



UNIVERSITI PUTRA MALAYSIA

***EFFECTS OF METACOGNITIVE STRATEGY INSTRUCTIONS ON
READING COMPREHENSION AND CRITICAL THINKING SKILLS OF
INTERNATIONAL UNDERGRADUATE STUDENTS***

PARASTOO BABASHAMSI

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INTERNATIONAL UNDERGRADUATE STUDENTS**

By

PARASTOO BABASHAMSI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

February 2021

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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February 2021

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Metacognitive strategies have been investigated as facilitating tools for students' reading comprehension. Few studies have investigated the detailed procedure of systematically delivering and teaching metacognitive strategies in higher education. To fill the gap, the researcher aims to investigate whether explicit training in metacognitive strategies could improve undergraduates' reading comprehension and critical thinking skills. Quasi-experimental design, repeated measure ANOVA, and semi-structured interviews were conducted with six students in an experimental metacognitive group to support the results of the quantitative data. The data were collected using the reading test, Cornell Critical thinking skill test, and Metacognitive Reading Awareness Strategy inventory.

The experimental group and control group underwent 14 sessions of training. Apart from teaching metacognitive strategies to the experimental group, both groups were taught using similar teaching materials. Upon completing the treatment, post-tests of reading and critical thinking skills were administered to all participants. Semi-structured interviews and a Metacognitive Reading Awareness Strategy Assessment were conducted among experimental students.

The results showed a statistically significant difference between the scores of students taught in metacognitive reading comprehension and the conventional group ($F=2, 126 = 269.445. p < 0.05$). The results related to critical thinking tests revealed the mean scores of students in the metacognitive group were significantly higher than the mean score of the students in the conventional reading group ($F= 1.3, 82.3 = 215.973. p < 0.001$).

The results of the Metacognitive Reading Awareness Strategy Assessment showed that students had more awareness of global reading strategies (M= 3.511), followed by supporting reading strategies (M=3.468) and problem-solving strategies (M= 3.427). The thematic analysis result supported that students were moderate users of planning and monitoring strategies while less frequently used evaluative strategies. The results also revealed that students perceived that lack of vocabulary knowledge, heavy dependence on their teachers, and lack of strategy training were the main causes of their reading difficulties. The findings implied that EFL teachers should introduce metacognitive reading strategies through appropriate and systematic instructions to enable the students to implement them in their academic reading.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KESAN PENGAJARAN STRATEGI METAKOGNITIF KE ATAS
PEMAHAMAN BACAAN DAN KEMAHIRAN PEMIKIRAN KRITIS
PELAJAR PRASISWAZAH ANTARABANGSA**

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Strategi metakognitif telah diselidiki sebagai alat pemudah bagi pemahaman bacaan pelajar. Sedikit kajian telah menyelidiki prosedur terperinci mengenai penyampaian dan pengajaran strategi metakognitif secara sistematik di peringkat pendidikan tinggi. Bagi memenuhi jurang tersebut, penyelidik bertujuan untuk menyelidiki sama ada latihan eksplisit mengenai strategi metakognitif dapat meningkatkan pemahaman bacaan dan kemahiran pemikiran kritis pelajar prasiswazah. Reka bentuk eksperimental kuasi, pengukuran berulang ANOVA, dan temubual separa berstruktur telah dijalankan dengan enam pelajar dalam kumpulan metakognitif eksperimental bagi menyokong dapatan data kuantitatif. Data telah dikumpul menggunakan ujian bacaan, ujian kemahiran pemikiran kritis Cornell, dan inventori Strategi Kesedaran Bacaan Metakognitif.

Kumpulan eksperimental dan kumpulan kawalan menjalani 14 sesi latihan. Selain mengajar strategi metakognitif kepada kumpulan eksperimental, kedua-dua kumpulan juga diajar menggunakan bahan pengajaran yang serupa. Sebaik tamat rawatan, pascaujian bacaan dan kemahiran pemikiran kritis telah dilaksanakan kepada semua partisipan. Temubual separa berstruktur dan Pengukuran Strategi Kesedaran Metakognitif (MARSİ) telah dijalankan dalam kalangan pelajar eksperimental.

