THE USE OF THINK-ALOUD IN EXPLORING THE HIDDEN PROCESSES OF L2 READING COMPREHENSION IN A SMALL GROUP

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Abstract

Think-aloud has become a popular research tool among both L1 and L2 reading researchers in general and particularly to those who are interested in the area of reading strategies and comprehension monitoring. This is because the reading process is not easily (if at all) observable. No one knows what is going through a person's mind while comprehending a reading text. Nonetheless, reading researchers have since resorted to the use of think-aloud protocol as a means to providing direct evidences of the thinking and cognitive processes of readers. While there have been many studies made exploring and delineating the reading strategies of individuals, this article reports an attempt to examine the reading strategies and comprehension monitoring of ESL students as they read L2 text in a small group.

Keywords: Think-aloud, L2 reading comprehension, reading strategies, comprehension monitoring, ESL students

Abstrak

Think-aloud semakin popular dalam kalangan pengkaji bahasa ibunda (L1) dan bahasa kedua (L2) dan mereka yang cenderung dalam bidang pembacaan. Ini kerana proses membaca ini bukanlah mudah untuk dibuat pemerhatian. Memanglah sukar untuk menyelami proses minda seseorang apabila dia sedang membaca. Oleh itu, pengkaji pembacaan meletakkan penggunaan *think-aloud* ini dapat memberi jawapan sejauh mana bentuk pemikiran dan proses kognitif pembaca itu. Banyak kajian dibuat untuk meneroka dan menjelaskan strategi membaca, dan kajian ini mencuba mencari apakah strategi membaca dan pemantauan kefahaman pembaca dalam kalangan pelajar ESL apabila mereka membaca teks L2 dalam satu kumpulan kecil.

Kata Kunci: Think-aloud, kefahaman membaca L2, strategi membaca, pemantauan kefahaman, pelajar ESL

INTRODUCTION

Imagine someone snuggling down in his or her favourite chair at a cozy corner of the house to enjoy a book or magazine. Or undergraduates, by the hundreds, being in their university's library poring silently over journals, textbooks, reference books, and lecture notes. In such scenarios, we can never be sure what is going through their mind or what they are actually doing (day-dreaming, figuring out the meaning or an unknown word perhaps) while looking at the reading texts. This is because reading is essential a very private or personal activity in the same that no one knows what is actually going through a reader's mind during that activity. Hence, we definitely can observe people in the act of reading but to observe the online reading processes that are taking place while someone is in the act of reading is surely not as easy.

Due to this 'private' nature of reading, researchers in the field of reading have frequently investigated the product of reading, that is, what is understood and what is not understood as indicated through some form of reading measures. As for researchers who are interested in examining what the subjects were thinking about as they read, they could of course ask their subjects to report or describe what their thoughts were when they have finished reading through a text. Their subjects could also inform researchers if they experienced difficulties or not, what they tried to do when faced with difficult words and so on. However, such methods of inquiry allow only a certain level of insights into the reading processes after reading the text and not while reading the text.

While the methods mentioned above are useful and valuable in many ways, they do not provide direct evidences of the cognitive and metacognitive processes of the readers. Reading researchers have since resorted to the use of think-aloud so as to look into the hidden processes of reading comprehension.

Think-aloud has become a popular research tool (albeit its limitations) among both L1 and L2 reading researchers in general and particularly to those who are interested in the area of reading strategies and comprehension monitoring. It is the aim of this article to provide a brief description of this method particularly for those who may be interested in using think-aloud as a research instrument. It is hoped that the usefulness of the method can be seen through an example of a study in which the data was collected through the use of think-aloud. The study described is an attempt to examine the reading strategies and comprehension monitoring of ESL students as they read L2 texts in a small group.

LITERATURE REVIEW

Think-Aloud

In general, think-aloud simply means saying aloud one's thoughts. Cohen (1996: 7) described think-aloud as a "stream-of-consciousness disclosure of thought process while information is being attended to'. In research, Matsumoto (1993) explained that think-aloud is a data collection method whereby information are asked to say "what they are thinking and doing (i.e. everything that comes to mind) while performing a task" (p. 34).

In this study, think-aloud is defined as the verbalisation of one's thoughts while engaged in a task (Kucan and Beck, 1997). Applied particularly to the area of reading, think-aloud can be seen as the reader's verbalisation of his or her mental processes while engaged in reading.

