

## A Comparative Study on Reasoning Strategies in L1 and L2 Critical Reading-Thinking Tests

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**Abstract:** The need to investigate test-takers' reading comprehension processes has been emphasized in the related literature. The present study aimed at examining English as a Second Language (L2) students' reasoning processing strategies in taking critical reading-thinking tests in their first and second language using a think aloud approach. The study is set against a background of recent research into critical thinking and reading comprehension in a second language. Reasoning strategies were identified from the protocol analyses and these were categorized into reasoning formulation, reasoning monitoring and reasoning regulation strategies. The majority strategies indicated that inference acted as an over-arching strategy that linked to the reasoning strategies which made inferences from contextual clues, background knowledge and knowledge of formal schemata. Implications of the findings for pedagogy and future research into critical reading in a second language are considered.

**Key words:** Reading comprehension • Critical thinking • English as second language • Think aloud method  
• Reasoning strategies • Critical reading test

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### INTRODUCTION

Most academicians agree that thinking entails some kind of cognitive or mental process or activity. The processes that happen during comprehension of text require the reader to use many skills or strategies based on available resources [1]. Students need to have a critical eye in reading texts, i.e. to evaluate information critically, by looking into similarities and differences, to achieve meaning in texts. However, one characteristic of critical reading is that, unlike in writing, much of the students' performance involves cognitive processing strategies that are unseen and not directly observable. This has been a concern for academicians as most research in critical reading/ thinking employ tests that only offer a characteristic score on students' critical thinking abilities, hence the 'on-line', mental processes at work.

Over the years, the focus of reading comprehension research has transferred from the product of reading, i.e. a score on a multiple-choice test or cloze test, to the cognitive process of reading, i.e. strategies used by readers to achieve meaning. While research in first language (L1) reading comprehension processes has advanced [2, 3, 4, 5], research in second language (L2) reading comprehension processes research has primarily

centred on whether L2 readers process text in similar ways to L1 readers, whether the L1 reading processes are transferable to L2 reading comprehension and whether L2 readers monitor their own comprehension [6-12].

A lot of studies treat ESL readers as a group which possesses distinct linguistic and cultural backgrounds and this makes information processing increasingly unpredictable and creates a challenge to infer what might be taking place in these readers' minds [12]. The use of think aloud protocols can thus help to investigate such processes.

**Research Objectives:** The study aims to investigate English for Academic Purposes (EAP) students' reasoning processing strategies in critical reading-thinking testing using a think aloud approach with a focus on comparing the use of these strategies in L1 (Bahasa Melayu/BM) and L2 (English) critical reading-thinking (CRT) tests. The investigation was based on the likelihood that other factors might have contributed to students' CRT ability in BM and English. For instance, students' cognitive reasoning strategies used in their reasoning of the CRT test items may explain more of students' CRT ability in English and BM than just basing it on the students' levels of language proficiencies, education and family background.

## **Literature Review**

**Conception of Critical Reading:** Even though studies have been made to bring in a new range of approaches to critical reading [13-21], early research in reading comprehension traces the definition of critical reading back to its alliance with ‘critical thinking’ [22]. The model critical thinker has been understood as someone who possesses certain skills, knowledge and dispositions to achieve a purposeful outcome [23].

Ideally, the theoretical framework of critical reading rests on the critical thinking theory [24, 25] and the schema theory of reading comprehension [26, 27, 28]. The relationship between schema theory and critical reading was investigated by [29] in her study to investigate the critical reading ability of Singaporean secondary school pupils in their L1 (Malay) in which critical reading is regarded as a higher level of reading comprehension.

**Think Aloud and Reading Comprehension Strategies:** Numerous studies have been conducted utilizing think aloud or verbal protocols in L1 reading comprehension processes to investigate the cognitive processes or strategies involved in reading comprehension [30,31, 5, 3]. In L2 research, L2 learners’ articulation may not be the same as what is being coded in the mind as learners cannot take the role of linguists in providing information about learning processes [32].