Dapatan menunjukkan perbezaan signifikan secara statistik antara skor pelajar yang diajar dalam pemahaman bacaan metakognitif dan kumpulan konvensional ($F=2, 126$) = 269.445. $p < 0.05$). Dapatan berkaitan dengan ujian pemikiran kritis memperlihatkan min skor pelajar dalam kumpulan metakognitif secara signifikan adalah lebih tinggi daripada min skor pelajar dalam kumpulan bacaan konvensional ($F= 1.3, 82.3$) = 215.973. $p < 0.001$).

Dapatan Pengukuran Strategi Kesedaran Metakognitif menunjukkan bahawa pelajar mempunyai lebih kesedaran mengenai strategi bacaan global ($M= 3.511$), diikuti oleh strategi bacaan sokongan ($M=3.468$) dan strategi penyelesaian masalah ($M= 3.427$). Dapatan analisis tematik menyokong bahawa pelajar merupakan pengguna sederhana bagi strategi perancangan dan pemantauan manakala kurang kerap menggunakan strategi evaluatif. Dapatan juga memperlihatkan bahawa pelajar menganggap bahawa kekurangan ilmu kosa kata, pergantungan tinggi ke atas guru mereka, dan kekurangan latihan strategi merupakan punca utama kesukaran bacaan mereka. Penemuan memberi implikasi bahawa guru EFL harus memperkenalkan strategi bacaan metakognitif melalui pengajaran yang sesuai dan sistematik bagi membolehkan pelajar mengimplentasikannya dalam bacaan akademik mereka.

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TABLE OF CONTENTS

		Page
ABSTRACT		i
ABSTRAK		iii
ACKNOWLEDGEMENT		v
APPROVAL		vi
DECLARATION		viii
LIST OF TABLES		xiii
LIST OF FIGURES		xv
LIST OF APPENDICES		xvi
CHAPTER		
1	INTRODUCTION	1
	1.1 Background of the study	1
	1.2 Critical Thinking	3
	1.3 Statement of the problem	4
	1.4 Objectives of the Study	6
	1.5 Research Questions	6
	1.6 Research Hypotheses	6
	1.7 Significance of the study	7
	1.8 Limitations	8
	1.9 Definition of key terms	8
	1.9.1 Metacognitive strategies	9
	1.9.2 Critical Thinking	9
	1.9.3 Reading comprehension	10
 2	LITERATURE REVIEW	 11
	2.1 Chapter Overview	11
	2.2 Language proficiency in academic settings	11
	2.3 Academic language demands for university students	12
	2.4 Academic reading ability	13
	2.5 Reading Comprehension	13
	2.5.1 Difficulty in L2 Reading Comprehension	16
	2.5.2 Features of Reading Strategy Instruction	17
	2.5.3 Metacognitive Reading Strategies	20
	2.5.4 How to Teach Metacognitive Strategies	21
	2.6 Metacognitive awareness of reading strategy	26
	2.6.1 Assessment of Metacognitive Strategies	26
	2.7 Empirical Studies on the Effect of Teaching MRS on Reading	27
	2.8 Critical Thinking	31
	2.8.1 Critical Thinking Skills	33
	2.8.2 Bloom's Framework of Critical Thinking	37
	2.8.3 Strategies for Teaching Critical Thinking	41
	2.8.4 The Significance of Critical Thinking Skill in Higher Education	43

2.9	Metacognition and Critical thinking	44
2.9.1	Relationship between Critical Thinking and Reading Comprehension	46
2.9.2	Empirical studies on Correlation among Critical thinking, Reading Comprehension, and Metacognitive Strategies	48
2.10	Theories Related to the Study	49
2.10.1	Constructivism	50
2.10.2	Schema Theory	51
2.11	Conceptual Framework of the Study	53
2.12	Summary	54
3	METHODOLOGY	55
3.1	Introduction	55
3.2	Research Design	55
3.3	Location of the study	57
3.4	Participants	57
3.4.1	Participants' Demographic Information	58
3.5	Sample Size and Sampling Procedure	59
3.6	Instrumentation	60
3.6.1	Test of Reading (IELTS)	60
3.6.2	Cornell Critical Thinking Test (Level X)	61
3.6.3	Metacognitive Awareness of Reading Strategies Inventory	62
3.6.4	Interview	62
3.7	Pilot study for the treatment	64
3.8	Validity and reliability of instruments	65
3.8.1	Reliability	65
3.8.2	Internal validity and its threat	66
3.8.3	External Validity & Its Threats	66
3.8.4	Issues of validity and reliability of qualitative data	70
3.9	Data Collection Procedure	70
3.9.1	Major Characteristics of the Treatment	72
3.9.2	Control group teaching outline	73
3.9.3	Duration of the Study	73
3.10	Data Analysis	73
3.10.1	Quantitative Data Analysis	74
3.10.2	Qualitative Data Analysis	75
3.11	Summary	77
4	RESULTS AND DISCUSSION	78
4.1	Overview	78
4.2	Descriptive Data Analysis	78
4.2.1	Comparing control and experimental groups for research variables in the pre-test	78
4.3	Preliminary tests of assumptions for repeated measure ANOVA	79
4.3.1	Normality	79
4.3.2	Homogeneity test of variance	80

