



Metacognitive awareness and comprehension among Malay secondary school students

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ABSTRACT

This study investigates the relationship between metacognitive awareness and comprehension of an expository text among secondary school students. It also determines the relationship between the students' level of metacognitive awareness and their gender, school type, stream and language achievement. A quantitative approach using an Index of Reading Awareness and a set of comprehension test based on an expository test was administered to 110 Form Four students from a national and a national-type schools in Penang Island, Malaysia. The gathered data revealed that metacognitive awareness and comprehension had weak correlation. Besides, no significant relationship was detected between metacognitive awareness and gender, or school type and stream. However, there was a relationship between metacognitive awareness and language achievement. The study underscored that students who score high in the level of metacognitive awareness may not necessarily score as high in comprehension. Furthermore, metacognitive awareness can also be applied to a variety of texts of different subject matters as well as different languages.

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1. Introduction

In the academic context, the reading ability is a critically important receptive skill for students to produce and practice the language. Nevertheless, reading has become a challenging task in which it involves the demanding of students' cognitive abilities. Besides, comprehension is a constructive process, personalized by the ideas and thoughts of each reader. Such ideas and thoughts could not be taught; they are rather absorbed through personal connection and experience (Maibodi & Fahim, 2012). In other words, a reader needs to make sense of the text as it is a language written in context with an intended message. As to achieve this, the reader must possess some background knowledge of the text, as well as taking into account his or her own goals, attitudes and understanding of the communicative intention of the author. As a constructive process, reading requires a reader's awareness and active monitoring of the comprehension process. This is known as metacognition which is also called thinking about thinking (Lim, 2011).

1.1 Background of the Study

In Malaysia, four language skills are stressed on in the curriculum. Reading is a critical skill to master for students to have high achievement in examination results and to be competent in the language itself. Thus, other than merely focusing on the development of reading skills and improvement of material selection, metacognitive awareness which concerns reader's employing effective reading strategies for optimum comprehension should also be emphasized.

Reading skill in the curriculum is approached according to themes, language, types of texts and skills. The themes of reading texts are organized to provide schemata for learners to relate their texts, while the skills emphasized are more towards declarative and procedural knowledge. The types of texts and language used are varied based on the themes and topics.

However, the English language curriculum has neglected metacognitive awareness in employing reading strategies. According to Paris and Jacobs (1984), 'Conditional Knowledge' is vital for learners to know the rationale for using a particular strategy during reading.

1.2 Problem Statement

Teachers face a hard time dealing with comprehension texts as it is very much affected by students' inability to utilize comprehension skills. As a receptive skill, inability in reading also affects other productive language skills especially writing which is also a crucial part in the examination. Apart from that, the issue of teaching instruction should be re-examined starting from the lower to upper secondary. The matter of reading comprehension should also be addressed from the perspective of metacognition since students face great difficulties dealing with the texts.

1.3 Objective of the Study and Research Questions

The objective of this study is to evaluate the extent of the relationship between metacognitive awareness and comprehension of Malay secondary school students. Thus, it deals with the following research questions in particular:

1. What is the extent of the relationship between students' metacognitive awareness and reading comprehension?
2. What is the extent of the relationship between students' metacognitive awareness and gender?
3. What is the extent of the relationship between students' metacognitive awareness and school type?
4. What is the extent of the relationship between students' metacognitive awareness and subject streaming?

2. Literature Review

The context of research on reading has shifted the focus from methods of instruction to consideration of skills used by readers of different abilities and ages. Flavell (cited in Iwai,

2011) describes metacognition as cognition on cognitive phenomena, monitoring one's own memory, comprehension and other cognitive activities. These activities are labeled as cognitive enterprises. Flavell's model of cognitive monitoring includes 4 classes of phenomena: metacognitive knowledge, metacognitive experiences, goals (tasks), and actions (strategies). The first two classes are briefly explained below.

2.1 Metacognitive Knowledge

It is the segment of stored world knowledge and the diverse cognitive tasks, goals, actions and experiences. Also, it refers to the ways the factors of *person*, *task* and *strategy* interact to influence the outcome of cognitive enterprises. The category of *person* comprises of interindividual difference and universals of cognition. Human mind is not always a predictable and reliable cognitive device even though it is very remarkable. Thus, we are able to function interactively in the society only by realizing that our cognitive characteristics are varied. As for category of *task*, it is subcategorized into the quality and quantity of information to carry out a task, as well as the demands or goals one can devise his own goal based on the available information. The category of *strategy* refers to the strategies employed to achieve certain cognitive goals.

