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THE RELATIONSHIP BETWEEN READING COMPREHENSION AND STRATEGIES OF READERS: A CASE STUDY OF UTM STUDENTS

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INTRODUCTION

Examining the dynamic process of reading is not an easy task, as reading is most of the time a private process. Researchers have attempted to examine the reading processes through qualitative studies employing techniques such as miscue analysis, introspection, retrospection, think-aloud protocol and verbal recall. These techniques have offered valuable contributions to the investigation of the reading process.

Studies relating reading strategies to reading comprehension are quite limited. In the light of this issue, this researcher focuses on the relationship between a student's reading strategies and comprehension of texts. In exploring the psycholinguistic processes involved, a qualitative approach is used to analyse the data. This study seeks to find answers to this research question: Is there a relationship between individual student's reading strategies and reading comprehension?

THE RELATIONSHIP BETWEEN READING COMPREHENSION AND READING STRATEGIES

A limited number of studies have investigated the relationship between reading strategies and reading comprehension. Many past studies tend

to focus on the effect of one type of strategy on reading comprehension rather than on the relationship between general strategies used and comprehension. For instance, Close (1993) investigated the effect of inferring the meaning of unknown words on reading comprehension. Amer (1994) studied the effect of knowledge-map and underlining strategies on reading comprehension. A number of studies investigated the effect of *making inferences* strategy (Kembo, 1997; Chikalanga, 1992, Horiba, 1996) and *metacognitive* strategies (Li and Munby; 1996, Auerbach and Paxton, 1997) on reading comprehension. Nevertheless, these studies did not really include an investigation on the relationship between the overall use of reading strategies and reading comprehension.

Pritchard's (1990) study, for instance, attempts to investigate the differences in the use of strategies and the level of comprehension between L1 (American) and L2 (Palauan) readers. A difference was observed between American and Palauan subjects' use of strategies. For instance, the subjects had the tendency to use their cultural background knowledge in comprehending the texts. The focus of the study, however, was not on the relationship between reading strategies and reading comprehension. He notes that

A great deal remains unexplained regarding the relationship between the strategies readers use and the comprehension they achieve. Preliminary results from this study suggest that differences in comprehension may be related to differences in the strategies readers employ. However, future research needs to explore this issue more thoroughly. (Pritchard, 1990: 291)

A similar situation is observed in a study conducted by Amer (1994) who investigated the effect of two reading strategies namely *knowledge-map* and *underlining* on the reading comprehension of scientific texts using open-ended questions and summary tasks. Results suggest that there is no significant difference between *knowledge mapping* and *underlining* strategies on open-ended

questions. Both strategies were equally effective in helping students answer explicit and implicit questions. Although this study specifically investigated the causal relationship between these strategies and reading comprehension, it did not investigate the correlation between the use of these strategies and the level of comprehension achieved by the subjects. Therefore, whether or not there is a relationship between these strategies and reading comprehension remains unanswered.

Other studies by Kobeil (1999), Hassan (1999) and Zainal (2003) suggest that the relationship between comprehension and strategies is not significant. These findings indicate that the number of strategies and the ideas recalled are not related. Kobeil's findings imply that reading strategies and reading comprehension are two separate factors that are not necessarily related. Hassan (1999) provides further evidence that reading comprehension and reading strategies may not be associated. Although Hassan contends that there are some tendencies for positive correlations between reading strategies and comprehension when subjects read texts in their L1 and L2, the results indicate very weak relationships between reading strategies and comprehension. These findings seem to support some of Kobeil's findings.

A study conducted by Taillefer and Pugh (1998) shows counter evidence to the studies by Kobeil (1991) and Hassan (1999). Taillefer and Pugh (1998) investigated the correlation between the reading strategies and reading comprehension among French social science students. In terms of the correlations between reading strategies and comprehension in both L1 and L2, overall results suggest a strong association for L2 but less so for L1. These results contradict Kobeil's and Hassan's findings.