4.3.3	Sphericity	81
4.4	Inferential statistics/ Hypothesis testing	81
4.4.1	Effect of intervention on IELTS reading	81
4.4.2	The Effect of intervention	83
4.5	Effect of intervention on critical thinking subscale	85
4.5.1	Effect of intervention on Induction	85
4.5.2	Effect of intervention on the credibility of sources and observation	87
4.5.3	Effect of intervention on the deduction	88
4.5.4	Effect of intervention on assumption identification	90
4.6	Metacognitive awareness Strategie Assessment	91
4.7	Findings of Interview with Experimental Groups	93
4.8	Discussion of Findings	99
4.8.1	Research Question 1	99
4.8.2	Research Question 2	100
4.8.3	Research Question 3	102
4.8.4	Research Questions 4	103
5	SUMMARY, CONCLUSION, AND RECOMMENDATION	105
5.1	Introduction	105
5.2	Summary of Major Findings	105
5.3	Implication of the study	106
5.4	Conclusion	107
5.5	Suggestions for Further Research	108
	REFERENCES	110
	APPENDICES	127
	BIODATA OF STUDENT	214
	LIST OF PUBLICATIONS	215

LIST OF TABLES

Table		Page
2.1	The results of studies on the effect of teaching metacognitive strategies	27
3.1	Non-randomized control group, pretest-posttest design	56
3.2	Comparison of demographic variables between control and experimental groups	58
3.3	Threats to Internal Validity& Controlling Measures	68
3.4	Threats to External Validity& Controlling Measures	69
3.5	Research Procedure	71
3.6	Summary of Objectives, Research Questions, Data Collection Method and Statistical Tools	74
3.7	Illustration of coding	76
4.1	Independent Sample T-Test Results for The Mean Pre-Test Scores of Reading and Critical Thinking	79
4.2	Normality test for all dependent variables	80
4.3	Levene's Test of Equality of Error Variances	80
4.4	Mauchly's Test of Sphericity for all dependent variables ^a	81
4.5	Descriptive statistics of IELTS reading score in both groups	82
4.6	Summary of RM-ANOVA for IELTS reading	82
4.7	Pairwise comparison between pre-test and post-test for IELTS reading in both control and experimental groups	83
4.8	Pairwise comparison between groups across the tests for IELTS reading	83
4.9	Descriptive statistics of overall critical thinking score in both groups	83
4.10	Summary of RM-ANOVA for overall critical thinking	84
4.11	Pairwise Comparison Between Pre-Test and Post-Test for Overall Critical Thinking in Both Control And Experimental Groups	84

4.12	Pairwise comparison between groups across the tests for overall critical thinking	85
4.13	Descriptive statistics of overall induction score in both groups	85
4.14	Summary of Rm-ANOVA for induction	86
4.15	Pairwise Comparison between Pre-Test and Post-Test for Induction in Both Control And Experimental Groups	86
4.16	Pairwise comparison between groups across the tests for induction	86
4.17	Descriptive statistics of credibility score in both groups	87
4.18	Summary of Rm-ANOVA for Credibility	87
4.19	Pairwise Comparison Between Pre-Test And Post-Test for Credibility in Both Control And Experimental Groups	88
4.20	Pairwise comparison between groups across the tests for credibility	88
4.21	Descriptive statistics of deduction score in both groups	88
4.22	Summary of Rm-ANOVA for Deduction	89
4.23	Pairwise Comparison Between Pre-Test and Post-Test for Deduction in Both Control And Experimental Groups	89
4.24	Pairwise Comparison between Groups Across The Tests for Deduction	89
4.25	Descriptive Statistics of Assumption Identification Core in Both Groups	90
4.26	Summary of RM-ANOVA for Assumption Identification	90
4.27	Pairwise Comparison between Pre-Test and Post-Test for Assumption Identification in Both Control and Experimental Groups	91
4.28	Pairwise Comparison Between Groups Across the Tests for Assumption Identification	91
4.29	Descriptive Statistics of Reading Strategies Among Students	92
4.30	Coding scheme for students' problems in reading academic texts	94
4.31	Coding Scheme	97