2.2 Metacognitive Experiences

It is the segments of metacognitive knowledge activated deliberately or automatically and being experienced consciously or unconsciously. Consisting of duration and complexity of content, metacognitive experiences may happen before, during or after a cognitive enterprise. For instance, one may be obstructed while reading because of some complexities in the text. Flavell (1992) maintains the more one is highly engaged in conscious thinking, the more one's metacognitive experiences are expected to happen. It can affect cognitive goals, metacognitive knowledge and cognitive strategies by guiding one to a new goal through one's experience in one's own cognitive enterprise. Besides, Metacognitive can activate strategies which are set to achieve cognitive goals. For example, metacognitive strategies are activated as a result of which cognitive knowledge along with monitoring of cognitive progress can be improved simultaneously.

2.3 Metacognition and Executive Control

The differences between metacognition and executive control must be taken into account. Besides, the present study accounts for the former. Both fields are about learning strategies but developmental psychologists focus more on metacognition while information-processing psychologists are more concerned with cognitive processes involving input and output from learners' cognitive system which Garner calls as 'executive control' (cited in Michalsky, Mevarech & Haibi, 2009). Executive control is more task-focused and can be taught. Nevertheless, both agree on the importance of cognitive monitoring in achieving goals.

The Index of Reading Awareness (IRA) used in this study stresses on the aspects of metacognitive awareness: Regulation, Planning, Evaluation and Conditional knowledge. As to Paris and Jacobs (1984), Regulation Knowledge is where learners know how to use words or sentences around it to discover the meaning. Planning involves skimming through the text to explore the main ideas. Evaluation refers to learners' cognitive abilities where they know that the main ideas of a text are the important sentences telling about the text. As for Conditional Knowledge, it is about learners' knowledge on strategies application.

The findings by Paris and Jacobs (ibid) show that students with the highest reading strategies awareness score better than those having low awareness. Myers and Paris (cited in Marchand & Skinner, 2007) also conclude that younger readers have limited reading comprehension as a cognitive process while older children are more inclined to apply reading strategies. Besides, in her study, Chandrasegaran (1981) reports that contextual clue approach to meaning requires learners' capability to comprehend the surrounding vocabulary, grammar structure and content. Such strategy is strongly related to Regulation aspect in metacognition in which it involves 'non-unidirectional' procedure to relate ideas. It is further supported by the Step-Wise Regression Analysis that strategy of searching for meaning is very much associated with success in learning English. In discussion of gender differences by Bucko (1997), due to the structural difference of males and females' brains, it is observed that females are more fluent than males in using language while males are better at spatial analyses.

3. Methodology

3.1 Participants

The participants of this study consisted of 110 Form Four students from 4 classes in 2 secondary schools in Penang Island, Malaysia (Table 1).

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	62	56.4	56.4	56.4
	Female	48	43.6	43.6	100.0
	Total	110	100.0	100.0	

The 2 schools, one national and another national-type, were of academically average ability performing schools and were considered as urban schools in terms of the location. Selection of participants was done based on science and non-science stream students from each type of school respectively. Besides, selection of schools was done through nonprobability sampling (also called convenience or availability sampling) in which the subjects can represent the population though they are not selected from a larger population (Holosko & Thyer, 2011). As such, the participants selected from both school types and streams were the representatives to average and high ability students.

3.2 Design

The design of this study is quantitative in nature. In order to achieve the objective of the study, Pearson-r correlation coefficient was used to measure the strength of relationship between the variables of metacognitive awareness and comprehension of text. Besides, one-way ANOVA was used in comparing the level of metacognitive awareness and gender, level of comprehension of students from different school-type and subject streaming. Subjects were given the questionnaires and IRA scale to identify their level of reading awareness and a multiple-choice reading comprehension test. Subjects were informed about the objective of the study beforehand. They were given 40 minutes to fill in the IRA scale. Afterwards, they were given a comprehension text and a comprehension test to answer.

3.3 Instruments

Four instruments were employed in this study as follows:

3.3.1 Questionnaire

It was a short questionnaire mainly on subjects' demographic data to find out their gender and English language achievement.