Although the think aloud approach has its critics [33, 34, 35], the strength and legitimacy of this methodology has been upheld [5, 36], as research adopting this approach continues to increase [4, 37]. [38] states that there is a need to uncover readers’ reasoning that goes into the production of responses in reading comprehension tests so that we are not misguided to conclude “that a wrong answer is due to the lack of understanding, for the answer may come from an alternative, equally valid interpretation”. Therefore, think alouds are best used to study cognitive processes and strategies especially for critical reading of text [39].

Think aloud research in L2 reading comprehension strategies have largely compared the strategies used by L1 and L2 readers [12, 40, 41, 42, 43]. These studies found that the application of cognitive strategies may or may not depend on the readers’ L2 proficiency and that aspects of reading strategies were readily transferred from one language to another, like the use of background knowledge. Although these studies are legitimate, they still relied on the readers’ recall of text and not concurrent introspections. But what about the processing that occurs while the multiple-choice question is being attempted?

Cognitive processing also occurs from the point of reading the question, to the final decision in choosing the right answer to the multiple-choice question. The students’ reasoning process during this occasion can help uncover more of their hidden yet analytical thought processes in critical reading tests. In terms of assessment, think alouds have also been used to investigate the processes and strategies by L1 reading test-takers [44, 45].

**Test-Taking Strategies in Multiple-Choice Reading Comprehension Test:** Test-taking strategies consist of language use strategies and test-wiseness strategies [46]. Language use strategies are related to language learning strategies [53, 47], whereas test-wiseness strategies are strategies that are not necessarily determined by proficiency in the language being assessed, but ones that enable respondents to work around the text [48].

[49] used concurrent think aloud protocols as well as retrospective reports to investigate the cognitive strategies used by 42 native Hebrew 10th graders taking two multiple-choice reading tests written in Hebrew (L1) and two in French (L2). The findings indicated that the students transferred test-taking strategies from L1 to L2 although low L2 proficiency prevented the transfer of test-taking ability from L1 to L2. [50] used multiple-choice questions and verbal reports to examine individual differences in strategy use by adult ESL Spanish students. Both studies showed that strategy use may be determined by vocabulary control and background knowledge, that without these, students may not have the competence in using and articulating the strategies.

Although it has been said that students may have answered an item wrongly by using sound reasoning or answered correctly by using poor reasoning and also by depending on their own hunches, beliefs or attitudes about the best way to produce results in reading comprehension tests, these processes are all central in critical reading as they reflect the very aspects of students’ analytical reasoning processes even if the answer may be incorrect.

## **MATERIALS AND METHODS**

This study aimed at investigating EAP students’ cognitive reasoning strategies through a students’ concurrent think aloud protocols of an English (L2) and Bahasa Melayu (L1) critical reading test.

**Participants:** The participants were 10 Malaysian matriculation students (five females and five males) of a

university in Malaysia. All of them had been educated largely in Malay and were 17 years of age. The students were enrolled in the English for Academic Purposes (EAP) course, where the brief was to teach academic reading and writing. This course was part of every degree programme requirement.

**Research Design:** Although quantitative analysis allows for greater generalization of findings, more details of the students' perceptions and judgments can be elicited by qualitative means. The design of the study involved the use of think alouds, for collecting data.

**Instrument:** Tests that focus on critical reading are rare but earlier efforts have been reported [51, 52]. For the present study, the Malay Language Critical Reading-Thinking Test (MLCRT) by [29] was adapted and used to investigate the students' critical reading-thinking skills and dispositions.

The MLCRT is a Malay language critical reading multiple-choice test in order to measure students' CRT ability from secondary school and college. This test was selected based on the process of CT and schema theory in reading comprehension. This test achieved a reliability coefficient of .86 using Cronbach's alpha. The CRT sub-skills tested in this test are shown in Table 1.0.

**The Think Aloud Research:** In the think aloud research, the students were asked to think aloud as they answered the test questions one by one. The aim was to get the students to report on their thoughts as they critically reasoned their way through the test questions.

**The Construction of the Think Aloud Tests:** The two sets of multiple-choice CRT tests, one in English (L2) and one in Bahasa Melayu (L1), were prepared for the think aloud research.

The English Language Critical Reading Test (ELCRT) and Bahasa Melayu Critical Reading Test (BMCRT) were developed in this research. The 60-item ELCRT was used and the questions were divided equally according to the critical reading skills tested into 2 versions, e.g. Version 1 and Version 2. Each question was categorized according to the 9 skills.