LIST OF FIGURES

Figure		Page
2.1	Gradual Release of Responsibility (Pearson & Gallagher, 1983)	15
2.2	Bloom's taxonomy of learning objective	38
2.3	Revised version of Bloom's Taxonomy	40
2.4	Theoretical Framework of the Study	52
2.5	Conceptual Framework	53
4.1	Frequency of Using Three Reading Strategies Among Students in Experimental group	92

LIST OF APPENDICES

Appendix		Page
A	Letter of Permission for Carrying Out the Research	127
B	Informed Consent Form	128
C	Pre-test of Reading	130
D	Cornell Critical Test	143
E	Sample of Metacognitive Strategy Lesson Plan	161
F	Metacognitive strategy lists	180
G	IELTS Reading Post-test	182
H	Metacognitive Awareness Questionnaire	193
I	Interview Protocol	194
J	Box Plots	195
K	Interview Transcripts	206

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Reading is a receptive skill that plays a crucial role in foreign language learning. A growing body of literature recognises the importance of reading in a higher education context (Yapp et al., 2021; Miller & Merdian, 2020). Academic texts present a new level of lexical difficulty to students as they use specialized writing styles or genres to which many learners may not have been exposed. To be able to write academic papers, they are expected to successfully comprehend the academic language of the textbook, journal articles, and other sources of information (Amir et al., 2019). Despite the need for continued support in reading, maintaining a structured focus on the reading process is commonly ignored by university instructors to provide more direct instruction in writing. The reading comprehension products are focused on each content area, but reading comprehension is received very little attention. Instructors often assume that students have developed sufficient reading skills from previous academic experiences (Andrianatos, 2019).

Instead, poor reading comprehension of academic texts often leads to a misrepresentation of core ideas. Reading comprehension research confirms the notion that successful readers can monitor their comprehension of text in their first or native language. However, poor readers have very little awareness of their reading and thinking processes. One researcher states they have little metacognitive insight into their success or failure (Amir et al., 2019; Yapp et al., 2021).

In the 1980s and 1990s, there was a rise in L2 research related to reading and recognising that it is perhaps the most critical skill for second language learners in academic contexts (William Grabe & Zhang, 2013). Researchers have found that L2 learners who mainly have view reading as a top-down, conscious, meaning-based process are more likely to be successful than those who view it as a bottom-up, word-centred process involving the simple decoding of letters and words (Cetin, 2016; Li et al., 2016; Susanto, 2020).

The last two decades have seen a growing trend toward investigating the importance of reading and teaching different reading strategies to enhance students' reading comprehension (Susanto, 2020; Amir et al., 2019). Research has documented reading instruction's nature and effective characteristics; some researchers maintained that less skilled readers specifically take advantage of direct instruction ((Nourdad et al., 2018; Peters et al., 2021). Therefore, learning outcomes in reading comprehension are directly associated with the quality of the instruction.

The issue of reading strategies classification has received considerable critical attention, with different scholars proposing different classifications. Though there is little consensus on how many learning strategies are exactly used by learners and how they should be named or grouped, Chamot & O'Malley (1987) and Oxford (2011) have suggested some useful and specific category types: cognitive, metacognitive, and socio-affective. Specific methods for the classroom delivery of metacognitive reading strategy instruction were used, such as the Cognitive Academic Language Learning Approach (CALLA), first introduced by Chamot and O'Malley (1987). More recently, Anderson & Briggs (2011) have proposed a model for metacognition that is composed of five main components: (1) organizing and planning for learning, (2) choosing and employing strategies, (3) monitoring the use of strategy, (4) organizing variety of strategies and (5) assessing the use of strategy and learning.

A few classifications emphasize 'metacognition' as an essential aspect of strategies, including planning and preparing for reading; and how to monitor, direct and evaluate the use of different reading strategies. Mokhtari & Sheorey (2015) classified metacognitive reading strategies into global, problem-solving, and support reading strategies. *Global reading strategies* are strategies followed to get the main idea or gist of the text. *Problem-solving strategies* help the reader tackle the problem while the text becomes difficult. However, *support reading strategies* are techniques to sustain the reading.