3.3.2 The IRA Scale

The IRA scale developed by Paris & Jacobs (cited in McLain, Gridley & McIntosh, 1991) consists of 20 items of multiple-choice question measuring 4 aspects of metacognition in reading: Regulation, Planning, Evaluation and Conditional Knowledge. Each item is given a score from 0-2. The higher the score, the higher the level of reading awareness. In order to provide easier language access and avoid misunderstanding, the IRA was translated into Malay language. Then, 2 Malay secondary school teachers of more than 10 years teaching experience checked it through for the clarity of instruction, questions and answer choices as well as language structure. Also, a pilot test on the IRA was carried out on 10 students from a national-type school.

3.3.3 The Comprehension Text

The selected text was made up of 421 words. The theme chosen was environment relating to pollution, waste treatment and recycling. The selection of text was based on the familiarity of topic among students of different cultures and schemata, the optimal length of the text as well as the nature of expository of the text.

3.3.4 The Comprehension Test

A comprehension test with 12 multiple-choice items was designed pertaining to the 4 aspects in metacognition, comprising of 3 questions for each aspects respectively. The test was rated by 3 English language teachers of more than 10 years of teaching experience. Some modifications on the questions were made based on the definition of the metacognitive aspects and the corrected version was verified again to establish referential adequacy.

3.4 Data Analysis Method

The observed data was analyzed by Pearson product-moment correlation coefficient to provide answers to the research questions on the relationship between metacognitive awareness and the comprehension of text. Besides, One-Way ANOVA was adopted to describe the relationship between the independent variables (gender, school type and subject streaming) against the dependent variable. Then, one step regression analysis was performed to determine the best predictor of metacognitive awareness among the 4 variables of gender, school type, subject streaming and English language achievement in the study.

4. Findings and Discussion

The results were analyzed based on statistical procedure using SPSS and displayed in the tables according to the sequence of null hypothesis as follows:

H₀1: There is no strong relationship between metacognitive awareness and students' reading comprehension score among students from both school types and subject streaming.

Table 2 shows that there is a weak ($r = .276$) though positive correlation (Correlation is significant at the 0.01 level). Thus, this null hypothesis is rejected. Somehow, this explains that students with high level of metacognitive awareness do not necessarily have high level of comprehension of text.

Table 2

		IRA	COM
IRA	Pearson Correlation	1	.276
	Sig. (1-tailed)	.	.002
	N	110	110
COM	Pearson Correlation	.276	1
	Sig. (1-tailed)	.002	.
	N	110	110

H₀1(a): There is no strong relationship between 'regulation' as an aspect of metacognitive awareness and comprehension score.

Table 3 indicates that the correlation is positive with a medium strength (.556). Thus, the null hypothesis is rejected. The results put forward the idea that students use surrounding words around a word or sentence on an average ability.

Table 3

		REG	COM
REG	Pearson Correlation	1	.556
	Sig. (1-tailed)	.	.000
	N	110	110
COM	Pearson Correlation	.556	1
	Sig. (1-tailed)	.000	.
	N	110	110

H₀1(b): There is no strong relationship between 'planning' as an aspect of metacognitive awareness and comprehension score.

Table 4 reveals there is a strong relationship with a positive and high correlation ($r = .734$). Thus, this null hypothesis is rejected.

Table 4

		PLA	COM
PLA	Pearson Correlation	1	.734
	Sig. (1-tailed)	.	.000
	N	110	110
COM	Pearson Correlation	.734	1
	Sig. (1-tailed)	.000	.
	N	110	110

H₀1(c): There is no strong relationship between 'evaluation' as an aspect of metacognitive awareness and comprehension score.

The correlation between these two variables is considered high ($r = .686$) as shown in Table 5. So, this null hypothesis is also rejected.

Table 5

		EVA	COM
EVA	Pearson Correlation	1	.686
	Sig. (1-tailed)	.	.000
	N	110	110
COM	Pearson Correlation	.686	1
	Sig. (1-tailed)	.000	.
	N	110	110

H₀1(d): There is no strong relationship between 'conditional knowledge' as an aspect of metacognitive awareness and comprehension score.

With a correlation value of .5777, it is the weakest correlation with comprehension among the 4 aspects. This null hypothesis is rejected, too (Table 6).

Table 6

		CON	COM
CON	Pearson Correlation	1	.577
	Sig. (1-tailed)	.	.000
	N	110	110
COM	Pearson Correlation	.577	1
	Sig. (1-tailed)	.000	.
	N	110	110

These findings reveal that the level of comprehension does not necessarily correlate with metacognitive awareness. This is similar to the findings of Idris (1998) where she reported a correlation value of .316 between these two variables. This

might be caused of the students' level of English competence in understanding the text. Furthermore, another reason for such result could be the inability to employ such metacognitive awareness strategies. Children may not understand the benefits and rules in the application of the strategies (Paris, Cross & Lipson, 1984). As a result, metacognitive awareness should be emphasized to achieve the objective of comprehension in reading. Yet, students with low language proficiency may not still be able to perform even though they can utilize their metacognitive awareness ability.