In sum, many empirical studies have attempted to investigate the relationship between strategy use and comprehension. These studies have also tended to test the effect of one or two types of strategies on the subjects' reading comprehension. Kobeil (1999), Hassan (1999) and Taillefer and Pugh (1998) are among the few who investigated the correlation between reading strategies and reading comprehension of L2 readers. The overall results from these

three studies are inconsistent. While Hassan's (1999) and Kobeil's (1999) results show a lack of correlation between strategies and comprehension, Taillefer and Pugh's (1998) results show a strong correlation. As the issue of the level of association between reading comprehension and strategies is still open to question, we make this a focus of investigation in our own study.

METHODOLOGY

This study, conducted in UTM, is part of a larger study. For the purpose of this paper, the data used was elicited from four subjects through think-aloud and verbal recall techniques. These subjects were from two proficiency levels: high (Hanz and Hani) and intermediate (Ilyas and Irwan). Subjects were required to read four texts: Text 1 – All-Water Systems, Text 2-Transformational Leadership Behaviour, Text 3-Air-conditioning and Text 4-Conceptions of the Manager.

The results were described through case study approach which provides a fine-grained examination of the data. The objectives of conducting these case studies were to examine in detail the reading processes of the subjects in terms of the strategies used (through the think-aloud technique) and the level of comprehension (through the verbal recall technique). This researcher took a qualitative approach to the analysis of these individual cases by providing excerpts of the subjects' protocols and highlighting the specific features of the processing behaviour of these subjects.

The subjects' think-aloud and recall protocols were taped and transcribed verbatim. From the think-aloud data, a checklist of strategies was drawn up and became the coding scheme. In analysing the data, the protocols were matched with the original texts to ascertain the strategies used by the students. Then, to measure the students' level of comprehension this researcher adapted and employed Johns and Mayes' (1990) categorization scheme to record the idea units produced by the students. According to Kroll (1977), idea units are propositions

which reflect the choices made by an encoder to create some kind of relationship between ideas and the grammatical surface form. In this study the idea units were categorized into *meaning preserving* and *meaning transforming* idea units. *Meaning preserving* idea units refer to the correct recall made while *meaning transforming* refers to distortions made by the reader.

This study attempts to answer the following research question:

Is there a relationship between the subjects' reading strategies and reading comprehension?

In this study, this researcher first examines the reading processes of individual students. Then, a comparison is made between high and intermediate students.

RESULTS

RQ1. Is there a relationship between Hanz's reading strategies and reading comprehension?

Hanz was a second year male student majoring in mechanical engineering. Based on the English Language Proficiency Test result, his language proficiency was advanced.

There seemed to be an association between Hanz's reading strategies and reading comprehension - the greater the number of strategies employed by Hanz, the greater the number of idea units produced. A closer examination of the protocol suggests some tendencies for Hanz's think-aloud and verbal recall protocols to be related, although not consistently. For instance, when Hanz's think-aloud pointed to the understanding of a text, he also produced Meaning Preserving idea units on the same content matter. One such example can be seen in Excerpt 1 below.

Excerpt 1

Text	Think-aloud	Verbal recall
#7The development of highly-efficient refrigerant gases of low toxicity known as Freons (carbon compounds containing fluorine and chlorine or bromine) in the early 1930s was an important step.	In 1930s they created aa... the invention of Freons which is a carbon compound containing fluorine and chlorine or bromine which is also known as CFC and if I'm not mistaken it is also harmful to our environment which creates a hole in our ozone layers that can harm our health.	And a Freon or a carbon compound of fluorine or chlorine and chlorine which is also known as CFC and non-toxic compound was devised in 19... about 1930. Now it's considered as a dangerous gas. And this aa...and it is an important step in modern air-conditioner development.

In the example above, Hanz demonstrated background knowledge about Freons, the carbon compound used in an air-conditioning system, through the think-aloud in which he mentioned the scientific acronym of the carbon compound as CFC. He also included information concerning the danger of CFC to our environment and health. The same kind of information was also revealed in his verbal recall when he mentioned that CFC, a non-toxic gas at the time it was devised, is considered a dangerous gas now. In other words, content in Hanz's think-aloud is also found in his verbal recall. When he preserved the meaning of the text in his think-aloud, there was also the tendency to preserve the meaning of the text in his verbal recall. However, when he transformed the meaning of the text in his think-aloud, he also tended to do the same in his verbal recall.

