were from the Faculty of Law, Universiti Teknologi MARA. The subjects were selected on the basis of a questionnaire (See Appendix A), willingness to participate in the research and, most of all, the ability to effectively verbalise their thoughts. The questions in the Students Profile Questionnaire ranged from age, level and type of education to proficiency in the English Language, which was an important criteria. Also included in the questionnaire was a section that obtained the students' attitudes towards English.

The students ranged in age from 20 to 23 years. Older students were chosen based on the premise that older individuals would understand the purpose of the study and also be better at verbalizing their thoughts than younger children. This would add validity and credibility to the verbal reports collected. In addition, these

subjects would have had 11 years of formative school education in which they would have had all studied English as a subject in school up till the eleventh year of their formal education.

As the students were at the ESP level of study for English, it meant that they had already completed two proficiency courses in English in MARA University of Technology. The courses were Mainstream English I and II in their first and second semester respectively. The Mainstream English I or BEL 200, is the first part of the proficiency English courses that the students have to take. The four main components of this course are - reading, writing, speaking and listening. Only if they pass this course can they move on to Mainstream English II or BEL 250. The Mainstream English II is designed to prepare the students for the Malaysian University English Test (MUET). The Mainstream English II course also comprises four components - reading, writing, speaking and listening.

At the outset of this study, the equivalence in the reading ability of the research sample was also established. This was done by comparing the scores obtained by these students in the reading section of the final examination of the Mainstream English II course in the previous semester.

The final examination of the Mainstream English II course has four components:

- Reading - 45%
- Speaking - 15%
- Listening - 15%
- Writing - 25%

The total raw score for the reading component is 50, out of which 45% is taken to add to the final score of the Mainstream English II exam. The scores of the research subjects in the reading section of the Final Examination for Mainstream English II ranged from 30 to 36 out of 45%. This information was verified by consulting available academic records.

The subjects were in their third semester at the University. This particular (third) semester was thought especially suitable for the purpose of this study because by this time, the students are required to read a considerable amount of their research materials in print and on the Internet. In addition, some of their coursework involved working on the computer. Furthermore, there was evidence that these students had adequate proficiency in English. Proficiency was demonstrated by the students obtaining an A or B+ grade in the Mainstream English Final Exam paper which is similar to the Malaysian University English Test (MUET). There was a need to make sure that the students were fairly proficient in the language so that their language proficiency was not an obstacle to the collection of data. The selected research sample had all obtained a Band 4 or 5 for the Malaysian University English Test (MUET). The test components and the maximum score for each test component are as follows:

Test Components	Maximum Score
Reading	135 marks
Speaking	45 marks
Listening	45 marks
Writing	75 marks
Aggregated Score	300 marks

Once a student obtains his/her aggregated score, he/she will be placed in the appropriate band. Given below is the description of the various bands.

Figure 5 - The description of the Aggregated Score sheet for MUET is given below.

AGGREGATED SCORE	BAND	USER	COMMAND OF LANGUAGE	COMMUNICATIVE ABILITY	UNDERSTANDING	TASK PERFORMANCE
260 - 300	6	Excellent user	Very good command of the language	Highly expressive, accurate and appropriate language with hardly any inaccuracies	High level of understanding of the language: understands complex texts easily	Functions extremely well in the language
220 - 259	5	Good User	Good command of the language	Expressive, accurate and appropriate but with minor inaccuracies	Good level of understanding of the language: understands complex texts well	Functions well in the language
180 - 219	4	Competent User	Satisfactory command of the language	Generally expressive and appropriate but occasional inaccuracies	Satisfactory level of understanding of the language: has satisfactory understanding of complex texts	Functions reasonably well in the language
140 - 179	3	Modest User	Fair command of the language	Fairly expressive, usually appropriate but with noticeable inaccuracies	Modest understanding of complex texts and with some misinterpretations	Able to function in the language but with some effort
100 - 139	2	Limited User	Limited command of the language	Lacks expressiveness and appropriacy: inaccurate use of the language resulting in breakdown in communication	Limited understanding of the language: has limited understanding of complex texts	Limited ability to function in the language

Below 100	1	Extremely limited user	Poor command of the language	Inexpressive and inaccurate use of the language resulting in very frequent breakdown in communication	Poor understanding of the language: little or no understanding of complex texts	Hardly able to function in the language

8 out of the 10 students scored a Band 4. They are described as competent users of the language. Therefore, they have a satisfactory command of the language. For their communicative ability they are described as generally expressive and appropriate with occasional inaccuracies. They have a satisfactory level of understanding of the language and complex text. Finally, they would be able to function reasonably well in any task performance.

Two of the students obtained Band 5. They are described as good users of the language. Therefore, they have a good command of the language. For their communicative ability they are described as expressive, accurate and appropriate with minor inaccuracies. Also, they are believed to have a good level of understanding of the language and complex texts, and function well in the language.

Table 3.2: Comprehensive Overall Information about the Subjects

Subject	Age	Sex	SPM(Eng)	Mainstream Eng. II (BEL 250)	MUET BAND
1	20	F	B	B+	4
2	21	M	A1	A+	5
3	21	F	B	B+	4
4	23	F	B	B+	4
5	20	F	B	B+	4
6	20	F	B	B+	4
7	21	M	A1	A+	5
8	23	F	B	B+	4
9	22	F	A1	A	4
10	21	F	B	B+	4

Thus based on their SPM (Sijil Peperiksaan Malaysia) English grades, reading scores for the the UiTM Final Mainstream English Examination (BEL 250) and the MUET scores, it can be said that the sample was fairly homogeneous in their reading ability and language proficiency.

Given below is Table 3.3 which shows the students' attitudes towards English.