Think-Aloud as a Research Method

Newell and Simon (1972: 885) pointed out that the "first thinking-aloud tapes were transcribed in the spring of 1957" with the view to defining a computer programme of information processing that would parallel and explain the human behaviour exhibited in them. Nevertheless, Newell and Simon themselves have been credited and generally accepted by researchers (e.g. Block, 1986; Cavalcanti, 1987; Elekes, 1997; Kucan and Beck, 1997; Liaw, 1995) as being the first to introduce and to develop think-aloud as a research instrument.

By assigning a pivotal role to the analysis of verbal protocols provided by their subjects, Newell and Simon developed a theory of human problem solving and thus also demonstrated the potential of think-aloud as a research method (Lucan and Beck, 1997). Since then, many researchers have chosen think-aloud as their tool of inquiry in cognitive research including seeking access to on-line processing for reading comprehension.

From a more general perspective, the think-aloud procedure as a mode of inquiry belongs to the broader context of introspection (Cavalcanti, 1987). Introspection, or the reporting of one's thoughts and the resulting verbal reports of subjects, was heavily used particularly by cognitive psychologists to understand the workings of the human mind (Afflerbach, 2000). Informants' verbal reports were seen as important sources of information about the detailed steps of thought processes.

Presently, think-aloud as a data collection technique has gained popularity among researchers who seek access into the cognitive processing of their subjects.

Researchers working in the second language learning context have also advocated the use of think-aloud (e.g. Cohen, 1996; Cohen and Hosenfeld, 1981; Faerch and Kasper, 1987; Matsumoto, 1993). Besides that, a few researchers like Rankin (1988) and Elekes (1997) have provided suggestions in designing and using think-aloud studies in ESL reading.

Think-Aloud and L2 Reading Research

In the field of second language reading, Hosenfeld (1977, 1979, 1984) is one of the earlier researchers to utilise the think-aloud technique as a research method. Indeed, it can be said that the use of think-aloud is well represented by the series of studies carried out by Hosenfeld. Like Olshavsky (1977), Hosenfeld (1984) adopted a problem-solving perspective of reading and sought to identify and understand the strategies that are used by young readers when they confront problems.

Upon identification of the strategies used by successful readers, Hosenfeld (1979, 1984) designed two case studies with unsuccessful readers with the same purpose of finding out if unsuccessful readers can acquire the strategies of successful readers. The first case study involved a subject named Cindy, the daughter of two university professors, who was having difficulty reading in the French language. The second case study involved a 14 year-old boy named Ricky who was having difficulty reading in Spanish and who comes from a working class family.

Both studies have diagnostic and instructional phases in which the think-aloud procedure was used. The think-aloud procedure was used to identify the subjects' reading strategies before and after a remedial phase. The results obtained in the studies showed that unsuccessful readers can be helped to acquire and to use the strategies utilised by successful readers. More importantly, in the studies cited thus far, the representation of reading as problem solving initiated "a new era in reading comprehension research, an era in which strategies readers use as they read became the focus of attention" (Kucan and Beck, 1997, p.276).

The Reading Process

Research into the nature of the reading process is abundant and various reading models have been proposed (see Ruddell, Ruddell, and Singer, 1994) based on a variety of theoretical perspectives. Barnett (1989) pointed out that a reading model provides an imagined representation of the reading process. Models of the reading process can generally be placed across a continuum of two opposing approached in understanding the reading process, namely, bottom-up approaches and top-down approaches.

However, as Hudson (1998: 46) noted, 'most current researchers adhere to what has been termed as interactive approaches'. These three approaches are based on the reading activity that necessarily involves two elements: the text and the reader. A third element, namely the writer is also important (e.g. Widdowson, 1984) but is often not emphasised in the approaches mentioned. Nevertheless, the major distinction between the approaches is the emphasis given to text-based variables such as vocabulary, syntax, and grammatical structure and reader-based variables such as the reader's background knowledge, cognitive development, strategy use, interest, and purpose (Lally, 1989).

Interactive Approaches

Grabe (1991) posits that the term interactive approaches refers to two different conceptions. Firstly, it can refer to the interaction that occurs between the reader and the text whereby the reader constructs meaning based partly on the knowledge drawn from the text and partly from the existing background knowledge that the reader has. Secondly, the term refers to the interactivity occurring simultaneously between the many component skills that results in reading comprehension. Therefore, he asserts, form an interactive approach, the reading process is seen as involving "both an array of low-level rapid, automatic identification skills and an array of higher-level comprehension / interpretation skills" (p.383).