Numerous researchers identified the major role of metacognition in text comprehension and differentiated between good and poor readers (Meniado, 2016; Montaghmi & Mahdavi-Zafarghandi, 2016; Bećirovic et al., 2017; Dardjito, 2019; Ajideh & Pournalvar, 2018; Hapsari, 2019; Deliany & Cahyono, 2020; Kung & Aziz, 2020; Manh Do & Le Thu Phan, 2021). Some studies suggest a positive correlation between the use of metacognitive reading strategies and reading scores (Rawengwan & Yawiloeng, 2020; Alici & Serdaroglu, 2016; Memiş & Kandemir, 2019; Memiş & Kandemir, 2019). Studies investigating online metacognitive reading strategies were similar to those cited in printed materials (Azmuddin et al., 2017;

Yusuf Sukman, 2017; Rianto, 2021). It has been reported that students used problem-solving strategies the most, although global reading strategies and support reading strategies were the least used strategies. However, some studies found no significant relationship between teaching metacognitive reading strategies and reading improvement among students (Meniado, 2016; Surlitasari & Premini, 2018).

It is now well established from various studies that explicit teaching of metacognitive strategies would improve reading comprehension scores. However, the results of some studies are questionable as there has been no one specific way of conducting the instruction of metacognitive reading strategies. To the best knowledge of the researcher, few studies explained the detailed procedure of systematically delivering and teaching metacognitive strategies in a higher education context.

1.2 Critical Thinking

In the current challenging educational context, students are required to go beyond their current knowledge; they must develop higher-order thinking skills, namely, decision making, critical thinking, and problem-solving (Surlitasari & Premini, 2018; Mbato, 2019; Mbato, 2019; Van der Zanden et al., 2020). Metacognitive reading strategies and the ability to think critically are also crucial to university students. Scroll and For (2021) highlighted the vital role of critical thinking in higher education. He argued that English second language students who can think critically consequently develop the ability to ask appropriate questions, collect and sort this information creatively, and come up with consistent conclusions regarding this information could critically empower them to achieve success. Ali et al. (2020) and Sudha (2018) research revealed how ESL learners could improve their critical thinking skills by integrating critical thinking activities into the classroom.

English language proficiency and critical thinking skills are significant requirements for university education (Brown, 2017; Aghajani, 2019; Studies & Mete, 2020). Therefore, educators and policymakers consider students' critical thinking skills an essential educational priority. Cook (2000) thought of reading as a thinking process and emphasized the importance of involving the students in discussing the text they have already read while using reading strategies. Therefore, students are required to think critically to comprehend the texts.

Marin & Halpern (2011) developed a model of metacognition and included critical thinking in the model. She expressed that metacognition refers to utilising knowledge to direct and improve thinking skills. As students are involved in thinking critically, they must deal with particular metacognitive skills, such as monitoring the thinking process, confirming the accuracy, and making decisions using time and mental effort. Mango (2010) argued that critical thinking is an outcome or product of metacognition, which predicts two variables (Magno, 2015).

Similarly, Ku & Ho (2010) stated that metacognitive strategies utilized in critical thinking are categorized under planning, monitoring, and evaluating categories. Planning activities refer to planning and determining procedures that direct thinking, select appropriate strategies, and allocate existing resources. Monitoring is defined as the state of having an awareness of task comprehension (Schraw et al., 2006). Monitoring activities refers to checking whether to validate task comprehension and direct attention to main ideas. Finally, evaluating strategies refers to examining and correcting individuals' cognitive processes, which include evaluating individuals' reasoning and conclusions. Overall, a critical thinker is responsible for his thinking processes, whereas metacognitive strategies facilitate this control.

Some studies confirmed the association of critical thinking with language learning, especially in reading comprehension (Fahim & Bagheri, 2012; Zare & Biria, 2018; Mohseni et al., 2020; Marzban, 2016). They found that reading comprehension was

directly related to some components of students' critical thinking skills. Yousefi & Mohammadi (2016) declared that the essential skills of thinking of individuals are good predictors of academic performance; consequently, higher education institutes need to know students' level of critical thinking skills.

However, a systematic understanding of how teaching metacognitive strategies contributes to which sub-skills of critical thinking is still lacking. This study aimed to verify the existing literature by explicitly teaching metacognitive strategies and examining their effects on reading comprehension and critical thinking skills.