Table 3.3: Students' Attitudes Towards English

Subjects / **Questions**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Effectively learn English through which skill.	R	R/W	R	R	R/W	R/W	R/W	R/L	R/L	R/W
Which skill is important?	S	R	S	S	S	S	R	S/R	S	R
Amount of reading on computer.	Av	Lots	Lit	Av	Lots	Lit	Lots	Lit	Lit	Av
Importance of reading academic materials on computer.	VI	VI	VI	I	VI	I	I	I	I	I
Hours per week on computer reading academic materials.	6-10	11-15	<5	11-5	6-10	<5	11-15	<5	<5	6-10
Rate Reading ability in English.	Ad	Ad	Ad	Ad	Ad	Ad	Ad	Ad	Ad	Ad

KEY: R =Reading, W= Writing, S= Speaking, L=Listening

Lit = Little, Av=Average Amount, Lots=A lot

VI= Very Important, I= Important

Ad= Adequate

In general all the subjects expressed that they learn English effectively through reading, while some through writing and listening skills. 6 of the subjects felt that speaking was the most important skill and the other 4 subjects thought it was reading. Only 3 of them read a lot on the computer.

All of the students expressed that reading academic and reference materials using the computer were important. Out of which, only 3 subjects spent 11-16 hours per week on the computer reading academic materials and another 3 subjects spent about 6-10 hours per week reading on the computer. The remaining 4 of the subjects did very little reading on the computer about less than 5 hours per week

Another important criteria for the selection included willingness to participate in the study and commitment to spend their time participating in all phases of the study. The 10 research subjects had willingly signed the consent form (See Appendix B) to show their willingness to participate in the research.

3.3 The Research Instruments

The following is a list of instruments used in this study.

- Texts
- Questionnaire
- Think –Aloud Sessions
- Retrospective Interview Questions
- Observations
- Summary

3.3.1 Texts

The reading texts used in this study consisted of two expository texts of a similar level of difficulty. Expository texts were chosen because most of the academic references and research materials are expository. Furthermore, according to Elizabeth Schmar-Dobler (2003), most of the texts on the Internet are expository.

Kamil and Lane (1998) report that in an analysis of 50 websites, 48 contained expository text while 2 sites contained narrative text. Most of the expository texts found on the Internet are written as hypertext, where highlighted elements within it, such as a word or phrase, are linked to other texts. Each link can lead to a definition, additional information, or a video example related to the original linked word or phrase.

By selecting links in various orders, a reader creates his or her own path when reading on the Internet. This path can be ever changing because information on the Internet is ever changing, with websites continually being updated, removed, or remodeled. Text on the Internet is not static, whereas the text of a book remains the same each time the book is opened. The Internet is “an interactive model of continuously updating information” (Glister, 1997 p.137), which requires a rethinking of what it means to be a reader or even a literate person in today’s world. As a result of technology, our definition of reading has changed to include websites, e-books, e-mail, discussion boards, chat rooms, instant messaging and listservs.

Expository text makes up the bulk of what we read and these texts are written to convey, describe, or explain non-fictional information. In Education, most textbooks and academic reference materials in print at tertiary level are expository. An expository text is text that is informative. Expository texts include essays, encyclopedias, reference books, speeches, journals, experimental books, scientific reports, newspaper articles and so on (Reutzel and Cooter, 2007). Most learning requires students to read and understand expository text in print. Based on this premise, expository texts were chosen to be used in this study.

Both the texts ranged in length from 523 to 537 words and had a predetermined 12th grade readability level. The Fry's readability Formula was used to determine this.

Printed Text (*Shifting Paradigms*)

	Number of Sentences (to the nearest)	Number of Syllables
1st 100 words	6.1	176
2nd 100 words	7.9	160
3rd 100 words	5.5	161
Totals	19.5	497
Divide Totals by 3	6.5	166

Hypertext (*It's Eco-logical*)

	Number of Sentences (to the nearest)	Number of Syllables
1st 100 words	6	167
2nd 100 words	5.3	171
3rd 100 words	5.5	158
Totals	16.8	496
Divide Totals by 3	5.6	165

To control the effect of prior knowledge, an attempt was made to select topics that were familiar to the subjects. Given that there are no established ways of accomplishing such a goal, and after much reflection, a list of familiar topics was drawn up by the researcher and reading Lecturer. Examples of such topics include those frequently found in newspapers and magazines. After much discussion and deliberation the researcher and the subject's reading lecturer, a consensus was reached to select the two passages. (See Appendix C and D)

Following established methodological recommendations for increasing the likelihood of obtaining complete and accurate self-reports (Ericsson and Simon, 1987 and Pressely and Afferbach, 1995) the printed text and the hypertext was marked with intermittent red dots placed after each sentence. The red dots were embedded in both the printed and hypertext after each sentence, as a reminder to verbalize their thoughts while reading. The linear text was printed in three separate

pages, which were placed in front of the students. The hypertext was designed to have six hyperlinks which the students could access.

3.3.2 Questionnaire

The Online Survey of Reading Strategies (OSORS), a 38-item Likert scale questionnaire adapted from Sheorey and Mokhtari, (2001) by Neil. J. Anderson (2003) was used in this study (See Appendix E). It is a self-report measure assessing students' awareness and perceived use of reading strategies, while reading hypertext on the following three subscales:

- Global reading strategies
- Problem-solving strategies
- Support reading strategies

The 10 subjects were required to answer the questionnaire after they had completed reading the hypertext. The questionnaire was used to indicate the extent to which the subjects perceived themselves as using the described strategy while reading on-line.

The questionnaire used a 5 point Likert scale to assess the frequency of strategies used:

1 Never

2 Only occasionally

3 Sometimes

4 Usually

5 Always or almost always

The strategy use scale defines a continuum of increasing levels of intensity, that is, low scores indicate a low frequency of strategy use and high scores indicate a high frequency of strategy use while reading on-line.