Two sets of tests were prepared, one in English and one in BM, based on the test questions presented in Version 1. The first version was termed as ELCRT1 and the second version, that is the BM version, was called the BMCRT1. The same process was also done for Version 2 set of questions. Each group was given a different combination of tests.

Table 1.0: The critical reading skills

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- 1) The ability to evaluate inductive inferences
  - 2) The ability to evaluate the soundness of generalization
  - 3) The ability to recognize hidden assumptions
  - 4) The ability to identify bias in statements
  - 5) The ability to recognize author's motives
  - 6) The ability to identify facts and opinions
  - 7) The ability to identify relevant and irrelevant materials
  - 8) The ability to recognize similarities and differences and
  - 9) The ability to evaluate the strength of arguments.
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A one-week gap was given between the first and the second version of the test. The students were asked to voice their thoughts in English as they attempt the ELCRT and the BMCRT, where they had to do it in their native language.

The students were trained in the think aloud procedure to give them an idea of how and what they should report. They were not given too much practice in case some of them verbalize thoughts that do not signify the actual process, but which they assume are important and which the researcher might want to hear. The students were found to be very verbal about their thoughts, albeit few reminders to them whenever they forgot to think aloud [39].

The same procedure was repeated during the BMCRT think aloud sessions. The researcher sat behind each student to eliminate that kind of dependency as well as anxiety among them. This is to minimize or eliminate the participants' inclination to engage in social conversation and focus on reporting what goes on in minds [53]. All their responses were tape recorded and informed consent was obtained.

**Transcription of Verbal Data:** Verbal data were translated into English and transcribed for content analysis. An important characteristic of research using transcribed data is the element of selectivity. The type and amount of information must be decided to be incorporated in a transcript [54, 55]. Transcription conventions were also implemented to make the transcript readable and straightforward [56].

**Analysis of Verbal Report Data:** In analysing the qualitative data, the researcher read and re-read the data gathered from the think alouds, in the manner used broadly in qualitative research [57, 58, 59]. The ATLAS.ti software was used for a systematic analysis and codification process of data.

Responses or thoughts, were deemed distinct from 'reading' from the text. This basic codification process

was repeated for all transcriptions. The coded quotations were then re-examined and grouped based on their role in the reasoning process. Three over-arching main reasoning codes or categories were created, which were 'reasoning formulation strategies', 'reasoning monitoring strategies' and 'reasoning regulation strategies'.

**Inter-Rater Reliability:** Reliability was imperative in order to suggest generalizable findings for think aloud data in reading research [5]. Samples of the think aloud protocol were coded by 2 raters. The discrepancies were sorted through discussions among the coders. A third rater, a native speaker of English, was invited to verify the decisions made and in terms of overlaps of strategies. It was agreed that the strategies worked 'hand-in-hand' and that they should not over-ride the importance of one another. A reasonable amount of overlap and occasionally ambiguous aspects in categories are supported by a number of leading researchers who strongly argue for ill-defined and affect-linked categories, especially in the social sciences [38].

## RESULTS

The findings are presented based on the protocol data. Data is analyzed based on the following research question, "How are students different in terms of their reasoning strategies in CRT in English and Malay?". Prior to this, the findings of the students' test scores for both tests are presented and a model of the reasoning process in CRT is established.

**Students' Test Scores:** The ELCRT and BMCRT test scores of Group A and Group B students are presented in the Table 2.0 below.

Both groups scored higher in the BMCRT compared to the ELCRT, which suggests an influence of the students' language proficiencies in the two tests. Group B student's test scores in the ELCRT were generally similar to Group A students' ELCRT test scores. This suggests that the arrangement of tests administered to the groups may not have had an effect on Group B's ELCRT test scores, although they were initially 'exposed' to a think aloud test in BM, before they were given the English version.

**A Model of the Reasoning Process in CRT:** The analyses of the students' reasoning of the test items showed that their reasoning processing strategies were highly

dependent on the types of inference used. Three different types of inferences were identified: inferences from contextual clues (C), their general background knowledge (BK) and their knowledge of formal schemata (FS).

