

S²RMCA – An Effective Model for Learning Self-regulated L2 Writing

Mrs Manashi Gogoi Dutta

King Mongkut's Institute of Technology Ladkrabang
Thailand

Dr Uthaivan Danvivath

Confucius Institute of Khonkaen University
Thailand

Abstract

This research has been conducted to investigate the effects of instructionally induced cognitive involvement load for improving L2 writing skills through facilitating use of self-regulated and metacognitive learning strategies by learners. Low use of self-regulated learning strategies can cause lower use of metacognitive learning strategies resulting in low proficiency. Therefore, a reverse process of developing self-regulated and metacognitive learning strategy use has been modelled to improve L2 writing skills. The innovative L2 writing instructional model of this study has been named as Strategic Self-Regulated Metacognitive Activities (S²RMCA). The S²RMCA model focuses on promoting self-regulated learning management. For measuring and facilitating learning strategy use, a strategy inventory named SILL2W and a set of self-monitoring and self-assessing rubric have also been developed. Participants of this study are 26 Thai undergraduate students. Questionnaire, pre-post test scores, checklist, and interviews were used for collecting data. Findings have reflected that the S²RMCA has been a practically usable tool for self-regulated learning of L2 writing. Findings have also shown satisfactory improvements in writing skills of the participants as the results of instructionally induced cognitive involvement load. However, accuracy in self-reporting and brief teaching duration to train learners about learning strategies have remained as limitations of this study.

Keywords: L2 writing, self-regulated learning, metacognitive learning strategies and cognitive involvement load

Article Received: 18 October 2020, Revised: 3 November 2020, Accepted: 24 December 2020

Introduction

Studies have established that there is a strong correlation among self-regulation, language learning strategies, metacognition and cognitive involvement load from different perspectives and angles. Ertmer and Newby (1996) have claimed about less metacognitive strategies being used by students with low self-regulation and low autonomy. Feryal Cubukcu (2009) has explained the correlation between self-regulation, metacognition, and autonomy and shown that low autonomy is closely related to low self-regulation habits. Chamot and Harris (2019) have mentioned that promising evidence are still due regarding how to design and carry out language learning strategy interventions. Evans, Kirby, and Fabrigar (2003)

have claimed that during the processes of writing, learning approaches and self-regulation interplay synchronously. Farrington and colleagues (2012) have noted that limitations of existing studies show focus on researcher specified learning strategies which are not necessarily chosen by teachers or students. Raya (2011) has mentioned that in creating learning opportunities, a decisive role is played by teachers which can promote self-regulation and reflectivity of learners. Conley (2014) has mentioned that research is rarely designed to influence classroom practices in the domain of Language Learning Strategies and self-regulated learning. According to Conley, it is even difficult to design such research. Again, there are not enough models to enlighten teachers on instructional designs that can foster self-regulated learning of L2 writing. Having said how self-

regulated learning factors are related to the metacognitive learning strategy factors, this study has come up with an innovative model of teaching and learning L2 writing — *Strategic Self-Regulated Metacognitive Activities* (S²RMCA). S²RMCA is designed for promoting use of self-regulated and metacognitive learning strategies through instructionally induced cognitive involvement load on learning processes. The underpinning theories behind the S²RMCA model are Learner Autonomy, Language Learning Strategies, Cognitive Load Theory, and Involvement Load Hypothesis. This may be a novel approach in the area of teaching and learning of L2 writing. To develop L2 writing, a learner needs to be trained to realise and control own mental activities to manage the constraints that can limit his or her writing abilities. The instructional model S²RMCA of this study is designed to control learners' mental activities through involvement in planning, self-monitoring, and self-evaluation. For facilitating metacognition, self-regulation is a prerequisite, and this study has developed the multi-theory cluster model of teaching and learning as Strategic Self-Regulated Meta-Cognitive Activities (S²RMCA) to promote self-regulated and metacognitive learning strategy use of a group of Thai undergraduate students.