The Survey of Reading Strategies (SORS) developed by K. Mokhtari and R.Sheorey (2001) measures three broad categories of reading strategies, namely metacognitive strategies, cognitive strategies and support strategies. The Survey of Reading Strategies (SORS) was developed for post secondary students who are native and non native speakers of English. The SORS was based on a separate metacognitive reading strategy survey developed for native speakers of English called The Metacognitive Awareness-of-Reading Strategies Inventory (MARSI). Therefore the SORS three categories were based on both MARSI factor analyses and theoretical considerations.

A brief description of each SORS category and the number of items within each category are given below;

1. Metacognitive Strategies are those intentional, carefully planned techniques by which learners monitor or manage their reading. The strategies include having a purpose in mind, previewing the text as to its length and organization, or using typographical aids and tables and figures. (10 items)

2. Cognitive Strategies are the actions and procedures readers use while working directly with the text. These are localized, focused techniques used when problems develop in understanding textual information. These cognitive strategies include adjusting one's speed of reading when the text becomes

difficult or easy, guessing the meaning of unknown words, and re-reading the text for improved comprehension. (12 items)

3. Support Strategies are basically support mechanisms to aid the reader in comprehending the texts such as using a dictionary, taking notes, or underlining or highlighting the text to better comprehend it. (6 items).

When Neil. J Anderson adapted the SORS for the Online Survey of Reading Strategies (OSORS), the same three categories were maintained, Metacognitive (Global), Cognitive (Problem-solving) and Support strategies. However, Anderson added another 5 items to Global strategies, 3 items to Problem-solving strategies and the original 9 items remained for support strategies. Each item was modified by Neil J. Anderson (2003) to include the phrase "on-line' each time a reading task was referred to.

Neil J. Anderson used the Cronbach's alpha for the overall reliability of the Online Survey of Reading Strategies (OSORS), which was 0.92. The reliability for each sub-section are:

- Global reading strategies - 0.77
- Problem-solving strategies - 0.64
- Support strategies - 0.69

According to Sekaran (2000) if the Cronbach's alpha value is greater than 0.7, the survey instrument can be considered to exhibit internal consistency realibility, thus resulting in a degree of confidence in the survey instrument. Therefore, this established the OSORS as a reliable instrument for assessing the metacognitive on-line reading strategies of L2 reading strategies.

Although Anderson (2003) established that the OSORS is reliable, the on-line survey of reading strategies (OSORS) was piloted by the researcher with 4 students to ensure its reliability and comprehensibility before the actual use in this study.

The OSORS for this study was administered after the subjects had read the hypertext. The 10 subjects were informed of the purpose of the survey and of the fact that there were no right or wrong answers and were asked to express their honest opinion by circling the appropriate number printed on the right side of each OSORS statement. The subjects were able to complete the survey in 10 to 15 minutes, with some taking a slightly longer time. Each completed survey was manually examined, and then coded for statistical analysis.

3.3.3 Think –aloud Protocol

Think alouds are a research tool originally developed by cognitive psychologists for the purpose of studying how people solve problems. The basic idea behind a think aloud is that if a subject can be trained to think aloud while completing a defined task, then the introspections can be recorded and analysed by researchers to

determine what cognitive processes were employed to deal with the problem. In the field of reading comprehension think alouds have been used to identify reading strategies used by L1 and L2 learners, good and poor readers. As Coiro (2003) states that think aloud bring to the open the strategies the learners use to understand the text. Therefore, think alouds provide a direct view of a reader's mental activity, a kind of window into these processes which are usually hidden.

The research design of this study involved reading two different types of text, one printed and the other hypertext. The think aloud protocol was used to identify metacognitive and cognitive reading strategies used by 10 students, while reading a printed and hypertext of similar levels of cognitive difficulty.

The procedure was as follows. From a total of 28 students, 10 were selected to participate in this study. Before the actual data collection of the think aloud reports, the subjects were given a formal introduction to the think aloud protocol method. The researcher modeled to the subjects what is meant by think aloud protocol. Then the subjects had two practice sessions in which the subjects read a printed text and reported exactly what they were thinking after reading each sentence.

After the practice sessions, the data collection for the actual task was individually scheduled. The subjects were asked individually to think aloud while reading a printed text and hypertext. The subjects' verbalizations of all their thoughts were recorded. When subjects fell silent, the researcher would prompt them to think aloud.

Each think aloud sessions lasted anywhere from 40 minutes to an hour for the printed text and 50 minutes to two hours for the hypertext. All 20 sessions (10 for the printed text and 10 for the hypertext) of the tape recordings were transcribed for analysis. Analysis took the form of coding each discrete verbalization in the transcript according to the type of reading strategy exemplified.

Both the think aloud procedures for the printed and hypertext are discussed in great detail in the data collection procedures.

3.3.4 Retrospective Interviews

One of the concerns about think-aloud protocols by researchers are whether the subjects were verbalizing all of their thought processes. Theoretically, the completeness of a think-aloud protocol is dependent on the extent to which information is heeded while in short-term memory (Ericsson and Simon 1980:1984). However, Ericsson and Simon (as cited in Smagorinsky 1995) point out that think-aloud protocols are often incomplete, not because the information is not attended to, but because the subjects do not utter all their thought processes. To address this problem, Gill, (2004) followed Haastrup's suggestion that the think-aloud procedure be "supplemented by a retrospective interview, the purpose of which is to probe into some of the statements made during the thinking aloud, thereby improving the reliability of the protocol analysis" (Haastrup1987, p.202). Therefore these retrospective interviews allow the researcher to explore beyond what the subject said or did not say without increasing the chance of invalid or reactive reports.