The results also indicate that the metacognitive awareness aspect of 'planning' has the highest correlation with comprehension. It can be explained that students possess higher capability in the selection of particular actions to achieve goals especially using skimming strategy to search for main parts and general meaning. However, the aspect of 'regulation' in metacognitive awareness is the least practiced aspect among students and this indicates students have difficulty in using contextual clues to figure out meaning. According to Chandrasegaran (1981), using contextual clue to approach meaning is less employed by national school students who are found to prefer using more of dictionary, as compared to national-type school students who use both contextual clues and dictionary for that purpose.

H₂: There is no difference in the level of metacognitive awareness between girls and boys students.

Results reveal that there is no relationship between males (M=29.53, SD=4.76) and females (M=28.40, SD=3.71) as there is no statistically significant difference (Tables 7 & 8).

Table 7

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Male	62	29.5323	4.76228	.60481	28.3229	30.7416	14.00	36.00
Female	48	28.3958	3.70589	.53490	27.3198	29.4719	16.00	33.00
Total	110	29.0364	4.35137	.41489	28.2141	29.8587	14.00	36.00

Table 8: ANOVA: Relationship between Metacognitive Awareness and Gender

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.940	1	34.940	1.860	.175
Within Groups	2028.915	108	18.786		
Total	2063.855	109			

Thus, this null hypothesis is failed to be rejected. This finding is similar to Idris's (1998) results but it is in contrast to the research done by Paris & Jacobs (cited in McLain et al., 1991) where they found that 5th grade girls' score is significantly higher than those of the boys in their IRA score. However, this may be a judgmental sampling due to the uneven proportion of boys and girls in the participants. Besides, gender-based concept of brain dominance is commented by Bucko (1997) to be receiving little support and is inconclusive in recent research.

H₃: There is no difference in the level of metacognitive awareness between students from national school and national-type school.

The findings show there is no significant relationship between metacognitive awareness and school type (Tables 9 & 10).

Table 9

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
SMK	56	28.5357	4.38992	.58663	27.3601	29.7113	15.00	36.00
SMJK	54	29.5556	4.28982	.58377	28.3847	30.7264	14.00	36.00
Total	110	29.0364	4.35137	.41489	28.2141	29.8587	14.00	36.00

Table 10: ANOVA: Relationship between Metacognitive Awareness and School Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.593	1	28.593	1.517	.221
Within Groups	2035.262	108	18.845		
Total	2063.855	109			

National school (M=28.54, SD=4.38) and national-type school (M=29.60, SD=4.28) have no significant difference, thus, this null hypothesis fails to be rejected. This shows students from both school types have similar capability to identify reading awareness as in the IRA. Although it is translated into Malay language, the language used in the IRA is not identified as the cause of similar level of awareness because the IRA is not a comprehension test requiring language competence. Nevertheless, comparing comprehension scores in both school types, it is surprising to discover that students from national-type school have higher score than national school students (Table 11).

Table 11: Comprehension Score

	National School	National-type School	Total
Science	118 (N=26)	124 (N=24)	242
Non-science	83 (N=30)	129 (N=30)	212
Total	201	253	

It somehow indicates the levels of comprehension and school type correlate. However, based on the findings of Paris and Jacobs (1984), there is a significant relation between reading awareness and comprehension. That is, subjects being taught reading strategies have higher score in comprehension as compared to subjects not being taught such strategies. Possibly, language competency is the contributing factor rather than metacognitive awareness in its correlation to comprehension.

H₄: There is no difference in the level of metacognitive awareness between students from science stream and non-science stream.

With the level of significance of .354, the results of analysis show metacognitive awareness and students from science (M=29.46, SD=4.21) and non-science (M=28.69, SD=4.47) have no significant difference (Tables 12 & 13).