Literature Review and Conceptual Framework

Although, research and theories on teaching L2 writing by promoting use of learning strategies are available in literature, yet time and training are needed by teachers for explaining modelling, and scaffolding the learning strategies to students in regular classrooms (Pressley, Lindsay, Fingeret, Reffitt, & Raphael-Bogaert 2007). O'Malley and Chamot (1990) have claimed that strategies are the tools for active, self-directed involvement required for improving communicative abilities in L2. In the

fields of language learning strategies, metacognitive strategies, and self-regulated learning, a large number of research have been conducted. Yet, hardly any consensus has reached on issues like relationship of theoretical underpinnings with strategy training and successful learning, or the relationship between and among the learning strategies and learner variables, including the way or ways to conduct research on strategy training (Gkonou & Inceçay, 2016). Recent trend has started showing how much recent technologies can help in self-regulated learning. Increasing digital communication has been demanding more research in using technology for L2 writing as well. Recently, emphasis on relationships between the language learning strategies and self-regulation have been noticed in some studies (Rose, 2012; Chamot, 2014; Griffiths, 2013; Oxford, 2018). Focus has been shifted to find how and what learners do to learn a second or a foreign language. Several studies have established the necessities of active engagement and contribution of the learners in the process of learning (Cotterall, 2000; Zimmerman & Schunk, 2008). This has been established that learners have to take responsibilities and active roles to make their learning successful, and accordingly use appropriate learning strategies. The main purpose of this study is to help learners to improve L2 writing skills by promoting self-regulated and metacognitive learning strategies. If students are trained to use self-regulated and metacognitive learning strategies, they may become more independent in learning and critical thinking. One of the remaining limitations in the available literature is that very little is studied regarding how learners think and link their thinking step by step with the output in texts. Figure 1 below outlines the conceptual and the theoretical framework of this research study.