1.3 Statement of the problem

The academic success of university students depends on their reading proficiency, as they are required to read textbooks and resources to acquire the content and procedural knowledge of fields of specializations. Reading entails successful interactions between writer, context-specific, and text-based factors, including fluency and automaticity in text processing, lexical resource, background knowledge, motivation for reading, and metacognitive reading strategies

(Ghaith, 2019; Kung & Aziz, 2020). Some researchers maintained that a significant number of EFL learners might reach tertiary education without being well-prepared for the reading requirements of their academic programs (Grabe & Stoller, 2013; Aghajani, 2019). In my experience, students complain about how difficult it is for them to read an academic article that includes many unknown and complex words—reading needs much more than the ability to recognize written words in a text and decode information at this level. Some students might decode the written texts; however, they cannot comprehend what they have decoded due to a lack of comprehension skills. These students encounter difficulty comprehending academic text and this weakness adversely influences their academic performance.

In Universiti Putra Malaysia, international students must meet English language proficiency requirements by presenting an overall IELTS band score of 6. Otherwise, undergraduate students must go through The Certified Intensive English Program – CIEP, which is ideal for students who wish to learn English to further their academic studies. However, many undergraduate students struggle with reading comprehension after going through English preparation courses. Comprehension of academic text is essential because it promotes evaluation, analysis, and synthesis of information using different sources.

To understand the current practice of teaching reading metacognitive reading strategies at the ELS institution, the researcher observed three reading sessions taught by instructors. The researcher has observed most instructors used conventional teaching practices while teaching reading comprehension. She has noticed that instructors used

only planning strategies. One source of the learners' difficulty despite their satisfactory language proficiency might be their lack of knowledge of reading metacognitive strategies.

In addition, the existing body of research suggests that explicit teaching of metacognitive strategies would improve reading comprehension scores. However, such studies have failed to clarify how do they systematically teach metacognitive strategies in practice. A considerable lack of standardization of instrumentation and lack of specification with teaching metacognition was identified in the current literature. Besides, the researchers have not investigated the application of reading metacognitive strategy to different textual genres, such as argumentative texts, which are considered necessary in academic reading.

Few studies have investigated the detailed procedure of systematically delivering and teaching metacognitive strategies in higher education (Ajideh et al., 2018; Hapsari, 2019). To fill the gap in the existing literature, the researcher described the systematic implementation of teaching metacognitive strategies to international undergraduate students and examined their effects on their reading comprehension.

The next problem deals with a lack of critical thinking skills in university contexts. Critical thinking refers to the selection, analysis, evaluation, reflection, inference, questioning, and judgment (Zanden et al., 2020; Bankole-, 2019). Some studies confirmed the relationship between critical thinking and metacognitive reading strategies (Fahim & Bagheri, 2012; Zare & Biria, 2018; Mohseni et al., 2020; Marzban, 2016). However, a systematic understanding of teaching metacognitive strategies contributes to which sub-skills of critical thinking is still lacking. Much less is known about how metacognitive strategy training may contribute to critical thinking skills in EFL learners' reading comprehension. In addition, there have there been cases where explicit teaching of metacognitive strategies does not lead to a positive impact on reading comprehension or attainment of critical thinking skills (Gholami et al., 2016). The researcher aimed to teach metacognitive reading strategies and examine whether students' critical thinking skills would enhance after the instruction.

Previous research only administered MARSJ to measure students' metacognitive reading awareness. Some studies skeptically questioned this assessment method for identifying students' degree of awareness of metacognitive reading strategies. (Hong-Nam & Page, 2014; Alici & Serdaroglu, 2016; Dardjito, 2019; Ulu, 2019; Deliany & Cahyono, 2020). To understand better students' awareness and perception of using metacognitive strategies, the researcher interviewed students in the experimental group to identify their problems while applying these strategies.

1.4 Objectives of the Study

The general purpose of the study is to investigate the effect of explicit teaching metacognitive strategies and critical thinking on the reading comprehension of undergraduate international students in Malaysia. Specifically, this study wants to:

1. Investigate the effect of explicit teaching of metacognitive strategies on reading comprehension of international undergraduate students.
2. Identify the effect of metacognitive strategies on the critical thinking skills of undergraduate students.
3. Identify the most commonly used metacognitive reading strategies employed by undergraduate international students.
4. Identify undergraduate international students' perception of metacognitive strategies in their reading comprehension.