A model that would be a good example of such an approach is the interactive-compensatory model presented by Stanovich (180. Hudson, (1998: 5) explained that Stanovich's model incorporates an assumption that "a deficit in one of the component subskills of reading may cause a compensatory reliance on another skill that is present". For instance, poor word recognition (i.e. lack of ability in a lower level) can be compensated by extra reliance on contextual factors (higher level skills). On the other hand, a lack in background knowledge may be compensated by a reliance of bottom-up processing of a word or phrase in order to construct meaning.

In summary, interactive approaches in reading theories reflect the view that the reading process is an interactive process between the reader and the text and that it is bi-directional in nature involving both bottom-up processing and top-down processing. Such a view of the reading process is widely accepted by researchers in that both the bottom-up process and top-down process interact (Block, 1992) and that the reader activity interacts with the text using both processes.

Such a view of the reading process is also taken in this present study. As such, the reader is seen as a cognitively active learner and that an effective reader reads strategically (Dole, Duffy, Roehler and Pearson, 1991).

While an interactive approach to the reading process is adopted, the reading activity is viewed as resembling a problem solving activity where strategies are utilised in managing the reader's interaction with the text. In addition, these strategies reflect the bottom-up and top-down processing involved in the reading process. These strategies are the focus of discussion in the text section.

Reading Comprehension Strategies

Reading comprehension strategies refer to the "mental operations involved when readers purposely approach a text to make sense of what they read" Barnett (1989: 66). In a way, reading strategies reveal the reader's resources for comprehension and indicate how readers conceive a task, what textual cues they attend to, how they make sense of what they read, and what they do when they do not understand (Block, 1986). They range from bottom-up vocabulary strategies such as simply, rereading difficult segments and guessing the meaning of the unknown word from context or looking up the word in the dictionary, to more comprehensive strategies such as summarising and relating what is being read to the reader's background knowledge (Janzen, 1996). Put simply, reading strategies are "plans for solving problems encountered in constructing meaning" (Duffy, 1993: 232).

Studies on reading strategies reflect a shift an attention from a focus on the product of reading, e.g. a score on a reading comprehension test, to process-oriented research which emphasise on determining the strategies that readers actually use while they are reading. Central to the description of the reading strategies is the view of the reader as a cognitively active learned and that an effective reader reads strategically (Dole, Duffy, Roehler & Pearson, 1991).

Reading strategies are of interest for what they reveal about the way readers manage their interaction with the written text and how these strategies are related to text comprehension (Carell, 1989). Various taxonomies of strategies have been suggested in various studies (e.g. Anderson, 1991; Jiménez, García and Pearson, 1996; Kern, 1989; Knight, Padron, Waxman, 1985). Most (if not all) of these taxonomies are obtained based on the think aloud protocols of individual subjects. This article, however, reports the strategies identified through the think-aloud protocols of a small group of students reading a group environment and hence offers a different perspective of how reading is carried out when the students are placed in a group.

METHOD

This report looks specifically at the qualitative aspect of a wider study which is to characterise how the students read L2 texts in a small collaborative group. It is hoped that the usefulness of think-aloud as a research method in L2 reading can be highlighted in this report.

The study sought to answer two research questions:

1. What are the reading strategies used while reading in a small group?
2. How is comprehension monitoring carried out while reading in a small group?

Subjects

The subjects in this study were 4 girls who were second master (first year) Bachelor in Education (B.Ed.) undergraduates of Universiti Pendidikan Sultan Idris (UPSI), Malaysia. They were designated as the focal group in an intact class consisting a total of 20 students (divided into five groups) who formed the experimental group in a wider study that involved both quantitative and qualitative approaches in the research design.

Procedures

The four subjects (in fact all the students in the experimental group) were first put through a few practice sessions to familiarise them with the think-aloud procedure. They were then placed in small group and asked to think-aloud while reading various texts. Each subject will read aloud a portion of the text and think-aloud as they read. The others in the group will also be reading the text (silently) and will participate in any ensuing discussion arising from the think-aloud of the group member whose turn it was to read. The group reading sessions were both audio-and video-recorded. The recordings were the main source of data in the study. These data were then coded so as to facilitate analysis.

Coding Scheme

Recorded think-aloud and verbal discourses by the students in the focal group were transcribed and the protocols were then analysed in order to identify the reading strategies of the students.