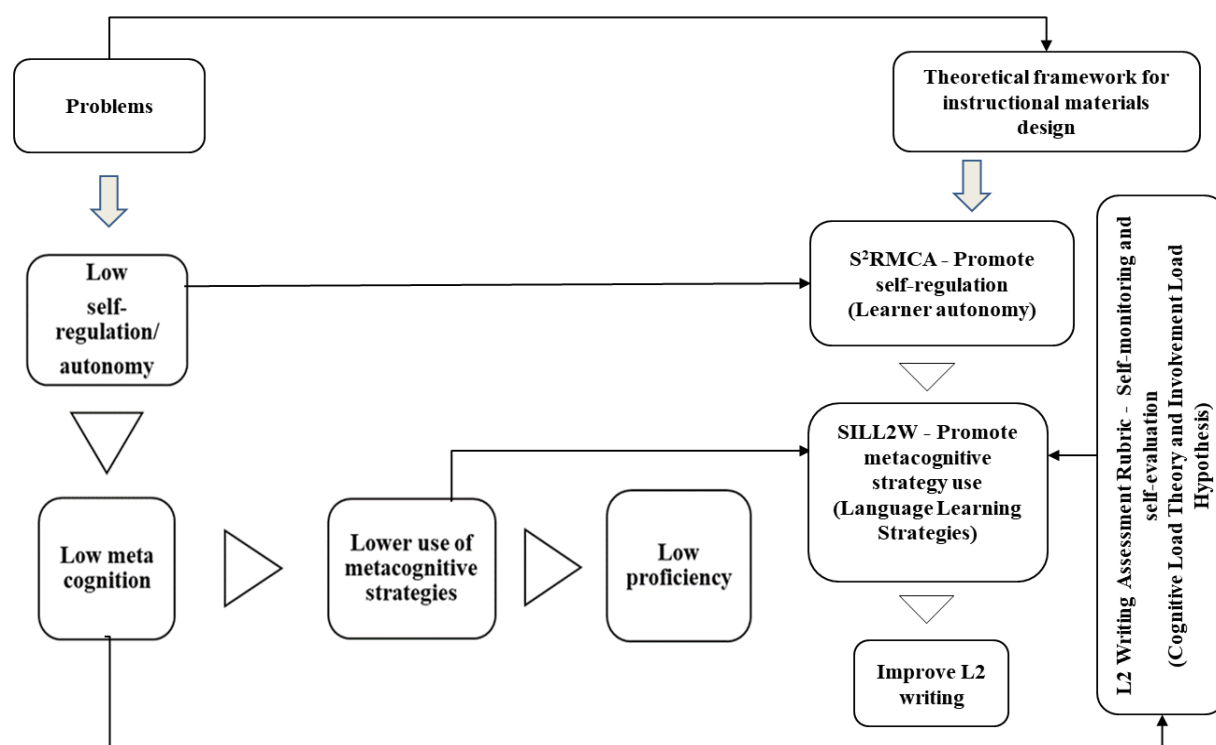


Figure 1 Conceptual and theoretical framework

Previous theoretical models of teaching L2 writing have followed theories of cognition as a human problem-solving factor and used task analyses principles to study the process of writing (Ericsson & Simon, 1980). Hayes and Flower's (1980) widely known cognitive model has categorised the sub processes of generating and self-monitoring of texts through planning, organising, and goal setting, which are known as the basic self-regulated learning strategies. Other sub processes that have been included in the Hayes and Flower's model were translating thoughts into texts and reviewing in relation to a learner's long-term memory and a task environment. Hayes (2012) has redesigned his earlier model and established a control over level of motivation, setting goals, planning, and writing schemata. Studies have also examined sub processes of L2 writing in terms of revising, fluency of text generating, and restructuring of texts (Hall, 1990; Chenoweth & Hayes, 2001; Larios, Murphy & Manchón, 1999). There are other studies that have compared cognitive strategy use between L1 and L2 writing (Arndt, 1987; Whalen & Menard, 1995; Cumming, 1989; Sasaki, 2000). This study has tried engaging learners' thinking processes in need, search, and evaluation as the controlling factors of learning management through instructional cognitive load for achieving specific learning goals. In this study, self-regulation in L2 writing pedagogy is mainly concerned with

learners' internal control of psychological capacities over utilising self-regulated and metacognitive learning strategies. This study views self-regulated learning as learners having control over their own thinking, using metamemory, choosing learning strategies and learning behaviour to solve problems in developing L2 writing. While engaged in the process of the L2 writing tasks, learners engage themselves in certain deep-thinking processes such as extracting meaning, seeking and organising ideas, developing sentences and paragraphs, monitoring own composition, dealing with learning materials, understanding task requirements and other similar intrinsic self-regulated behaviours that lead to complete the compositions. Models of teaching learning strategies for L2 writing should be designed to fulfil the needs of learners, irrespective of their educational backgrounds, linguistic proficiency, and motivation, etc. Pour-Mohammadi, Zainol and Cheong Lai, (2012) have claimed that if interventions of language learning strategies are effective and strategic, that can help to improve L2 writing qualities. In this cluster model of S²RMCA, learners' mental actions for concentrating, processing information, extracting meaning, organizing ideas, composing texts or developing sentences and paragraphs, monitoring own compositions, engaging with study aids, understanding the tasks, etc. are categorised as