Furthermore, retrospective interviews advocate a kind of probing in which the researcher asks the subjects to amplify or clarify certain types of verbalization in their protocols. For example, if the subjects' protocol for reading a text includes behaviour that may signal uncertainty e.g. uhms, ahs or particularly long silence, it may be fruitful to ask the subjects if something is confusing or difficult. It seems likely that the subject could retrospectively articulate the source of a behaviour that he has just exhibited. The information to which he was reacting should still be present in the working memory. The subject might not spontaneously articulate a problem. This is because it can be too demanding to concentrate on solving the problem and at the same time verbalize one's thoughts. However, probing working memory after the task should yield useful additional information without threatening validity.

The technique of cued retrospective recall uses the audio-recordings of the verbal performances as represented in their think-aloud to serve as cues in eliciting their retrospective reports (DiPardo 1994). The technique rests on the premise that confronting the subjects once again with the task situation provides reactive traces in short-term memory, thus allowing the subjects to report their cognitive processing with an acceptable degree of accuracy (Faerch and Kasper, 1987).

Therefore, in order to ensure the completeness of the data, the researcher combined the think-aloud protocols with data obtained from cued retrospective recall interviews.

A sample of the type of questions asked during the cued retrospective interview is given below:

- You paused here for awhile. What were you thinking about?
- You repeated this word. Why?
- What were you thinking at this point?
- What were your thoughts when you were looking at the picture?
- Did you relate it to any incidents?
- Why did you reread the whole paragraph?
- Why did you say that?
- What does okay mean?
- Why did you sigh?

These questions were aimed at expanding and clarifying the responses expressed by the participants during the reading of the think-aloud protocols. Therefore the retrospective interview sought clarification and elaboration of their think alouds. The aim here was to elicit further details of the subjects' strategies.

3.3.5 Observation

Observation has always been considered a major data collection tool in qualitative research. In second language research observations are most often used to collect data on how learners process language in a variety of settings, to study language learning and teaching process in the classroom, and to study teachers' and students' behaviours. The main use of observation is for examining a phenomenon or behaviour while it is going on. Direct observation is unobtrusive, meaning that the researcher allows the activity to proceed without interruption. Questions, if asked at all, are reserved for after the activity.

Some observations are “structured” meaning that the researcher has determined in advance what to look for in the observed context. In this study the researcher wanted to note if the students were:

- taking notes
- scrolling up and down
- referring to a dictionary
- underlining words or phrases
- showing signs of irritation/agitation
- showing signs of confusion

The observation notes were used to clarify the primary data and allow for triangulation. Many researchers have encouraged triangulation as a means of enhancing the validity and reliability of verbal data (Ericsson and Simon 1984; Greene and Higgins 1994).

3.3.6 Summary

The subjects were required to write a summary, for both the printed text and hypertext. After the subjects had completed the think aloud reports and the retrospective reports the subjects were asked to write a summary of the texts. The summary was used to assess the subjects’ comprehension of the text. It was not a primary method for data collection but rather used to clarify or support the primary findings.

3.4 Data Collecting Procedures

3.4.1 Procedures before collecting Verbal Protocol

3.4.1.1 Selecting Subjects

A student profile questionnaire was administered to 52, 3rd year Law students. At the onset, only 28 were selected for this study. The criterion for selection at this point was adequate proficiency in the English language. Proficiency in English was demonstrated if the subject had obtained a Band 4 or Band 5 in the Malaysian University English Test. (Refer to Fig 5 on page 80). This information was verified by consulting available academic records.

3.4.1.2 Briefing Subjects

At the very onset, the purpose of the study was once again stated, emphasizing the importance of the study to reading. The subjects were also informed that their verbal reports would be recorded and transcribed and that there must be commitment and willingness to participate for a good number of hours in all phases of the study. As reporting in a second language (English) would probably increase the cognitive load of the task, the subjects were told that they could verbalize their thoughts in their native language, or a combination of both L1 and L2 (Robinson, 1991). Garner, as cited in Matsumoto (1993), cautions that the subjects' verbal facility in the target language should always be considered in data collection process so that verbalization difficulties will not mask out the emergence of some important mentalistic data. The ability for the subjects to provide think aloud protocols is critical to the success of this technique.

It was also made clear that the anonymity of the subjects would be preserved. This was to make sure that the subjects were comfortable about sharing their thoughts during their reporting. At the end of the session a date convenient to all the subjects was fixed for the next session.

3.4.1.3 Modeling

Presseley and Afflerbach (1995) say that "researcher silence about how the text might be processed is more defensible than directions that prompt particular processing…" (pp 132-135). However, Ericsson and Simon (1987) feel that there is a need for the subjects to be trained before think-aloud protocols are elicited. They are of the opinion that this training had no effect apart from increasing the completeness of the verbalization.

During the modeling session the subjects were given a formal introduction to the think aloud protocol method. The instructions to the subjects were intentionally kept neutral to reduce the likelihood it might influence the subjects' processing of the text in one way or another. The subjects were asked to read and say everything out loud regardless of how trivial the thinking might seem. Since the main aim of the study was to learn as much as possible about the strategies used while reading printed text and hypertext, the subjects were not given any specific instructions about how the text might be processed. The researcher just modeled 2 examples to the subjects of what is meant by think-aloud protocol.

Firstly, she demonstrated solving a mathematics problem (See Appendix F)

Example: Model 1

The Researcher says: 20 : 10 ---------- 50 : _____ (25, 150, 30 100)

Think-aloud – Ok, 20 goes with 10, so what goes with 50? Maybe it's 150. Is that right? Twenty is two times 10. Is 50 two time 150? No, that can't be right. The second number must be smaller. Maybe it is 25. Yes, 50 is two times 25 just like 20 is two times 10.

Next, the researcher modeled thinking aloud while reading an excerpt from a short story entitled *Food's on the Table* (See Appendix G).

Example: Model 2

Teacher reads story title and introductory note.