In preparing to code the strategies uncovered during analysis of the protocols, reading strategies were tentatively identified based on the works of Anderson (1991), Block (1986), Jiménez, García and Pearson, 1996, and Steinberg, Bohning and Chowning (1991). This initial list of strategies was then refined based on data from the preliminary study. The second list was further refined once the audio-recorded data in the actual study was collected and transcribed.

In refining the second list, the transcripts were read through carefully and parts of the protocol containing the possible use of strategies were determined. This was necessary as the data (verbal protocol) was a complex mixture of think-aloud comments by individuals, group discussion, comments related to group administrative matters, backtracking, and discussions with the instructor who joined the group from the time to time. During this phase the parts that indicated any overt purposeful effort (i.e. strategies) or activity used by the reader or group members to make sense of the text (Jiménez et al., 1996) were identified and marked.

After marking the parts, the list of strategies was then used in identifying any particular strategies demonstrated in the marked sections. For the strategies to be identified during analysis, some form of verbalisation of the strategies was necessary although students did not have to explicitly identify or define them (Jiménez et al., 1996).

There were occasion where two different strategies seemed to overlap during the assignment of strategies. For example, a question asked in the L1 [*Makhluk asing sakit-lah ni*? (So these aliens are sick?)] could perhaps be classified as the strategy of 'translation' or 'questioning'. Based on the context and also the description and example given in the list of strategies as a guide, it was classified as 'questioning' because the primary function of the utterance in that particular context was to question and not to translate the idea.

As a way of establishing the reliability of the coding, two independent raters (faculty members) were given the list of strategies (see Appendix 1) together with the definition and example of each strategy. The raters were asked to code the strategies in the protocol using the final list. The raters' codings were then compared with the researcher's own coding as well as between the raters themselves in order to determine inter-rater reliability. The codings in the first two group reading (representing 33.39% of the total number of strategies coded) were used for this purpose. The percentage of agreement between the researcher and one rater was 84.50% and with the other rater was 86.63%. The agreement between the two independent raters themselves was 83.56%. Discrepancies in the assigning of codes were resolved through discussion with the raters and that consensus was the 'governing principle' (Jiménez et al., 1996).

RESULTS AND FINDINGS

Strategies of the group reading protocol based on the described coding scheme resulted in the identification of 18 different strategies. These strategies (descriptions and examples of the strategies are given in Appendix 1), are presented below in Table 1. They are listed from the highest frequency down to the lowest frequency in which the strategies were used.

The strategies shown in the table can be placed under two general categories namely text-based strategies and reader-based strategies.

Table 1: Strategies Identified

Rank	Total	Percentage	Strategies
1	103	16.67	*RS 3 Parap (Paraphrasing)*
2	95	15.37	*RS 1 Rerdg (Rereading)*
3	63	10.19	*RS* 10 Trans (Translating)
4	48	7.77	RS 11 Guess (Guessing)
5	47	7.64	*RS 5 Contx (Using context)*
6	44	7.12	*RS 8 Q-idea [Questioning (idea-related)]*
7	40	6.47	RS 4 Infer (Inferencing)
8	35	5.66	*RS 7 Q-word [Questioning (word-related)]*
9	23	3.72	*RS 9 Recog-W (Recognising Word)*
10	21	3.40	RS 17 Rdgon (Reading on)
11	19	3.07	RS 12 RA-gse (Rejecting / Confirming guess)
12	18	2.91	RS 18 E-Comp (Evaluating Comprehension)
13	17	2.75	RS 15 Prior (Using prior knowledge)
14	15	2.43	*RS 14 U-Dict (Using Dictionary)*
15	12	1.94	*RS 2 Sumrs (Summarising)*
16	9	1.46	*RS 6 Struc (Using text structure)*
17	5	0.81	RS 13 E-Dict (Expressing need for a dictionary)
18	4	0.65	RS 16 React (Reacting to text)
Total	618	100.00	

The text-based strategies (italicised the Table 1) are those that focused on the various aspects of the text itself such as 'using text structure' (e.g. *"the root word – happy"*). Such strategies characterise the bottom-up processing involved in reading comprehension.

Reader-based strategies, on the other hand, reflect the top-down processing. These strategies are primarily based on the readers' conceptual abilities and past experiential background that they bring to bear in the process of meaning construction of meaning of the text. Examples of reader-based strategies are 'using prior knowledge' (e.g. *"Ahh, rest. Get fresh air la. Or chat. I always chat with my friend when I bored to study"*), and 'translating' (e.g. *"Dia melancarkan kempen dia, launched campaign"*).