metacognitive strategies. S²RMCA model has been contextualised for L2 writing and developed to create awareness, train, and control learners' self-regulated and metacognitive learning strategy use. Tseng, Dörnyei, and Schmitt (2006) have used terms like special techniques, ways, and methods. Yet, they did not include the learning strategies in their attempt to assess "strategic-learning". As claimed by R. Oxford and Amerstorfer (2018), there has been still a remaining vacuum particularly in the instructional modelling of teaching L2 writing that includes modelling of composition processes through self-regulation and self-correction in a formal classroom environment. This study is an attempt made in that direction of instructional modelling of teaching L2 writing through self-regulated learning in a formal classroom environment where learners are trained to be self-regulated. A constant concern about the language learning strategy research has been that they are focused on strategies in isolation, whereas learning strategies are extremely complex phenomenon (Gkonou et al., 2016). Lack of resources and guidance for measuring use of learning strategies by young language learners in classroom settings is a major existing challenge (Gunning, 2011). For facilitating and gauging self-regulated and metacognitive learning strategy use, this study has come up with a questionnaire — Strategy Inventories for Learning L2 Writing (SILL2W) (see Appendix A). The Strategy Inventories for Learning L2 Writing (SILL2W) comprise of total 40 inventory items with 11 strategies of motivation, 5 strategies of self-correction, 7 strategies of self-regulation and 17 metacognitive strategies. SILL2W has been specifically designed in self-questioning form to facilitate self-monitoring and self-evaluation in L2 writing.

Existing literature on self-regulated learning and language learning strategies for developing L2 writing do not display any cognitive construct taken into account. Oxford (2017) has categorised and harmonised several related definitions of learning strategies through theoretical insights and offered a more inclusive Strategic Self-Regulation (S²R) model. Oxford has shown the connections between self-regulation, agency, and autonomy and discussed them as the soul of learning strategies. As claimed by Oxford (2017), there are less information sources and it is hard to find everything enough literature in the context of developing self-regulated and metacognitive learning strategies for L2 writing skills. There has been a lack of domain-specific, sound methodological research in

developing self-regulated learning attained from strategic metacognitive learning behaviours facilitated through instructional materials in L2 writing. To teach beyond the boundaries of existing teaching approaches, pedagogy should incorporate learning strategy training for supporting obstruction-less self-learning. The ambition of SILL2W is inducing cognitive involvement load on the thinking process of learners to take responsibility of developing their self-regulated and metacognitive learning strategies for improving L2 writing. If instructional materials can demand and guide strategic actions by learners to take place for improving L2 writing, that may contribute to academic success. Underscoring this psychological aspect of learning strategy use, the construct of SILL2W has been designed aiming the difficulties in L2 writing of Thai undergraduate learners. SILL2W consists of four parts. The first part elicits information on the general and linguistic backgrounds of users. The second part elicits information on the motivation levels. The third part of SILL2W elicits information on the user's self-regulated learning behaviours. And the fourth part of the learning strategy inventory questionnaire elicits information on learners' application of metacognitive learning strategies.

In this study, strategic self-regulated learning means how learners manage or regulate their own learning strategies. Kormos and Csizér (2014) have defined self-regulation as the self-regulatory control of learners that includes use of the more conscious mental processes that are applied to control one's own learning. For promoting self-regulated and metacognitive learning strategies, this study has come up with an innovative teaching and self-regulated L2 writing learning model – Strategic Self-Regulated Metacognitive Activities Model or S²RMCA which aims to facilitate strategic self-regulated learning to improve SR (Self-regulation) and CA (Cognitive activities) strategies for improving L2 writing. The theoretical concept of the S²RMCA model is built up on the notions of S-W-SR (Skill-Will-Self-regulation) and ER-GO-CA (Effort related - Goal-orientation activities - Cognitive activities) models with modifications to make the approach more L2 writing focused. Table 1 depicts the theoretical concept behind the S²RMCA model. The S²RMCA model is inspired by Learning and Study Strategies Inventory (LASSI) by Weinstein and Palmer's (2002) (S-W-SR) and Olejnik and Nist's (1992) (ER-GO-CA) to promote self-regulation. S-W-SR and ER-GO-CA are two structural models for strategic learning. S or skill, W or will and SR or self-regulation are the