On the other hand, when Hanz misunderstood the text, there is the tendency that he would produce Meaning Transforming idea units for the same content matter in his verbal recall. This correspondence between think-aloud and verbal recall is shown in Excerpts 2 (with

highlighted material focusing on the example in question).

Excerpt 2

Text	Think-aloud	Verbal recall
<p>#33 Former British Prime Minister Margaret Thatcher took over an industrially drifting nation and by the power of her will helped to transform it into a nation fitting her vision of a more privatised, competitive, hard-working nation.</p>	<p>This means that aa... former British Prime Minister Margaret Thatcher is a transformational leader because aa... because she transformed the nation the British the United Kingdom aa... while to aa... nation that is more aa... competitive and hard working. Aa... before she takes over, the nation is industrialised industrially drifted drifting which means aa... aa... the nation concentrated more on industrial rather than aa... interpersonal relationship. Aa... no I mean aa... the employee of the aa... in the company for example, pay more attention in achieve achieving the goal of organisation in order to get good aa... good rewards rather than they feel that aa... they are responsible to have good performance.</p>	<p>And there are some prominent leaders are in the world. And some of aa... one of them aa... there are some famous transformational leaders in this world, aa... the one example of them is former English Prime Minis... Prime Minister aa... the former British Prime Minister Margaret Thatcher aa... who successfully transformed the nation from an industrial nation to a hard-working and competitive nation with her power.</p>

In the example above, the initial part of Hanz's think-aloud suggests that he understood the information about Margaret Thatcher being one of the transformational leaders in this world. The later part of the think-aloud, however, suggests that he might not have understood the original content of the text, since he tried to explain the meaning of the phrase 'industrially drifting nation' as 'the nation concentrated more on industrial rather than interpersonal relationship' in his think-aloud. The same kind of misunderstanding can be seen in his verbal recall when he mentioned 'Margaret Thatcher who successfully transformed the nation from an industrial nation to a hard-working and competitive nation...'. He, in fact, produced a Meaning Transforming idea unit (MT IU- 4a) which refers to an idea unit that has changed either the NP (noun phrase) or VP (verb phrase) of the original text which resulted in the alteration of the meaning of the text. In this respect, he had transformed the NP 'industrially drifting nation' to 'an industrial nation'. There may be two reasons as to why he interpreted the original text differently. First, he might not have understood the meaning of the word 'drifting' and therefore ignored it. Second, it is a common knowledge among Malaysians that United Kingdom is an industrialised country. It may be that his background knowledge was being brought into play. This example, therefore, adds further support to the notion of a relationship between Hanz's think-aloud and verbal recall.

On the other hand, there are also instances of a lack of correspondence between the think-aloud and verbal recall protocols. The following Excerpt 3 suggests that Hanz might have misunderstood sentence 12 of Text 4-Conceptions of the Manager in his think-aloud protocol but this was not shown in his verbal recall.

Excerpt 3

Text	Think-aloud	Verbal recall
#12 Practising managers and students of business in business schools, at least until recently, were likely to have little familiarity with the Weberian approach to managerial behaviour	This means that em... those studying management in business schools can recognise the formulation of Weber and the Weberian they can they are familiar at least a little familiar with the Weberian approach to managerial behaviour	The students of business school should have familiarity with the model of Weber.

In the example above, the researcher may summarise that Hanz interpreted the phrase ‘little familiarity’ as meaning ‘quite familiar’. However, in stating that ‘the students of business schools should have familiarity with the model of Weber’, he seems to be inferring a lack of familiarity. In this respect, Hanz’s think-aloud and verbal recall protocols do not correspond.

To summarise, the data described in this section suggest that Hanz played an active role in processing the texts, employing both surface and deep level strategies. Although Hanz’s processing strategies were predominantly text-based, he made use of background knowledge-based strategies especially when reading Mechanical Engineering texts. This confirms earlier hypotheses concerning some possible influence of background knowledge on the reading process. In addition, the data suggests that Hanz’s processing strategies for both discipline texts were in large measure associated with clause/sentence level units in the source texts. A difference between the two discipline areas is also observed in the processing strategies associated with word/phrase level with more in the case of Mechanical Engineering than Management texts. A closer examination of the data suggests than

Hanz attempted to explain or guess the meaning of a term which posed some difficulties to him. In terms of the frequency of a combination of strategies, the examples indicated that Hanz employed a variety of strategy types to process the meaning of the texts. His flexibility in moving from one type of strategy to another suggests the different route he took to understand the meaning of the texts. Furthermore, a number of instances in his think-aloud and verbal recall protocols suggested a correspondence between the frequency of strategies and production of idea units in the verbal recall.