Table 12

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Science	50	29.4600	4.21470	.59605	28.2622	30.6578	14.00	36.00
Non-Science	60	28.6833	4.46642	.57661	27.5295	29.8371	15.00	36.00
Total	110	29.0364	4.35137	.41489	28.2141	29.8587	14.00	36.00

Table 13: ANOVA: Relationship between Metacognitive Awareness and Subjects Streaming

	Sum Squares	df	Mean Square	F	Sig.
Between Groups	16.451	1	16.451	.868	.354
Within Groups	2047.403	108	18.957		
Total	2063.855	109			

Therefore, the null hypothesis is failed to be rejected. This means students from both subjects-streaming have the same level of metacognitive awareness. Yet, from the score of comprehension test, non-science students are observed to have lower score. Here, lacking of language competence might be the factor. Chandrasegaran (1981) suggests that achievement is dependent on practice, especially on elementary students who may require specific practice activities like pattern practice and vocabulary learning. Such learning strategies may contribute less to learning success when a higher level of competence is attained. Thus, practice is required to achieve comprehension through metacognitive awareness.

H₀₅: There is no difference in the level of metacognitive awareness between students' English language achievement.

As shown in Tables 14 & 15, there is a significant difference in the level of metacognitive awareness between students of different English language achievement. The mean scores for high (M=29.6), medium (M=28.7), and low (M= 25.9) achievement are at the level of significance of .048 in which the hypothesis is rejected. This explains that students with high achievement carry higher level of metacognitive awareness.

Table 14

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
High	68	29.6029	4.39518	.53299	28.5391	30.6668	14.00	36.00
Moderate	33	28.7273	3.86711	.67318	27.3561	30.0985	15.00	35.00
Low	9	25.8889	4.70225	1.56742	22.2744	29.5034	16.00	31.00
Total	110	29.0364	4.35137	.41489	28.2141	29.8587	14.00	36.00

Table 15: ANOVA: Relationship between Metacognitive Awareness and English Achievement

	Sum Squares	df	Mean Square	F	Sig.
Between Groups	114.141	2	57.070	3.132	.048
Within Groups	1949.714	107	18.222		
Total	2063.855	109			

Perhaps, it suggests that these students are more sensitive to utilize the reading strategies. In this regards, Jude and Ajayi (2012) argue that, to comprehend a reading text, a good reader employs several skills like identifying the main idea of a passage, summarizing the context of a text and looking for contextual that can answer questions. Furthermore, they may be more motivated in utilizing metacognitive awareness due to their high language competency. Besides, the stepwise regression reveals that English language achievement is the best predictor of metacognitive awareness among all the other independent variables (Table 16 & 17).

Table 16: One-step Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.219	.048	.039	4.26583

Table 17: Excluded Variables

		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
Model						Tolerance
1	Gender	-.097	-1.018	.311	-.098	.973
	Stream	-.009	-.084	.933	-.008	.860
	School type	.060	.616	.539	.059	.919

There is 4.8% of the variance in metacognitive awareness that can be explained by English language achievement. In addition, a standard regression analysis was carried out to determine if the level of IRA was the best predictor for comprehension in which dependent variable is the comprehension while the level of IRA constitutes to the independent variable. A statistical analysis was done and only 7.6% of the variance in comprehension could be explained by the level of IRA, though the level of IRA was used for the prediction of comprehension with a significant t-value of .003 at the significance level of .05 (Tables 18 & 19).

Table 18: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.276	.076	.068	2.13353

Table 19: Coefficients

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	5.443E-02	1.379		.039	.969
	IRASEMU A	.140	.047	.276	2.987	.003

5. Recommendations and Concluding remarks

Quantitative and qualitative studies are recommended to achieve more reliable results. Furthermore, the study can be done through a control group study. If the causal agent is the causal factor, the results of events would be more significant in the experimental group.

In addition, it is recommended that 'thinking aloud' method can also be done. Students can be fostered to report verbally their monitoring of reading strategies through discussion, retelling and writing. This can be used to measure their metacognitive awareness. Besides, teachers can provide the students with the benefits and rules in the application of metacognitive awareness strategies so that they could improve their reading comprehension.

The weak correlation between metacognitive awareness and comprehension found in this study may lead to conclude that students who score high in the level of metacognitive awareness may not necessarily score as high in comprehension. The relationship between these two variables is found to be not linear. Briefly, the reason might be of students' reading competency than their level of metacognitive awareness. Also, inability to utilize the metacognitive knowledge may contribute to this phenomenon. Besides, it should be noted that metacognitive awareness can also be applied to a variety of texts of different subject matters and in different languages. As such, it is important to notice that learners' language competence is in correlation to comprehension of text rather than assuming students with high level of metacognitive awareness will definitely score well in text comprehension. Lastly, while instructional provision of metacognitive awareness should be accounted for, the functions of these strategies must also be informed so that learners can understand the application of the strategies.

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