23 types of sub-strategies were identified from the study, 12 from the reasoning formulation strategy, 9 from the reasoning monitoring strategy and 2 from the reasoning regulation strategy.

The following Table 3.0 presents a model of the cognitive reasoning strategies in the students' CRT process.

The table above shows that the reasoning formulation (I) and reasoning monitoring (II) strategies depend on the types of inferences. The usage of the reasoning regulation strategies (III) is then dependent on (I) and (II).

**Reasoning Formulation Strategies:** Reasoning formulation strategies are cognitive processing strategies that the students undertake to formulate reasons in response to the test questions. A taxonomy of the cognitive reasoning formulation strategies and their sub-strategies is presented in Table 4.0 below.

**Reasoning Formulation Strategies used in Relation to Test Versions (ELCRT Versus BMCRT):** Figure 1.0 below shows the mean percentage of the processing strategies according to test types.

For elaboration strategy, 28% of ELB sub-strategy was reported in the ELCRT, compared with the BMCRT as seen in Figure 1.0. The discrepancy between the high usage of ELB sub-strategy in the ELCRT compared with the BMCRT showed that the students' reasoning relied on BK.

This strategy can be noted in Nazri's response to Question 3 of Skill 3, [4a]:

Nazri: Ok. The biased sentence is ... 'A'. 'An armed robbery had been committed by four young males who sported long hair'. 'B'. 'They had injured the owner of the shop and killed his daughter who evidently had screamed'. 'C'. 'Cash of about thirty thousand ringgit and all jewellery had been taken away'. 'D'. 'Everyone is reminded to beware of young males who sported long hair'. {laughter}.

The answer is obviously 'D'. Because this reminds me of apartheid.

Table 2.0: Test scores for Group A and B

GROUP A	ELCRT	BMCRT
Hakim	20	21
Azli	17	20
Siti	20	19
Lili	16	19
Eida	16	24
GROUP B		
Danny	16	16
Zara	16	21
Dina	16	19
Nazri	17	18
Farid	17	18

Table 3.0: A model of cognitive reasoning process in the EAP students' critical reading-thinking (CRT)

		Types of Inference		
		Contextual	General BK	Formal Schemata
(III) Reasoning Regulation Strategies	1) Modification			
	2) Verification			
	(I) Reasoning Formulation Strategies			
	A) Simple			
	1) Direct inference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	B) Complex			
	1) Interpretation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2) Elaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3) Compare and contrast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4) Hypothesis generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5) Integration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(II) Reasoning Monitoring Strategies			
	1) Evaluation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2) Questioning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Re-reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4) Paraphrasing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5) Suspended judgment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6) Elimination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Table 4.0: Reasoning formulation processing strategies and sub-strategies in the EAP students' critical reading-thinking process of the ELCRT and BMCRT

Reasoning Formulation Strategies and Sub-Strategies	
Simple Reasoning Formulation Strategies	
Strategy 1:	Direct inference (Making meaning by directly using existing information) <ul style="list-style-type: none"> <li>Inference from contextual clues (IC)</li> <li>Inference from BK (IBK)</li> <li>Inference from knowledge of formal schemata (IFS)</li> </ul>
Complex Reasoning Formulation Strategies	
Strategy 2:	Interpretation (Constructing interpretive, more familiar terms and conclusions) <ul style="list-style-type: none"> <li>Interpret information based on contextual clues (INTC)</li> <li>Interpret information based on background knowledge (INTBK)</li> <li>Interpret information based on knowledge of formal schemata (INTFS)</li> </ul>
Strategy 3:	Elaboration (Enriching an initial interpretation / evaluation) <ul style="list-style-type: none"> <li>Elaboration using background knowledge (ELB)</li> <li>Elaboration using knowledge of formal schemata (ELFS)</li> </ul>
Strategy 4:	Compare and Contrast (Comparing two different sets of information in context for comprehension) <ul style="list-style-type: none"> <li>Compare and contrast based on context (CCC)</li> <li>Compare and contrast based on background knowledge (CBK)</li> </ul>
Strategy 5:	Hypothesis generation (Predicting or hypothesizing implications and consequences of situations) <ul style="list-style-type: none"> <li>Generate hypothesis beyond context, e.g. use of background knowledge (HBK)</li> </ul>
Strategy 6:	Integration (Connecting new information with previously stated information) <ul style="list-style-type: none"> <li>Integrate information to establish meaning and form reason by relying on knowledge of formal schemata (ITGFS)</li> </ul>