RQ2. Is there an association between Hani's reading strategies and reading comprehension?

Hani was a second year female student majoring in Management. Based on the English Language Proficiency Test result, her language proficiency level was advanced.

Close observation of Hani's idea unit production reveals some interesting findings. First, Hani had a tendency to produce more Meaning Transforming than Meaning Preserving idea units for both discipline texts. It is not clear why this happens. Firstly, it may be that when reading engineering texts she could not really understand the content of the texts and therefore transformed the meaning of the texts in her protocol. When reading the management texts, however, she tended to use her background knowledge to go beyond the content of the texts and therefore also transformed the meaning of the original texts in her protocol. Secondly, she produced more Meaning Preserving and Meaning Transforming idea units for within- than outside-discipline texts. This suggests that there may be a background knowledge effect occurring when Hani processed within- than outside-discipline texts.

The protocols are examined in order to explore any possible relationship between Hani's think-aloud and verbal recall protocols. The following Excerpt 6, taken from sentences 1 and 2 of Text 2, illustrates instances of the data where there seems to be a relationship between the two types of protocol.

Excerpt 4

Text	Think-aloud	Verbal recall
#1- A number of years ago, James McGregor Burns wrote a book called Leadership that had a major impact on the course of leadership theory.	A few years ago there's an author named James McGregor Burns who wrote a book called Leadership that had an aa... very major big effect on the leadership theory	A few years ago an author wrote a leadership book I mean the author is called his name is Burns okay.
#2- Burns argued that leadership could be viewed as either a transactional and a transformational process.	He argues that leadership could be seen as aa... transactional or transformational process. If transactional that means aa... aspect aa... business or a business and transformational is to transform things or to do let's say there's a thing that we create them aa... we create them we the thing that we transform em... using our innovative thinking.	He wrote that generally there are two types of leaders; one is transactional leader and the other is transformational leaders.

The protocols of sentences 1 and 2 illustrate that when Hani showed signs of understanding the text in her think-aloud, the same content also appeared in her verbal recall protocol. When interpreting sentence 1, Hani attempted to paraphrase the text in her think-aloud by stating the name of the book author, James McGregor Burns.. This same information was also found in her verbal recall.

As for sentence 2, although Hani tended to produce a long

think-aloud, the same kind of information could also be found in her verbal recall. In both cases, it is noted that the verbal recalls are shorter than the think-aloud. This may be due to the presence of the original text during the think-aloud task but not during the verbal recall task.

However, there are also instances of a lack of a relationship between the two types of protocol. One such example can be seen in Excerpt 5 which is taken from sentence 3 of Text 2.

Excerpt 5

Text	Think-aloud	Verbal recall
#3- Leader behaviours like initiating structures and consideration, he suggested, are essentially based on quid pro quo.	Okay, leadership behaviours are essentially based on quid pro quo	XXXXXXXXXXXX

In this example, although Hani tried to interpret the text in her think-aloud, she seemed to have a problem in understanding the phrase ‘quid pro quo’, and she did not proceed with interpreting further the meaning of the sentence. In her verbal recall, the content was not recalled. It may be that Hani could not understand the phrase ‘quid pro quo’ which prevented her from recalling the content in her verbal recall. This example suggests that although Hani mentioned the content in her think-aloud, the content did not appear in her verbal recall. This indicates a lack of relationship between Hani’s think-aloud and verbal recall protocols. It is noted, however, that her inability to understand the original text may have hindered her from recalling the content in her verbal recall.