1.5 Research Questions

Based on the objectives mentioned above, the present study attempts to achieve answers to the following research questions and their related hypotheses.

1. What differential effects do metacognitive strategies have on international undergraduate learners' reading comprehension?
2. Does explicit teaching of metacognitive strategies affect undergraduate students' critical thinking?
3. What are the most commonly used metacognitive reading strategies by participants?
4. What is the students' perception of using metacognitive strategies to improve their reading comprehension?

1.6 Research Hypotheses

Ho 1: There is no significant difference between mean scores of reading comprehension among students who attended reading lessons using metacognitive strategy and students who attended reading lessons using the conventional approach in pre-test.

Ho 2: There is no significant difference between mean scores of reading comprehension among students who attended reading lessons using metacognitive strategy and students who attended reading lessons using the conventional approach in post-test.

Ho3: There is no significant difference in reading comprehension performance in using metacognitive strategy in pre-and post-tests after the treatment.

Ho4: There is no significant difference in the metacognitive group's mean scores for pre-and post-scores concerning induction reasoning.

Ho5: There is no significant difference in the mean scores of the metacognitive group for pre, post-test concerning deduction reasoning.

Ho 6: There is no significant difference in the mean scores of the conventional group for pre, post-tests concerning credibility.

Ho 7: There is no significant difference in the mean scores of the conventional group for pre, post-tests concerning the assumption identification.

1.7 Significance of the study

As mentioned earlier, reading comprehension skills are essential for university students to become effective readers (Afshari & Tavakoli, 2016; Ali et al., 2020). Some international students are not aware of metacognitive strategies and how to apply them while reading academic text. If students do not have enough metacognitive knowledge in reading comprehension, they get confused in applying the proper reading strategies (Zarei et al., 2012; Susanto, 2020). Students must go beyond the text and improve their higher-order thinking skills, problem-solving, critical thinking, and decision-making in the higher education context. Teaching metacognitive strategies might help undergraduate students think critically by creating new ideas and reflecting on the critical principles of reasoning that lead to developing their critical thinking skills. Consequently, some international students cannot self-plan, self-regulate, self-monitor, and self-evaluate their reading comprehension skills appropriately and strategically due to a lack of metacognitive strategies (Heikal, 2015).

This study aims to contribute to this growing area of research by exploring the effect of metacognitive reading strategies for EFL/ESL undergraduate international students. It is hoped that this research will contribute to teacher education programs by training teachers on how to teach and model applying metacognitive reading strategies to students. Foreign language teachers should primarily model for their learners by integrating higher-order thinking strategies into reading practices. They should also raise their learners' consciousness of what metacognitive strategies are and how and why they should deploy them. They should explain the characteristics, usefulness, and applications of the strategy explicitly and through several examples and illustrate his/her own strategy use through a reading task.

The study offers some critical insights into teaching reading in higher institutions in general and the Ministry of Education in Malaysia to emphasise teaching reading comprehension strategies in English and, in particular, syllabus designers and teacher professional development to promote teaching critical thinking skills in their curriculum. In addition, this study would inform policymakers on the importance of reading efficiency at the undergraduate level. Reading efficiency must be incorporated into the English courses so that students taking the proficiency courses will be well-equipped with general academic reading skills. EFL/ESL teachers and curriculum planners should explore how metacognitive reading strategies could be taught effectively at universities to improve the speed and comprehension of students. On the other hand, this research

provides an alternative method to teach critical thinking skills in reading in a second language classroom. Critical thinking skills and techniques teach students to evaluate information and ideas and decide what to accept and believe.

1.8 Limitations

This study investigates the effect of explicit teaching of metacognitive strategy on the reading comprehension performance of international undergraduate students in Malaysia. A complete discussion of reading strategies lies beyond the scope of this study. This study encountered some limitations that need to be addressed in this section.

While the target population in this study was international undergraduate students studying at UPM, the findings are acceptable in the limited context, and the findings of this study could not be generalized to other contexts. Though, universities with similar characteristics might benefit from the current study results.

Another limitation of this study is the number of participants and the duration of the instruction. A total number of participants (n=70) attended this study, 35 students in the conventional reading approach and 35 in the metacognitive reading strategy group. A larger pool of participants will maximize the likelihood of obtaining statistically significant results.