The use of both the text-based and reader-based strategies further supports the notion of reading comprehension as an interactive process. Nonetheless, as can be seen from the table, the students in general utilised text-based strategies (61.9%) more frequently than reader based strategies (38.1%). This findings regarding higher frequency of bottom-up strategies is similar to findings in other studies (e.g. Davis and Bistodeau (1993), Upton (1997)) that less proficient L2 readers have been observed to focus more on bottom-up strategies. Hence, this implied that the students in the focal group of this study were generally less proficient readers of the target language.

An examination of the strategy use each students show that each of the four students did indeed record higher frequency in the text-based (bottom-up) strategies that the reader-based (top-down) strategies. However, it was also found that one of the students (Di) was a proficient reader and understood the text well although she too recorded higher frequency of bottom-up strategies. This was because of the group environment that she was in and that the strategies she used were often for the benefit of the others in the group.

Thus, it was found is that while the reading behaviour of the students as a group might generally reflect their reading behaviour as an individual reader, considerations should be made with regards to the purpose of the strategies used when reading in a group situation. As with the case of one of the readers, Di, a closer examination of the possible reasons for the strategies she exhibited indicated that she was a proficient reader and not otherwise.

Comprehension Monitoring

Comprehension monitoring involves keeping track of one's understanding of the reading text and taking necessary remedial action if comprehension failure or difficulties are detected (Collins and Smith, 1980). Hence, comprehension monitoring is a two-part process – being aware of one's degree of comprehension and knowing that to do when there are comprehension failures (Dole et al., 1991). In other words, the detection of these snags to comprehension will 'trigger' (Brown, 1980) the employment of strategies steps to 'debug' (Brown, 1980) or clear the obstacles to their comprehension. Due to lack of space, what follows is a brief description and example of how the students carried out comprehension monitoring in a collaborative environment.

Resolving Idea-related Difficulties

Besides facing word-related problems, the students also experienced idea-related difficulties in comprehending the reading text. Various remedial strategies were activated to overcome the idea-related difficulties encountered.

These strategies were 'translating', 'guessing', 'rereading', and 'using context'. Other strategies involved that were used more specifically in dealing with idea-related problems were 'Translating', "Using Prior Knowledge", and "Inferring".

The following extract provides an example of the students' attempt to understand a segment of text read that posed some difficulties.

The extract shows the group starting on a new sentence in the passage with one of them, Ra, reading aloud the sentence. In general she was able to read the sentence without much difficulties except for the pronunciation of the words 'alien' and 'afflict'. Upon completion of the reading aloud and a correction on the pronunciation of 'afflict' there were indications that the students were experiencing implicitly (line 179) through rereading and also explicitly (line 180) through an evaluative comment by a group member.

The student who read aloud attempted to paraphrase the sentence (line 181) but the paraphrase was not only incomplete but also inaccurate, hence showing that she too had difficulty understanding the sentence. Therefore, a situation exists whereby everyone in the group did not understand the sentence.

A series of strategies were then employed to clarify the meaning conveyed in the sentence concerned. In a way, the strategies were focused on resolving smaller parts (words, phrases) of the sentence that were obstructing their understanding of the whole sentence. As can be seen from the extract, the students' attention was focused on the idea pertaining to the mysterious illness afflicting the aliens. Two key words that were unfamiliar to the students, 'illness' and 'afflicted', were resolved through strategies like translating, guessing, using dictionary and recognising word (see line 182 – 193).

Extract 1

RS17 Rdgon	174	**Ra**	- <u>The alien</u> /'Әilain /, <u>ehh, the aliens apparently,</u>
	175		<u>ehh, afflict</u> /ei'flikr /
(Correction)	176	**Az**	- afflicted /e'lәkt/
	177	**Ra**	- <u>afflicted with some mysterious illness and need</u>
	178		<u>these spare cattle parts to cure them.</u>
RS1 Rerdg(c)	179	**Ai**	- **To cure them**
RS18 E-Comp	180	**Az**	- *It is very difficult some of this thing*
RS3 Parap(P-)	181	**Ra**	- *Illness is a part of mysterious …*
RS10 Trans(w)	182	**Ai**	- *Illness macam sakit kan?*
RS8 Q-idea	183	**Ra**	- *Sakit misteri. Makhluk asing sakit-lah ni?*
	184	**Az**	- *Hmm (yes, nod of agreement)*
RS1 Rerdg(b)	185	**Ra**	- **And they need to spare cattle part to cure them**
	186		
RS10 Trans(i)	187	**Ai**	- Sepatutnya penyakit ni memerlukan badan?
RS11 Guess(w)	188	**Ra**	- *Mysterious, mysterious itu? Penyakit misteri?*