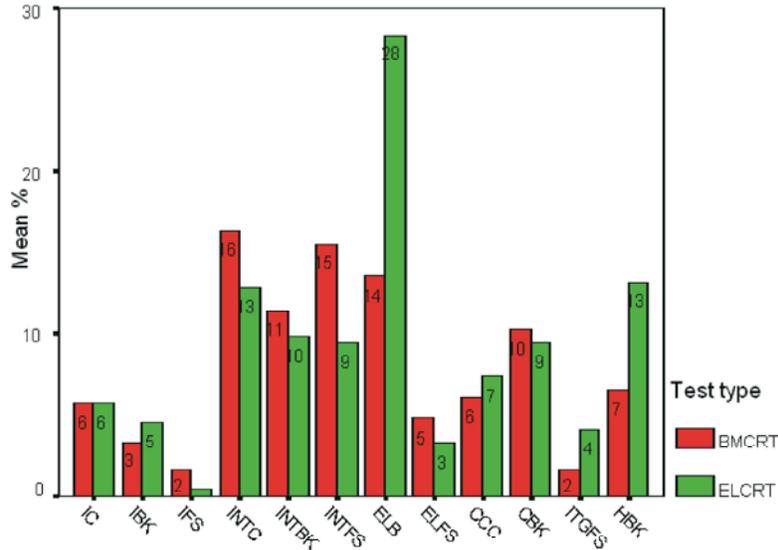


Fig. 1.0: Mean % usage of reasoning formulation strategies and sub-strategies used by the students in the BMCRT compared with in the ELCRT

[4a] For example the case where there's this one black man in America who robbed a store. The police in their attempt to catch the thief, questioned all the black community there and this is very biased. It's like saying every black man is a robber. So here, it is true that everyone is reminded to beware of young males who sported long hair in case one might be the culprit. But it is not fair to generalize this to all of them. So this is very biased. The answer is 'D'.

In which he recited a story about 'apartheid' which to his understanding, represented an example of a biased attitude towards the African American people. He detected the hidden assumption in the question which demonstrated his ability to recognize bias by exemplifying it based on his BK. This represented one of the many examples of overlapping or rather co-occurrence of CRT skills and dispositions in students' responses to the test questions.

However, for interpretation strategy, there was higher usage of all the interpretation sub-strategies in the BMCRT (16%) compared with the ELCRT (13%), although the mean percentage usage of INTBK was more or less similar in both versions of tests. INTFS accounted for 15% of the time in the BMCRT compared with the ELCRT (19%). In the BMCRT itself, the students made less use of INTBK compared to INTFS and INTC.

The students used HBK 4% of the time in the ELCRT compared to in the BMCRT (2%). This means that the students made more reasoning of a causal nature, i.e.

implications and consequences, in the L2 test than in the L1 test. This contradicts [12] findings in which his L2 readers' representation of the text contained fewer causal links than the L1 readers. In terms of the findings of the present study, the fact that the students made more predictions or elaborations in the L2 test can be attributed to their skilled use of L2 plus their BK used for mapping the events to statements for schematization.

**Reasoning Monitoring and Regulation Strategies:** The realization that comprehension has failed is a meta-cognitive experience and the cognitive activity which considers comprehension, or lack of it, is comprehension monitoring [3, 60]. Findings from the students' think aloud protocols of the test questions revealed that they monitored their comprehension during the reading process. A taxonomy of these strategies and their sub-components is presented in the following Table 5.0.

On the other hand, reasoning regulation strategies are those strategies that the students used to manage their reasoning process as the result of the reasoning formulation and reasoning monitoring processes. There are two basic regulation sub-strategies, modification (MODIF) and verification (VERIF).