Title: Food's on the table by Sydney Taylor

Introductory Note: Until a door is open, you don't know what's on the other side. Ella , her sisters and her brother opened a door to a new apartment

Teacher: I guess this story has something to do with eating and several children who go to an apartment. I wonder exactly where they're going and what does this have to do with food? This isn't making a whole lot of sense yet. I guess I'll read on.

Teacher reads from beginning of actual story of text.

Text: Ella glanced at the slip of paper in her hand. "We want 725--- it must be the next block.

Teacher: Maybe this takes place in the city, since Ella said “next block”. I know apartments are in cities and they have numbers. I bet the slip of paper must tell where the apartment is. Maybe they are looking for apartment 725. Is this making sense so far? I think so, it’s a little early to really decide. I’II read on get more information and find out.

At the end of the demonstration, the subjects were asked to share their thoughts and were free to ask questions and clarify their doubts. Then the first practice session was scheduled for the following day.

3.4.1.4 Practice Session

During the first practice session, the subjects practiced thinking aloud while reading a short expository text. This exercise was to further familiarize the participants with the think-aloud protocol procedure. For this first practice session, the researcher observed and reminded them constantly to verbalize their thoughts. They were told to report exactly what they were thinking after reading each sentence and were cautioned against trying to analyze or explain their thoughts. Ericsson and Simon (1984) state that the subjects’ verbalization could be assisted by reminding each of the subjects to speak when he or she lapses into silence.

During the second practice session the next day, the students again read a different expository text but this time their concurrent verbal protocols were audio-taped. This was done so that the subjects became accustomed to the use of the tape

recording device and procedures. The tape recordings were also helpful in reviewing the subjects' verbal reports and checking for completeness and accuracy of reports. The subjects received feedback in reaction to their verbal reports and a lot of encouragement until they felt comfortable with the procedure. Those subjects who were clearly unable to or struggling to provide adequate think-aloud reports as well as individuals who reported that they were unable to give their full commitment were eliminated from the selection. A rater, an English language lecturer who was familiar with think-aloud verbal protocol method, listened to the think-aloud report and rated the verbal reports on a scale of 1 to 5.

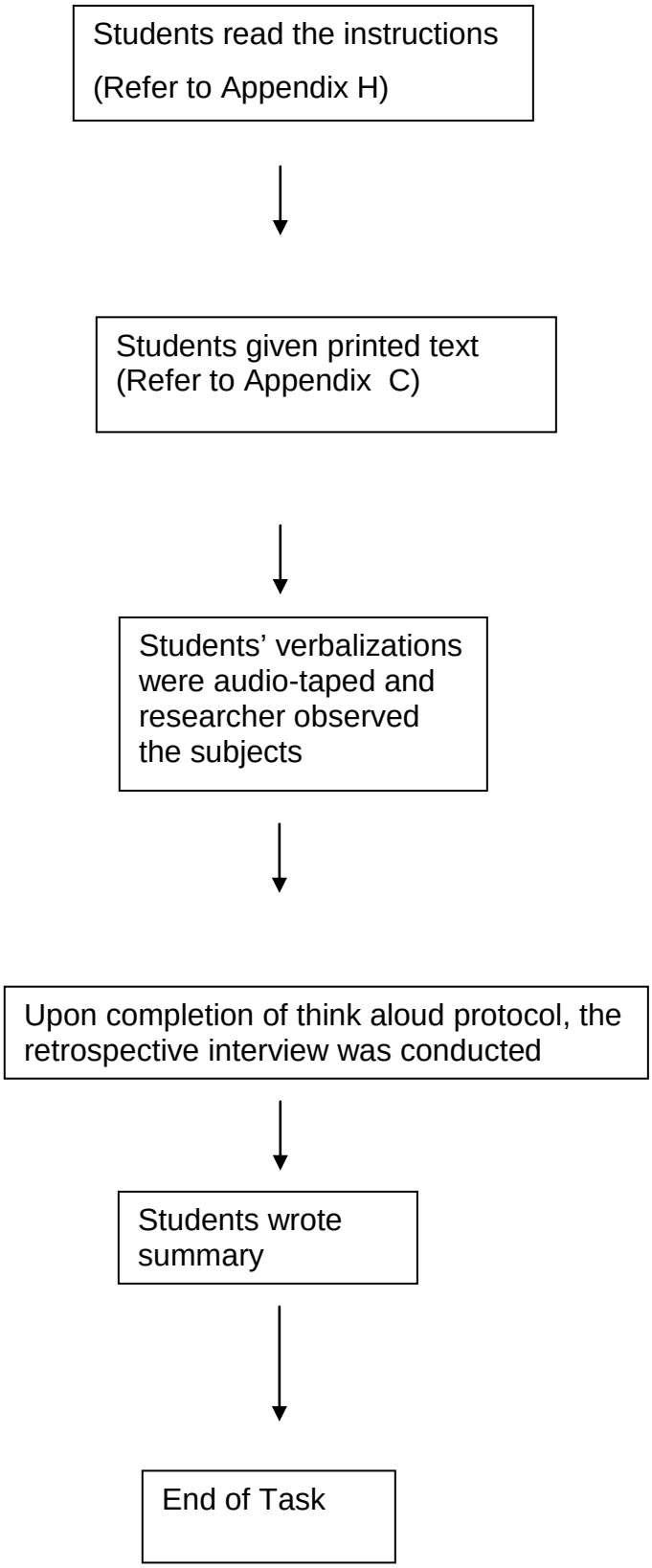
The rater and the researcher, by consensus, then selected the subjects for the study based on their ratings of the richness of data in the think-aloud protocol. Only 10 subjects were finally selected. The data collection for the actual task was individually scheduled and conducted four days after the practice session.

3.4.2 Procedures followed when reading in print during the think aloud Protocol.

Four days after the practice session, the actual data was collected. Individual appointments were set for each subject. At the beginning of the task each participant was given clear instructions on what they had to do and the steps involved.