The evidence highlighted earlier indicates that Hani varied her processing behaviour. The types of strategies she commonly used included 'reading aloud', 'repeating text', 'paraphrasing', 'making inferences' and 'using background knowledge'. Of these five strategies, there seems to be a pattern in her employment of 'paraphrasing' and 'using background knowledge' strategies. While she employed more 'paraphrasing' strategies for the Mechanical Engineering texts, she also tended to employ more 'activating background knowledge' strategies for the Management texts. In terms of the level of processing, Hani's processing strategies were more drawn on information at clause/sentence level. However, it must be noted that the frequency of strategies prompted by word/phrase level is moderate. With regard to the sequence of strategies, Hani employed a similar number of limited-strategy and multi-strategy sequences for texts of both discipline texts. Overall, she employed many strategies and produced a high number of idea units, indicating the possibility of a relationship between the number of strategies she used and the idea units she produced. However, it must be noted that there were also instances where little relationship were observed between her think-aloud and verbal recall.

In conclusion, Hani showed the characteristics of a good reader. She not only used many strategies, the type of strategy also varied. As noted earlier five types of strategies were commonly used by Hani; 'reading aloud', 'repeating text', 'paraphrasing', 'making inferences' and 'using background knowledge'. It is noted that 'making inferences' and 'using background knowledge' are two types of strategy commonly reported in many studies (Kobeil, 1999; Kletzien, 1991; Pritchard, 1990; Steffensen and Joag-Dev, 1984). Therefore, these strategies may be naturally employed by readers in processing a text. However, strategies like 'reading aloud', 'repeating text' and 'paraphrasing' are the types of strategy which may occur due to protocol method employed in this study. For instance, when we observe the data closely we discover that 'paraphrasing' strategy occurred after Hani employed either the 'reading aloud' or 'repeating text' strategies. This seems to indicate the Hani was processing the

text closely, part by part. The ‘reading aloud’ strategy was used mainly to indicate to the researcher at which point of the text she was thinking-aloud.

RQ3. Is there a relationship between Ilyaz’s reading strategies and reading comprehension?

Ilyaz was a second year male student majoring in mechanical engineering. Based on the English Language Proficiency Test result, his proficiency level was intermediate.

A number of examples from Ilyaz’s think-aloud and verbal recall data indicates that he was able to recall the content of a text when it was verbalised in his think-aloud, but was not able to recall it when it was not verbalised first. The following excerpt 6 taken from sentences 7 to 9 of Text 1 is an example.

Excerpt 6

Text	Think-aloud	Verbal recall
#7- A fan-coil system applied without provision for positive ventilation or one taking ventilation air through an aperture is one of the lowest first-cost central station type perimeter systems in use today.	A fan-coil system is the one of... is one of the lowest first-cost central station type perimeter systems in use today.	Fan-coil is one of the lowest cost...first-cost central station type systems being used nowadays.
#8- It requires no ventilation air ducts, is comparatively easy to install in existing structures, and as with any central station perimeter system utilising water in pipes instead of air ducts, its use results in considerable space savings throughout the building.	XXXXXXXX	XXXXXXXX

#9- All-water systems have individual room control with quick response to thermostat setting and freedom from recirculation of air from other conditioned space.	Thermos... thermostat setting is used to control the water system.	All-water systems have their own control. They use thermostat setting to control the systems.
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Excerpt 6 shows the correlation between Ilyaz's think-aloud and verbal recall. When the content was verbalised in his think-aloud, he tended to verbalise it in his verbal recall. In the examples of sentences 7 and 9, Ilyaz showed evidence of interpreting part of the content of the text by using 'paraphrasing' and 'making inferences' strategies. This content was also shown in his verbal recall. For instance, when Ilyaz inferred the meaning of 'thermostat setting', the same kind of information could be seen in his recall. However, evidence from sentence 8 indicates that when he skipped the content of the text in his think-aloud, his verbal recall data do not show evidence of the same content matter. This suggests that there may be some level of association between his strategies and idea units.

A substantial number of examples from the think-aloud and verbal recall data indicate a lack of association between the two protocols, however, where the contents of the texts were verbalised in the think-aloud protocol but not in the verbal recall protocol. For instance, Ilyaz did not recall information from sentences 7 to 16 of Text 2 in his verbal recall protocol although his think-aloud showed that these sentences were processed. Looking more closely at the think-aloud protocol of these sentences suggests that Ilyaz might not have understood the texts since he employed 'repeating text' and 'changing sentence structure' strategies. Excerpt 7 illustrates the lack of relationship between Ilyaz's think-aloud and verbal recall protocols for sentences 7 to 8 of Text 2.