RS1 Rerdg(C)	189	**Ai**	- *Ahh (yes), and then…***cattle parts to cure them**
RS14 U-Dict	190		Afflicted ini (<u>to be suffering or experiencing</u>
	191		<u>serious problem</u>) [reading from dictionary]
RS Recog-W	193	**Az**	- Afflicted–experiencing serious problem – *yang ini*
	194		*problem ini,* Suffering
RS1 Rerdg(b)	195	**Ai**	- **The aliens are apparently afflicted with some**
	196		**mysterious illness**, *itu macam*
RS3 Parap(P-)	197	**Az**	- *So, alien is a big problem and …macam mana*
	198		*cakap. Ini macam …Alien ni masalah lain selepas*
	199		*itu …ada pula macam sakit misteri pula itu lagi*
	200	**Ai**	- *Sama dengan*
RS4 Infer	201	**Ra**	- *Erh, penyakit misteri ini dikaitkan dengan …*
	202	**Az**	- *Alien tu*
RS5 Contx	203	**Ai**	- *Ahh (yes). Ini alien* **need these spare cattle parts**
RS1 Rerdg(c)	204	**Az**	- **Cattle parts to cure them**
	205	**Ra**	- *To cure*
RS10 Trans(w)	206	**Ai**	- *Ahh, memerlukan …*
RS5 Contx	207	**Ra**	- **To cure them**
RS10 Trans(w)	208		*Maybe medicine, medicine to cure them, ubat-lah.*
RS10 Trans(w)	209	**Az**	- *Ahh (yes), medicine ubat*
RS1 Rerdg(c)	210	**Ra**	- **To cure them**
RS9 Recog-W	211	**Az**	- *cure ni medicine, means medicine*
RS1 Rerdg(c)	212	**Ra**	- **need treatment and***…*
RS3 Parap(P+)	213	**Az**	- *ohh betul-lah, erh, dia perlukan…, maksudnya*
	214		*macam penyelesaian untuk penyakit dengan part*
	215		*of cattle*
	216	**Ra**	- *part of cattle ahh*
(Conclusion)		**Az**	- *ahh, baca, baca. Kak Aida ke?*

However, the students at that point were still not able to understand the idea conveyed in the sentence as shown through the inaccurate paraphrase by one of them, 'Az' (lines 196-198) when she failed to make the connection between the alien and the mysterious illness.

The breakthrough came when 'Ra' inferred the link between the aliens and the sickness (line.201) in the L1, the meaning of the sentence began to become clear to the students. Following this vital connection, 'Ai' was able to provide a further link (line 203) to the part of the sentence where the aliens needed the cattle parts to cure them of the illness.

From that point onwards, although the students still had to tackle the unfamiliar word 'cur', the meaning of the sentence had become clear to them. This led to an accurate paraphrase of the sentence by 'Az' indicating that they have managed to understand the sentence that was initially not understood.

A few findings were noted as to how the students went about trying to understand the sentence that was difficult to them. Firstly, it was found that word-related difficulties and idea-related difficulties and idea-related difficulties were not mutually exclusive but rather were intertwined in that problems understanding the ideas were often the result of unfamiliar vocabulary.

Secondly, the students were found tackling smaller parts of the sentence (e.g. words and phrases) that they found difficult to understand or that they thought held important information in understanding the whole sentence. Hence, they were trying to overcome obstacles in smaller parts of the sentence – unfamiliar words or difficult phrases – that obstructed their understanding of the whole sentence.

Another finding is that the students built on the result of each strategy employed by their peers. Although each individual student employed different strategies thought appropriate in solving the problems at hand at any one time, the information garnered through the various strategies were used to collectively provide a satisfactory understanding of the sentence.

This particular finding reflects what Donato (1994) called "collective scaffolding" whereby it can be seen that the students were able to "construct collectively a scaffold for each other's performance" (p. 45). Similarly, in the present study, the extract and discussion above showed how the students relied "on the collective resources of the group" (Donato, 1994, p. 45) to resolve a comprehension problem that they would most probably not have been able to resolve as individuals. Hence, this finding undersores Vygotsky's ideas on the importance of interpersonal or social interaction in learning (Ellis, 1997).