The flow chart below shows the steps involved.

Flow Chart : Think-Aloud Protocol When Reading In Print



At the beginning of the actual data collection for reading in print, each subject was reminded of the steps involved in completing the task. They were asked to read and say everything aloud regardless of how trivial the thinking might seem. The researcher also assured the subjects that they could verbalize their thoughts in either Bahasa Malaysia (L1) or English (L2) or a mixture of both the languages. They were asked to verbalize in the language that they were comfortable with and in the language that they can best express their thoughts. They were also reminded that the verbal report was not to test their proficiency but to identify the reading strategies employed to comprehend the text. Some of the studies that have recorded the subjects' verbal reports in their native language are, Shohamy, 1991; Buck, 1991; Sasaki, 2000; and Yamashita, 2003. A set of the instructions was prepared for the students to read before the task. (See Appendix H).

When the subjects were clear about the instructions, they were given the text entitled *Shifting Paradigms,* a piece of blank paper and a pencil for the task. The subjects then read and their think-alouds were audio-taped. The researcher's role was that of a guide and an observer. However, if the subjects kept silent for a long time, the researcher prompted the subject to describe his or her thoughts by asking such questions as "What are you thinking? or Why are you quiet, what are your thoughts?. The role of the researcher was not to provide explanations for the text but to act as a guide and to encourage and lead the subjects to continue and complete the think-aloud report. The researcher's interventions were minimal. While the subject thought aloud the researcher observed and took down notes, for example, scrolling up and down, signs of confusion etc.

Immediately after the think-aloud task, the retrospective interview was conducted. The tape was played back and both the researcher and the subject listened to the tape. This session allowed the researcher to ask questions, clarify statements that were considered obscure by the researcher and also obtain confirmation on statements that were incomplete.

Fontaine (1989) cited in Tung-Hsien He (2001:30) confirmed that because of the playback, her subjects further "explained decisions that they had not been able to verbalize on tape." Some participants clarified certain statements and also explained the long pauses. This helped reduce ambiguity and further strengthened the reliability of the data collected.

Just before writing the summary, the subjects were given a chance to look over the text so that they might reassemble a complete, coherent version from the fragmentation that might have resulted from the continual interruption involved in think-aloud (Block, 1989). The subjects were given 40 minutes to write a summary of the text. The summary was scored for the presence of the number of main ideas, supporting details and general understanding of the text.

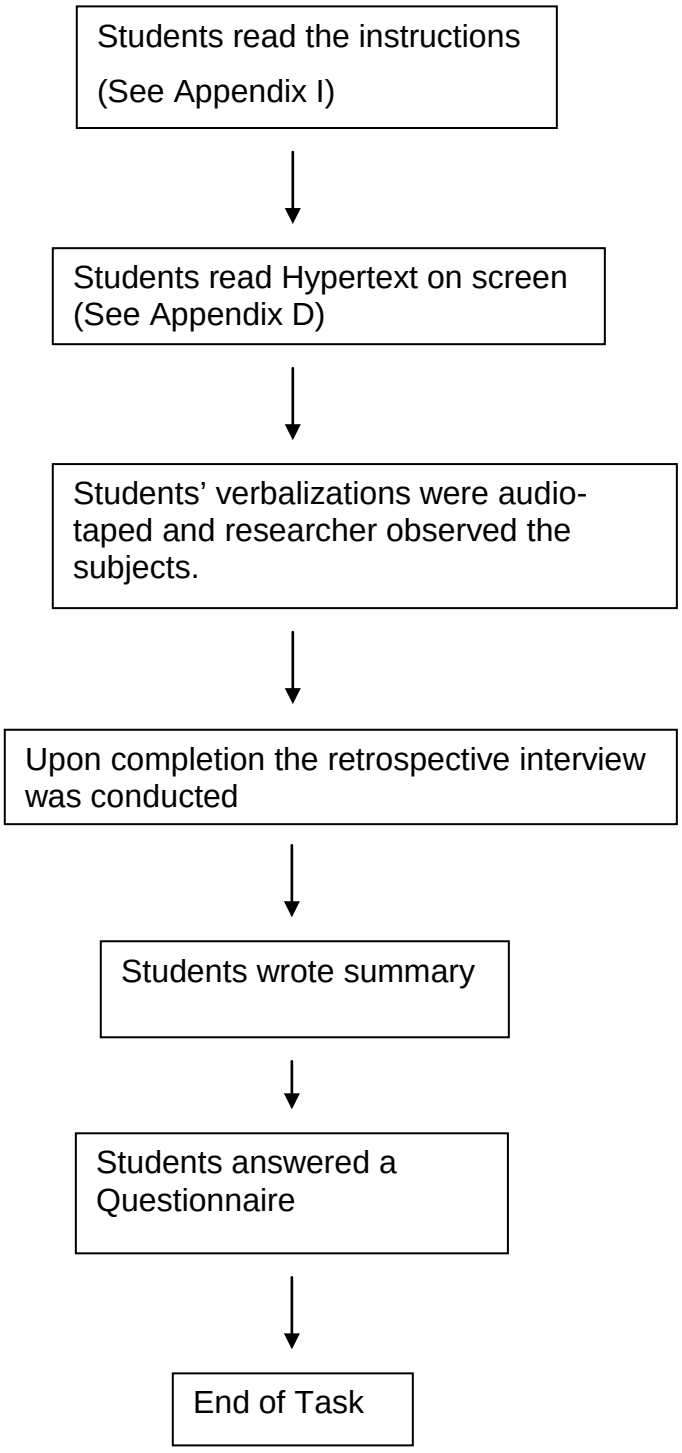
3.4.3 Procedures followed when reading hypertext during the think aloud protocol recording

When all the verbal protocols recording had been collected for the reading in print, the data collection for reading hypertext resumed. Once again individual appointments were set for each subject. At the beginning of the task each subject

was given clear instructions on what they had to do and the steps involved.