**Reasoning Monitoring and Reasoning Regulation Strategies Used in Relation to Test Versions (ELCRT Versus BMCRT):** Figure 2.0 shows the mean percentage of the reasoning monitoring and regulation strategies and sub-strategies according to the tests.

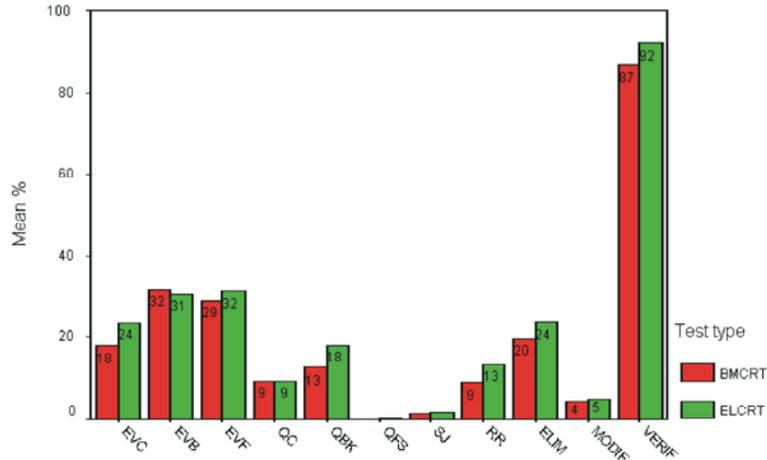


Fig. 2.0: Mean % usage of reasoning monitoring and regulation strategies and sub-strategies used by the students in the ELCRT compared with in the BMCRT

Table 5.0: The reasoning monitoring strategies and sub-strategies in CRT

Reasoning Monitoring Strategies and Sub-Strategies

Strategy 1: Evaluation (Checking and assessing comprehension for accuracy, completeness and acceptability)

- Evaluations based on contextual clues (EVC)
- Evaluations based on prior/background knowledge (EVB)
- Evaluations based on knowledge of formal schemata (EVF)

Strategy 2: Questioning (Asking questions about any part of the text for comprehension)

- Questioning related to context (QC)
- Questioning related to background knowledge (QBK)
- Questioning related to knowledge of formal schemata (QFS)

Strategy 3: Re-reading (Reading any part of the context again to assist comprehension)

- Re-reading a portion of the text (RR)

Strategy 4: Suspended judgment (Postponing judgment or reasoning to look at other incoming and available information for meaning)

- Suspending judgment to look at other information (SJ)

Strategy 5: Elimination (Cancelling out options for reasoning and comprehension purposes)

- Eliminating options that are unqualified as the correct answer (ELIM)

From the chart, the percentage of use of the evaluation sub-strategies was almost the same in the ELCRT and the BMCRT, especially for EVB. However, the use of EVF was higher in the ELCRT than in the BMCRT (32% compared to 29%), as well as EVC, (24%) in the ELCRT compared to the BMCRT (18%).

In the questioning strategy, QC was used equally for both tests (9%), while QBK was used more in the ELCRT (18%) than in the BMCRT (13%). For instance, this questioning strategy was also in terms of criticizing or questioning one's own views or arguments as in Siti's response below:

Siti: Which argument is the strongest in passage 8? Mm er mm I think it's the second one er no third. C. It's better to tell the truth. Er because nothing beats the truth right. And you know that the lecturer will believe it. Mm if you say you forgot then you're

forgetful which is bad. And so typical I think. And the second one is mm er mm er again not concrete enough. It might backfire. Cos who knows if the lecturer asks you if you have a rough sketch of the essay and you don't! You can't say you lost that too! Must be still laying around in your room or something right?

Mm. the fourth one is ridiculous because the lecturer will probably say, you know you have time to send your friend to the airport ((Siti laughs))

[4a] I mean what's the relationship between sending your friend to the airport and not doing your paper? How long does it take you to send him to the airport? One week? ((Siti laughs again)) I mean you send him and you come home and do your work. You must be responsible bla bla bla. So better to tell the truth.