Extract 1 not only illustrates the strategies used by the students and how they went about in their attempt to understand a segment of text but also shows a successful resolution of idea-related difficulties. However, it should be noted that, as with the attempts to resolve word-related difficulties, attempts to resolve idea-related difficulties are not always successful.

DISCUSSION AND CONCLUSION

It is hoped that the description of a study pertaining to reading strategies and the findings has exemplified the usefulness of think-aloud as a data collection tool particularly in the field of reading research. It has been shown that the procedure can be utilised to investigate on-line cognitive process (such as while-reading strategies and the metacognitive activity of comprehension monitoring) which would otherwise remain hidden.

Furthermore, when the procedure is used in a small group situation, reading strategies identified not only revealed individual efforts in comprehending a text but also what sort of concerted efforts were made by the group members in their attempts to overcome various obstacles to comprehension.

Despite the usefulness of procedure, careful planning and considerations of the various caveats and limitations of the procedure would be required while designing a study that uses the said procedure. Firstly, it is important to train the subjects on how to carry out think-aloud on their own. Such training and practices (e.g. Cohen, 1990; Ericsson & Simon, 1993) is to ensure that the subjects are able to do the think-aloud since it is not something that a reader would be familiar with.

Furthermore, the ability of the subjects to produce sufficient and also rich verbal data would be dependent on various factors pertaining to learner differences such as attitudes, learning styles, motivation, and level of confidence in their reading and speaking abilities (Cohen, 1998; Oxford, 1989).

Another issue that need careful consideration is the use of the subjects' first language (L1). This issue is, of course, pertinent in a research involving ESL students in Malaysia. The task of thinking aloud will be even more demanding on L2 learners if they are required to verbalise their thoughts in the target language that they learning. Indeed, many researchers in the L2 context who employed think-aloud as a research tool allowed their subjects to use their L1 or the language that they felt most comfortable using when thinking aloud (e.g. Brown, 1996; Davis and Bistadeau, 1993; Cavalcanti, 1987; Jiménez, García and Pearson, 1996; Mi-jeong, 1998).

It should also be noted that the procedure, as with any other procedures, is not without criticisms leveled against it. Most notably, the criticisms (e.g. Nisbett and Wilson, 1977) are that the procedure provides only an incomplete account of the thought processes being reported and also that the procedure itself changes informants' thought processes. These criticisms have, however, been answered adequately through the works of various researchers such as Erricsson and Simon (1993) and Pressley and Afflerbach (1995).

The incompleteness of the thoughts processes is inevitable, and most researchers do not depend solely of think-aloud protocols but triangulate the think-aloud data with other forms of verbal data obtained through other means such as retrospective interviews with the informants. Furthermore, most researchers do not aim to obtain a detailed and complete account (if that was possible) of the comprehension processes in a research that is usually very focused.

Besides that, advocates of the think-aloud noted that the procedure does not actually change the nature of the thought processes of the readers or informants but merely slowed down the process. Nonetheless, having to slow down and also verbalise their thoughts had an effect in the area of metacognition in that it also made the subjects more aware of what they were actually doing as they read. In fact, researchers (e.g. Baumann, Seifert-Kessell, Jones, 1992) have recognised such effects and have begun examining the usefulness of the procedure as an instructional tool in reading strategy instruction with the aim of enhancing reading comprehension abilities.

In conclusion, it can be seen that whether the think-aloud procedure is used as a research method or as an instructional tool, the usefulness of the procedure lies in its ability to allow researchers to look into hidden processes of reading comprehension.

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APPENDIX 1

List of Reading strategies

Note:
1. Examples of the reading strategies are given verbatim and not edited in order to retain their original form and may contain grammatical errors.
2. Strategies may be verbalised either through the L1 or l2 or both; e.g. Questioning – *"Mahkluk asing ini menyumbang macam mana?"* (How do the alien contribute?); Paraphrasing – *"She, erh, she here mencalonkan dirinya untuk menjadi presiden of Ireland"* (She nominated herself for the presidency of Ireland).
3. Notations (used in the examples given and in the transcriptions)

> i. Regular and underlined – Text from the passage read aloud the first time.
> ii. (Regular, underlined and in brackets) – Reading from the dictionary.
> iii. **Bold** – Text that has been read being read again or used during discussion.
> iv. *Italic* – Words spoken by students
> v. / *italic between slashes* / - phonetic transcription.
> vi. [Regular and in square brackets] – contextual notes.
> vii. (Regular and in brackets) – comment on most probable meaning