The flow chart below shows the steps involved.

Flow Chart : Think-Aloud Protocol When Reading In Hypertext



At the beginning of the actual data collection for reading hypertext, the subjects were reminded to verbalize their thoughts as they read. They were asked to read and say everything aloud regardless of how trivial the thinking might seem. The researcher also assured the subjects that they could verbalize their thoughts in either Bahasa Malaysia (L1) or English (L2) or a mixture of both the languages. They were asked to verbalize in the language that they were comfortable with and in the language that they can best express their thoughts. They were also reminded that the verbal report was not to test their proficiency but to investigate the reading strategies employed to comprehend the text. A set of the instructions was prepared for the students to read before the task. (See Appendix I).

When the subjects were clear about the instructions, they were allowed to read the hypertext on the computer. They were given a piece of blank paper and a pencil for the task. The subjects' think aloud protocol were audio-taped. The researcher's role was that of a guide and an observer. However, if the subjects kept silent for a long time, the researcher prompted the subject to describe his or her thoughts by asking such questions as "What are you thinking? or "Why are you quiet or what are you thinking?" The role of the researcher was not to provide explanations for the text but to act as a guide and to encourage and lead the subjects to continue and complete the think-aloud report. The researcher's interventions were minimal. While the subjects were verbalizing their thoughts, the researcher took down notes for example, scrolling up and down, signs of confusion etc.

Immediately after the think-aloud task, the retrospective interview was conducted. The tape was played back and both the researcher and the subject listened to the tape. This session allowed the researcher to ask questions, clarify statements that were considered obscure by the researcher and also to obtain confirmation on statements that were incomplete.

Fontaine (1989) cited in Tung-Hsien He (2001:30) confirmed that because of playback think-aloud method, her subjects further "explained decisions that they had not been able to verbalize on tape. Some subjects clarified certain statements and also explained the long pauses. This helped reduce ambiguity and further strengthened the reliability of the data collected."

Just before writing the summary, the subjects were given a chance to look over the text so that they might reassemble a complete, coherent version from the fragmentation that might have resulted from the continual interruption involved in think-aloud (Block, 1989). The subjects were given 40 minutes to write a summary of the text. The summary was scored for the presence of the number of main ideas, supporting details and general understanding of the text.

After writing the summary, the subjects answered the On-line Survey of Reading Strategies (OSORS) questionnaire. They were informed of the purpose of the questionnaire and of the fact that there was no right or wrong answers. They were asked to express their honest opinion by circling the appropriate number printed on the right side of each statement on the questionnaire. The 38 items of the OSORS were about their perceptions of the online reading strategies that they used.

Each subject was able to complete the questionnaire in about 15 to 20 minutes. Each completed questionnaire was manually examined, and then coded for statistical analysis.

3.5 Data Analysis

Data were obtained from the following sources:

- Think-aloud reports
- questionnaire
- retrospective interviews
- observations
- summary

3.5.1 Think –aloud report

The think-aloud reports were transcribed using a transcription system designed to preserve features of the verbal reports, including pauses, repetition, false starts and self-reports. This was done because all of these features could provide important information related to cognitive processing (Kasper, 2000). Since some of the subjects during the think-aloud sessions spoke in L2, their reports were transcribed in Bahasa Malaysia verbatim and then translated to English. Then, the English versions of transcriptions were given back to the subjects to make sure what they said and talked about while reading the two texts were all included in the transcriptions.

All the transcripts were double-checked for accuracy. Then the transcripts were coded to obtain ideas or trends of the second language learners' use of metacognitive and cognitive strategies while reading text in print and hypertext.

The researcher created a list of codes related to the research questions following Miles and Huberman's (1984) guidelines. A coding scheme of strategies was adapted from Sheorey and Mokhtari (2001) and Anderson (1991, 2003,) and from the data. The major categories of the coding scheme for reading strategies are metacognitive strategies, cognitive strategies and support strategies. It also includes an abbreviated code with a strategy term, description, and illustrative transcript excerpts.

Appendix J provides the list of strategies that were used for classifying the data in this study. The inventory assisted in identifying and determining which reading strategies students employ when reading a text in print and on screen, and guide the classification of strategies.

In order to identify the strategies used while reading in print and hypertext, two reading specialists were enlisted to work with the researcher in identifying the reading strategies used and to categorize them in a meaningful way.

After the purpose of the study was explained to the reading specialists, they were instructed to independently identify and categorize the strategies of four transcripts (2 printed texts and 2 hypertexts) using the coding system of strategies prepared by the researcher. The specialists were told that the subjects might resort to many

other strategies during reading and that they should carefully note any other type of strategy that might be used.

The method of analysis consisted of first reading the protocol transcripts and marking the parts of the think-aloud reports containing the strategies using the appropriate abbreviated codes (Pred, Rp, Prev etc) in the margins of the transcripts (See Appendix J). The specialists and the researcher then met to compare codes, calculate percentage of agreement for reliability, and resolve differences in coding. Any differences in coding, with respect to strategy type, were resolved through discussion referring back to the coding scheme and further clarifying definitions and distinctions of categories when necessary. Once the specialists were more confident and comfortable they worked on the rest of the transcripts. They then only met with the researcher to review differences in their coding. Thus, all coded data (10 transcripts of printed and Hypertext) were agreed upon by the two specialists and researcher, either in initial coding or after discussion. At the conclusion of the task, the raters were required to count the number of occurrences of those strategies.

In general, a relatively high degree of agreement was reached among the raters. Interrater reliability was 81% for the researcher and one coder, and 78% for the researcher and the other coder. Any discrepancies remaining in coding were resolved through discussion.