By questioning the text, Siti demonstrated her ability to critically evaluate the strength and the relevance of the arguments in relation to the question. In addition, prior to her questioning in [4a], she predicted the reaction of the lecturer to the character's fourth excuse, which was to send his friend to the airport and this formed the basis for her questioning. This implies that questioning, as part of monitoring strategy, entails that students question their own arguments. This implicates the notion of self-reflection or 'reflexivity', in which students can be reflective and self-monitor by asking questions of their own understanding in the effort to be 'critical beings' [61]. It can be concluded that these students generally evaluated and questioned the ELCRT tasks more than the BMCRT tasks using their BK and knowledge of formal schemata.

Figure 2.0 above also shows the mean percentage usage of reasoning regulation strategies, MODIF and VERIF. It can be noticed that the students mostly used VERIF to regulate their reasoning process in both tests. However, the usage was higher in the ELCRT than the BMCRT (92% compared to 87%), while MODIF was used 5% of the time in the ELCRT than in the BMCRT with only 4%.

## **DISCUSSION**

The main objective of this study was to investigate the differences in reasoning processing strategies among EAP students in taking CRT tests in English and Malay. Findings showed that inference was an over-arching strategy and that BK and knowledge of formal schemata played important roles in the students' reasoning. This finding further confirms the influence of BK in the students' CRT ability which also indicates the crucial aspect of displaying one's autonomous 'voice' or identity in the CRT process.

In terms of reasoning formulation, findings showed that the students made more BK-based elaborations in the ELCRT than in the BMCRT. This result contradicts the findings that L1 readers reported elaborations based on general knowledge and associations more frequently than the L2 readers [12]. In terms of reasoning monitoring, the non-context based evaluation and questioning sub-strategies, i.e. EVB, EVF and QBK, were more commonly used by the students in the ELCRT than in the BMCRT. This means that the students evaluated and questioned the ELCRT tasks using their BK and knowledge of formal schemata more than they did in the

BMCRT tasks. This contrasts with [49] findings in which they found that the native English readers gave more evaluative and questioning comments, a top-down strategy, in their L1 than in their L2. The students monitored their reasoning and comprehension more in the ELCRT than in the BMCRT. This parallels [46] study whereby the more proficient readers used a meaning oriented approach to solve comprehension problems.

For regulation strategies, verification strategy was higher in the ELCRT than the BMCRT, while modification was used more in the ELCRT than in the BMCRT. The discrepancies may mean that L2 students needed to monitor and regulate their comprehension more in the L2 test than in the L1 test. Hence, these findings support previous studies examining the relationship between L1 and L2 reading proficiency and strategy use [58].

Findings also suggested that the differences in strategy use between the ELCRT and BMCRT questions that were intended to test the same skill were influenced by the nature of the questions and that the questions in fact 'tested' for different capabilities in strategy use, not the same 'skill', as they purport to test. As the students were also proficient in their L1 and L2, the finding suggests that language proficiency may not be a dominant factor in strategy use on CRT but one's unique and varied ways in using the strategies may be more important for reasoning and comprehension purposes in CRT.

## **CONCLUSION**

This study has shown the value of using think aloud protocols in investigating EAP/ESL Malaysian students' analytical processes in CRT assessments which showed more evidence of students' ability in thinking critically. Although some of the students answered some test questions wrongly, their reasoning behind their chosen answers was highly critical and logical as they referred to their background knowledge when reasoning.

In this study, the test scores were treated as secondary as they could not give a conclusive depiction of the students' mental processes leading towards their performance in CRT. In fact, they may also be substandard especially when the students do not choose the expected answer, i.e. a wrong answer may not entirely or necessarily signify that students were poor or deficient in their CRT skills. Most of the questions which were answered wrongly have been shown to contain fairly

sound and logical explanations to them. This implies that there is no right or wrong answer in CRT, but there is logical and illogical reasoning. Criticality among ESL learners can be attributed to their familiarity with the content or topic which is reflected by their use of such inferences [62, 63].

The present study paired a multiple-choice CRT test questions with a think aloud approach. Pedagogically, a think aloud approach can help nurture the students' abilities to think critically. However, this study is limited by not considering a more integrated approach to critical reading, such as examining the students' writing assignments and classroom behaviour for more evidences of criticality. Further research might use larger samples of students, compare subjects of different ethnic groups, universities, i.e. local and abroad, year of study and students of different proficiency levels in both languages.

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