Strategy	Description	Examples
Rereading	Read again a portion of the text that has already been read	<u>Some children grab that treat the moment he's out the door</u>
RS 1 Rerdg	(a) – entire paragraph verbatim (b) – entire sentence verbatim (c) – parts of sentence verbatim	**out the door.** **Erh, some children grab the treat the moment he's out the door**
Summarising **RS 2 Sumrs**	Summarise what is thought as the information found in a segment (a paragraph or at least three sentence long) of the text after a discussion on that segment.	(After a parapgraph is read) *I think the paragraph, erh, erh, scientist wo erh, do a research and they want to know the future of the children*(GR1 L19, 20)
Paraphrasing **RS 3 Parap**	Use own words and rephrase content, but with the same sense. (P+ = accurate paraphrase) (P- = inaccurate paraphrase) (P\ = Incomplete / unfinished paraphrase)	*1997, Rosemary Scallon is 46 years old so 26 years ago she 18 years old and she is a famous artiste maybe when she apa win the contest*
Inferencing **RS 4 Infer**	Supply information that are not explicitly found or stated within the text	<u>Don't study too late, especially the night before your exam.</u> *So, you must go to sleep very early, don't study last minute and study too late*
Using context **RS 5 Contx**	Search for nearby relevant information to determine the meaning of a word or a portion of the text.	*Erh, it's refer to Milton William Cooper*

Using text structure **RS 6 Struc**	Demonstrate awareness of text structure or grammar and use the awareness in comprehending text or resolving comprehension difficulties.	<u>… questions you feel happiest about first</u> *the root word* *–happy - lah*
Questioning (word-related) **RS 7 Q-word**	Pose questions regarding the meaning and/or pronunciation of an unfamiliar word (m) = meaning (p) - Pronunciation	<u>… left your revision too late, don't despair…</u> *(a) Despair, what is despair? (GR2 L25)* *(b) And the she, what pronounce this? how to pronounce this?* <u>(Launched)</u>
Questioning (idea-related) **RS 8 Q-idea**	Pose questioning regarding the idea being conveyed in a portion of text (clause, sentence, sentences).	*if the children grabbed the sweet he will what happened?* *MJ12 – the name, the name apa ? Of ? …*
Recognising Word **RS 9 Recog-W**	Recognise or discuss a particular word used in the portion of text that is being read and paraphrased.	<u>It turns out that a scientist can see the future by watching …</u> *OK, scientist, scientist expert person who knows about science*
Translating **RS 10 Trans**	Translate a word or a portion of text to the L1 (w) = word (I) = idea	<u>She launched her campaign claiming</u> *Dia melancarkan kempen dia, launched campaign*
Guessing **RS 11 Guess**	Guess the probable meaning/pronunciation of a word or guess the probable meaning of a portion of text (w) = word (I) = idea	*Moaning what ahh, moaning?* (Question) *Maybe social chat* (Guess)

Rejecting / Confirming guess **RS 12 RA-gse**	Reject or accept a guess made earlier	*Discuss, maybe* (Guess) *No, to compare* (Reject guess)
Expressing need for a dictionary **RS 13 E-Dict**	Express need to look up the dictionary in order to resolve comprehension difficulties	*The law ? Constitution ? I need to find it in the dictionary.*
Using Dictionary **RS 14 U-Dict**	Use the dictionary to find out the meaning on unfamiliar word.	(Constitution – a country's set of laws that control how it is governed and respect the rights and duties of the people who live there). [reading from dictionary].
Using prior knowledge **RS 15 Prior**	Bring to bear prior knowledge and experiences in comprehending the text.	Take regular breaks to get enough fresh air and stretch, your legs. *Ahh, rest. Get fresh air lah. Or chat. I always chat with my friend when I bored to study.*
Reacting to text **RS 16 React**	React affectively to information in the text.	Don't study for more than thirty to forty minutes at a time *Ahh, I think it is good strategy right?*
Reading on **RS 17 Rdrgon**	Reader another portion of text despite a comprehension problem /snag remaining unresolved.	*The conclusion is ... OK, continue*
Evaluating Comprehension **RS 18 E-Comp**	Assess understanding of what is being read and demonstrate awareness of comprehension failure or success.	*Finish, too long. Don't understand*