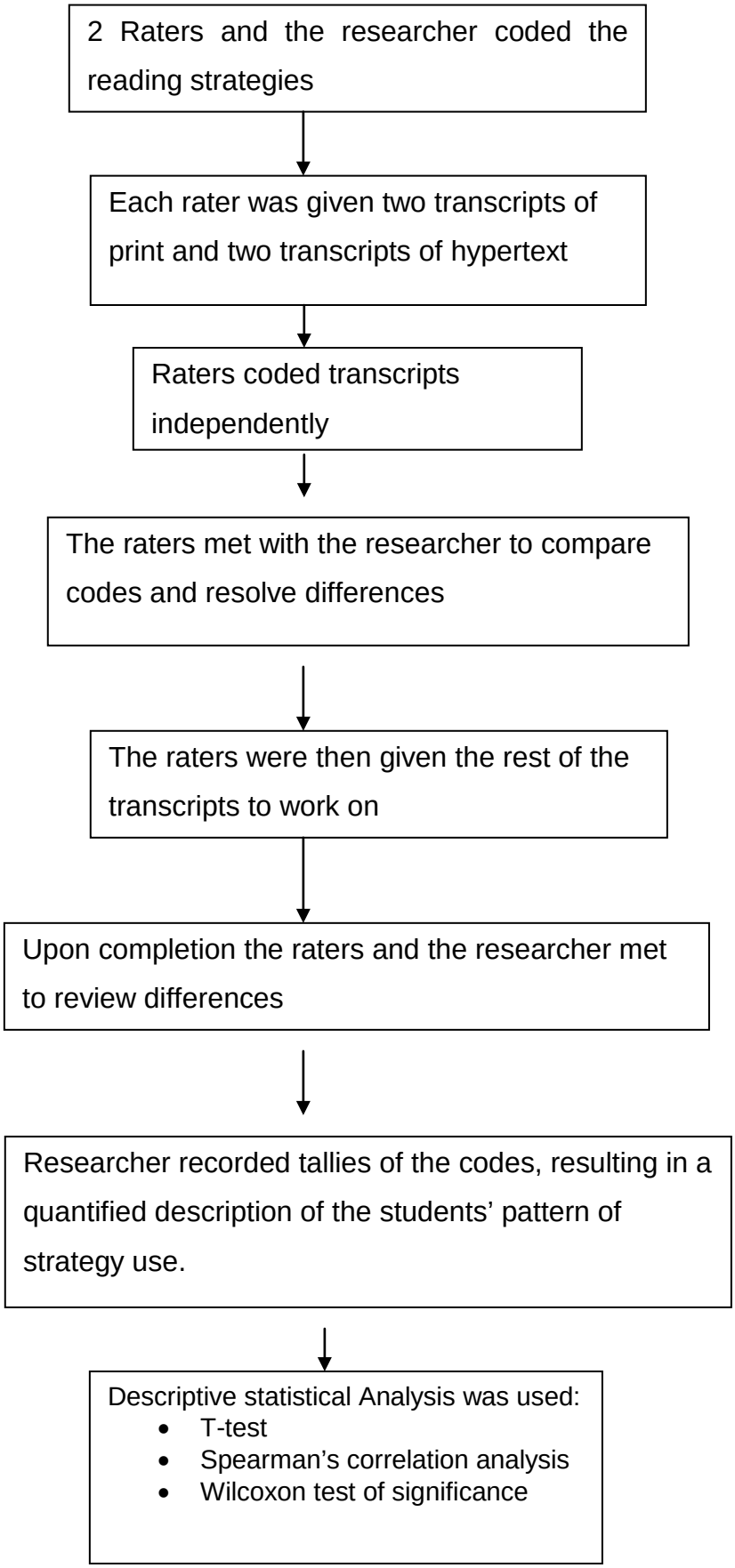
For each coded transcript, frequency counts of each strategy category were calculated, as was the proportionate use of each mode. Each occurrence of a

particular strategy was counted as one instance, whether it lasted for 1 second or 1 minute. If interrupted and resumed, a strategy was counted twice. Therefore, the response to one sentence might contain several strategies and several instances of the use of one strategy.

Qualitative descriptions of the responses of each participant for both passages were also prepared. The data were analysed using descriptive statistical procedures as well as *t*- tests, Spearman's Correlation analysis and Wilcoxon test of significance to examine whether significant differences existed between the two mediums with respect to print and hypertext, and reported strategy awareness and use while reading hypertext.

The flow chart below shows the coding process.

The Coding Process



3.5.2 Questionnaire

For the OSORS, all of the students (N=10) responses were scored for the 38 items within the three subscales (global, problem-solving and support). Scoring guidelines provided by Anderson (2003), were followed (See Appendix K). The students' responses from the OSORS were compared to the results of the think-aloud coding to see if there was triangulation

3.5.3 Retrospective Interviews

The retrospective interview was conducted with each subject to gather additional descriptive information. The subjects further explained decisions that they had not been able to verbalize on tape.

All the audio taped interviews were transcribed and where necessary the data was combined with the concurrent verbal reports.

3.5.4 Summary

The subjects were required to write a summary after reading both the printed text and hypertext. The summary was used as a method of assessing reading comprehension.

The summary was scored for the presence of the number of main ideas, supporting details and general understanding of the text. A strict criterion was adopted in which distortion of the original texts were not allowed. Paraphrases were accepted but elaborate inferences were not. The researcher enlisted the

help of a colleague to mark the summary. Interrater reliability coefficient conducted on the summary marked for both printed and hypertext was found to be 0.82. Both the scores for printed text and hypertext were compared.

3.5.5 Observation

The observation notes made by the researcher during both the think alouds, while the subjects were reading the printed and hypertext were used to clarify the primary data. The researcher just noted down certain behaviors and actions of the subjects while reading both text.