Excerpt 7

Text	Think-aloud	Verbal recall
#7 Transformational leadership refers to the process of influencing major changes in the attitudes and assumptions of organisation members and building commitment for the organisation's mission, objectives and strategies.	The process of influencing major changes in the attitude and the assumption of organisation members and building commitment for the organisation's mission, objectives and strategies is a transformational leadership.	XXXXXXXX
#8 Transformational leaders are those who brings about "change, innovation, and entrepreneurship."	Em...transformational leadership have to bring out the change, innovation and entrepreneurship.	XXXXXXXXXX

Although the data seem to suggest that Ilyaz's processing behaviour reflects an unskilled reader, from the psycholinguistic perspective this processing behaviour, to a certain extent, may be instrument induced. For instance, there were four types of strategies which Ilyaz used predominantly: 'repeating text', 'synonym substitution', 'paraphrasing' and 'making inferences'. Of these four commonly used strategies, it is felt that 'repeating text' and 'paraphrasing' might not occur in Ilyaz's natural reading. As noted earlier he employed the 'repeating text' strategy because he was having problems in processing the texts. Therefore, 'repeating text' strategy was a way in which Ilyaz could process the text part by part. This indicates that the strategy may be instrument induced. Furthermore, because Ilyaz was required to verbalise his thoughts while reading,

one of the ways he used to inform his understanding of the text was paraphrasing the text. If, for instance, he was reading for pleasure where thinking-aloud was not required, the need to paraphrase the texts might not arise. As noted by Kobeil (1999), 'it is possible that in natural reading in a normal setting, readers may not feel the need to paraphrase.'

In conclusion, Ilyaz exhibited the processing behaviour of an unskilled reader. He employed very few strategies and produced very few idea units. Evidence from his think-aloud protocol shows that he restricted himself to text-based processing. In processing Mechanical Engineering texts he did not employ background knowledge-based strategies at all, and only once for each of the Management texts. Closer examination of the sequence of strategies suggests that Ilyaz predominantly employed limited-strategy sequences compared to multi-strategy sequences. This indicates that he was not using many strategies in order to interpret the text at a deeper level. While there are some examples from the data which suggest some levels of association between Ilyaz's think-aloud and verbal recall protocols, there also exists some which suggest a lack of relationship as shown by excerpt 7.

RQ4. Is there a relationship between Irnie's reading strategies and reading comprehension?

Irnie was a second year female student majoring in management. Based on the English Language Proficiency result, her language proficiency level was intermediate.

There seems to be little difference between Irnie's processing of the texts. No difference is observed in the frequency of strategy types between the two discipline texts. In terms of the overall number of idea units, Meaning Preserving and Meaning Transforming idea units, the mean differences between the texts are small. In general, the findings seem to suggest that there is no difference in processing all texts. One possible explanation for this result may be due to Irnie's overall processing behaviour, that is, in general the data suggest a passive interaction occurring between the reader and texts. She employed very few strategies and in turn produced very few idea units.

Her limited linguistic ability may be a major hindrance to the text processing. In general, she had the tendency to employ a ‘repeating text’ strategy for both discipline texts which did not seem to help her in understanding the texts.

In general, there seems to be a subtle relationship between Irnie’s think-aloud and verbal recall. There is evidence showing that when she verbalised the content of the text in her think-aloud, she also tended to recall the same content matter in her verbal recall. One such example can be seen in the following excerpt 8 (sentence 2, Text 4).

Excerpt 8

Text	Think-aloud	Verbal recall
#2. Classical economists made no distinction between the manager and the entrepreneur, the person who brings together land, labour and capital and puts them to work.	Actually no distinction between the manager and the entrepreneur because aa... they always cooperate with each other and brings together land labour and capital and put them to work	However, the classical economist makes no distinction between the manager and the entrepreneurs. Besides that they are make cooperation to achieve aa... objective, aim and create a strategies for organisations.