The following limitation is related to the short duration of intervention which is ten sessions. Therefore, this limited intervention time might not be sufficient to develop students' metacognitive strategies. However, a more extended period of explicit instruction might produce more reliable results.

The fourth limitation of this study is related to the subject effect. The researcher cannot control the communication between two groups in the ELS language Centre. Students in two groups might exchange information with each other, and this issue might influence their performance in the post-test.

1.9 Definition of key terms

Some key terms in this study need to be defined conceptually and operationally to understand how these terms are exerted throughout the study.

1.9.1 Metacognitive strategies

Metacognition is ‘the knowledge of individuals about their own cognitive processes and their internal use of the specific cognitive process’ to improve learning and memory’ (Oxford & Nyikos, 1989, p.293). O’Malley and Chamot (1990) define the processes of *planning, prioritizing, setting goals, and self-management* in metacognitive strategies.

Learners can use metacognitive strategies to *organize, plan, evaluate*, (Oxford & Nyikos, 1989) *orchestrate, regulate* (Oxford, 1990), *arrange* (Oxford & Nyikos, 1989), *co-ordinate* and *monitor, control* (Grabe & Zhang, 2013) their own strategies and learning through thinking about learning, monitoring one’s own production, and evaluating comprehension; hence, monitoring strategies facilitate learning by applying metacognitive strategies (Yang & Lee, 2013). Commonly suggested metacognitive strategies are categorized under planning, monitoring, and evaluating categories. While various definitions of the term metacognitive strategies have been suggested, this paper will use this definition. Planning activities refer to planning and determining procedures that direct thinking, select appropriate strategies, and allocate existing resources (Schraw et al., 2006). Monitoring is defined as the state of having ongoing awareness of task comprehension (Pammu et al., 2014). Monitoring activities refer to checking whether to validate task comprehension and direct attention to main ideas (Rajoo & Selvaraj, 2010). Finally, evaluating strategies refers to examining and correcting individuals’ cognitive processes (Rahimi & Katal, 2012).

In this research, the self-assessment instrument developed by Mokhtari & Sheorey (2002) was used to measure adult ESL students’ metacognitive awareness and perceived use of reading strategies related to reading academic materials.

1.9.2 Critical Thinking

According to Ennis (2011), critical thinking is defined as ‘reasonable and reflective thinking that is focused on deciding what to believe or do’ (p.2). Paul & Elder (2007) described critical thinking as “the art of analyzing and evaluating thinking to improve it’ (p.15). In this study, critical thinking involves the measurement of four aspects of induction, deduction, credibility and identification of assumption, which are essential and vital to thinking and reasoning (Debes, 2009).

Deductive reasoning: It starts with the assertion of general rule and proceeds from there to a guaranteed specific conclusion. Deductive reasoning moves from the general rule to the specific application.

Inductive reasoning: It begins with observations and proceeds to a generalized conclusion that is likely, but not certain, in light of accumulated evidence. Inductive reasoning moves from the specific to the general.

Credibility: Credibility includes the objective and subjective components of the believability of a source or message.

Identification of assumption: ‘An assumption is an unexamined belief about what we think without realizing we think it. Our inferences are often based on assumptions that we haven't thought about critically’ (Ennis, 2007, p. 243-256).

Critical thinking skills in reading refer to students' mental abilities to think critically about the text, analyze multiple meanings, ask meaningful questions, and express their own ideas with clarity. Cornell Critical Thinking Test measured students' general critical thinking skills, level X. This test has been used in curriculum and teaching experiments to assess students' critical thinking ability in grades 5 to 12 and undergraduate students. Level X test includes 71-item, multiple-choice test questions administered within 50-minutes.

1.9.3 Reading comprehension

Reading comprehension is ‘the process of simultaneously extracting and constructing meaning through interaction with written language’ (Grabe. & Stoller, 2013, p.7). This interaction process between the text variables and the reader occurs within a larger social context. Reading comprehension is considered a complex skill that needs to develop and orchestrate lower- and higher-level processes and skills (William Grabe & Zhang, 2013). In this study, the academic IELTS reading was used in the current study as an assessment tool for measuring academic reading comprehension as it is assessed different text genres ranging from factual to discursive or analytical (Balota et al., 1990). Moreover, IELTS reading texts are selected from authentic sources such as newspapers, magazines, books, and journals, which students are required in academic reading. The final reason is that most students are familiar with the format and IELTS question types.

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