In this example, Irnie began the think-aloud task by repeating the initial part of the sentence using the ‘repeating text’ strategy. From there she inferred that the manager and entrepreneur cooperated with each other in putting together the resources in question. The same kind of content was verbalised in her verbal recall task, in which Irnie produced MP1a-*replicating idea unit*, followed by MT5-*adding new information to original IUs that alters meaning*.

On the other hand, there are a number of instances from Irnie’s data which suggest a lack of a relationship between her think-aloud and verbal recall as shown in the following excerpt 9. In this example, Irnie seemed to be facing problems in understanding the texts, and therefore, repeated the original texts in her think-aloud. In her verbal recall, the contents were not verbalised.

Excerpt 9

Text	Think-aloud	Verbal recall
#20. Alternate systems of cooling include the use of chilled water	The alternative system of cooling includes aa... the use of chilled water.	XXXXXXXX
#21. Water may be cooled by refrigerant at a central location and run through coils at other places	From this method water may be cooled by refrigerant at a central location can run through coils at other places	XXXXXXXXXX

To summarise, there are many instances in Irnie’s data which suggest both a relationship and a lack of relationship between her think-aloud and verbal recall. Irnie predominantly used limited-strategy sequences in her processing. She had the tendency to skip some sentences of a text especially when the sentences were long and complex. She commonly employed ‘repeating text’, ‘paraphrasing’ and ‘making inferences’ strategies. In general, there seemed to be little differences observed between Irnie’s processing within-discipline texts and outside-discipline texts. This may be partly due to the limited number of strategies employed by Irnie. She tended to repeat the texts when she could not explain the meaning in her own words. It is difficult to know how much Irnie had understood the texts she

read, since she did not inform her ‘failure to understand the text’. In fact, she did not use the ‘stating failure to understand text’ strategy at all. Although Irnie did not express her frustrations when she faced problems in understanding the meaning of a text, she tended to give up easily and abandon the processing as shown by the following examples in Excerpt 10.

Excerpt 10

Text	Think-aloud	Verbal recall
#7- To Weber, bureaucracy did not have the negative connotations often heard in casual conversations: he used the term simply to point to a phenomenon of growing importance even in his time: the large organisation with fixed positions linked together in a hierarchical pyramid, with specialisation and division of labour and with established rules and regulations governing behaviour.	Weber said bureaucracy they don’t have the negative connotations often heard in casual conversation...	1. repeating text

Overall, Irnie did not employ many types of strategies; only two types of strategies were commonly employed, namely ‘repeating text’ and ‘making inferences’. As noted earlier, although she used ‘making inferences’ strategy she did not attempt to process the text at a deeper level. Her processing strategies were mostly at the surface level and predominantly text-based. In terms of the number of strategies used in one sequence, Irnie tended to employ limited-strategy sequences more than multi-strategy sequences. Because she employed few strategies and produced few idea units, the difference between reading the Mechanical Engineering and the Management

texts could not be detected. In general, there seems to be no difference in her processing between the two discipline texts.

From the perspective of psycholinguistics, it is noted that two types of strategies seem to occur fairly frequently, 'repeating text' and 'paraphrasing'. Irnie was having difficulties in processing the texts. She therefore tended to repeat the text in order to process it. One of the ways used to explain her understanding of the text through the think-aloud method is by paraphrasing. It is felt that both these strategies may not occur frequently in Irnie's natural reading.

CONCLUSION

In general, some relationship can be claimed between the students' think-aloud and verbal recall. For Hanz and Hani, their data suggest that the more strategies they employed the more idea units they produced. In the case of Hani, however, more Meaning Transforming idea units than Meaning Preserving idea units were produced, which may have affected the overall relationship between her think-aloud and verbal recall. As for Ilyaz and Irnie, their limited use of strategies resulted in their limited production of idea units. A closer observation of the think-aloud and verbal recall data of all the subjects suggests that when they verbalised the text content in their think-aloud task, they recalled the same content in their verbal recall. Although some levels of relationship are observed between the think-aloud and verbal recall data, there are some instances in the data which suggest a lack of relationship between the subjects' think-aloud and verbal recall.

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