three main components of strategic learning. The objectives of this study underscore the link of the components of the two instructional models of S-W-SR and ER-GO-CA in facilitating self-regulated and metacognitive learning strategies for improving L2 writing. The S-W-SR model has listed four components of self-regulation strategies which are concentration, self-testing, study-aids, and time management. ER-GO-CA model has listed four cognitive components of self-regulation strategies which are selecting main ideas, self-testing, study-aids, and information processing. As seen in table 1 below that the S²RMCA model has included components of both self-regulated and metacognitive learning strategies that target learning goals related to L2 writing. Self-regulation is a prior requirement for facilitating cognitive activities. The teaching model of Strategic Self-Regulated Meta-Cognitive Activities (S²RMCA) has combined both self-regulated and

metacognitive learning strategy components under learning management. In the S²RMCA model, concentration, managing time for learning and information processing, extracting meaning, selecting and organising ideas, developing sentences and paragraph patterns, monitoring own composition through self-monitoring and self-evaluation, engagement with study aids and understanding task requirement – all these learning strategies are categorised under the umbrella of learning management. The S²RMCA has been modelled to create instructional demands for learners' engagement in self-regulated learning and developing self-regulated and metacognitive learning strategies to improve L2 writing. Therefore, the learning strategies listed under learning management are L2 writing oriented. Table 1 below shows the components and the self-regulated and metacognitive learning strategies of the S²RMCA model.

Table 1 S²RMCA model of this study

Model	Components	Self-regulation strategies			
S-W-SR	Self-regulation	Concentration	Self-testing	Study aids	Time management
ER-GO-CA	Cognitive activities	Selecting main ideas	Self-testing	Study aids	Information processing
S ² RMCA (Instructional model)	Self-regulated metacognitive learning activities	Learning management – Concentration, time management, extracting meaning, seeking and organising ideas, developing sentences and paragraph patterns, monitoring own composition, engagement with learning materials, understanding task requirements.	Self-monitoring and self-evaluation	Study aids	

Integration of four complementary theories namely Self-regulated Learning, Language Learning Strategies, Cognitive Load Theory, and Involvement Load Hypothesis to improve L2 writing skill is a sincere and novel move in a new direction in the fields of self-regulated learning, language learning strategies and L2 writing. Thai L2 learners usually spend a lot of time to find meanings, information, generate ideas and understand the tasks (Puengpipattrakul, W., 2013; Boonpattanaporn, P., 2007). There is no doubt that like any L2 learners, Thai learners struggle to develop sentences and paragraphs (Dutta, M. G., & Danvivath, U., 2015). A study about Thai English learners errors in writing, conducted by Phoocharoensil, S., Moore, B., Gampper, C., Geerson, E., Chaturongakul, P., Sutharoj, S., and Carlon, W. (2016) has revealed that some of the major problems with which Thai EFL undergraduate students usually confront in L2 writing are due to not only L1 influence, but also due to learners' confusion over the target language and its complex the grammatical system. Chuenchaichon (2014) has made a review on previous studies on EFL writing and the direction of research conducted in Thailand during the period of 2004 – 2013. Chuenchaichon (2014) has categorised them into the areas of type of errors, writing assessment, writing online, technology and writing, and genre-based writing instruction. As cited in Nopmanotham (2016, p. 37), the study by Pimsan (2003) has found that mainly metacognitive, cognitive, social, and affective strategies in L2 writing have been the lower strategies used by 370 Thai second-year graduate students. Deveney (2005) and Dhanarattiganon (2008) have studied and discussed classroom behaviour of Thai students and stated that Thai students' behaviour to their teachers in classroom settings reflect the existence of a teacher centered culture.

Dörnyei and Ryan (2015) have claimed that studies have not succeeded to resolve the core issue that explains what separates strategic learning activities from normal learning activities. Cognitive Load Theory (CLT) of John Sweller (1988) has related cognitive load to the amount of information that human working memory can absorb at one time. Macaro (2006) has claimed that learning strategies are situated in the working memory and Oxford (2017) has also claimed that implementing learning strategies involve working memory. However, Sweller (1988) has proposed that working memory has limited capacity to hold information, therefore, instructional methods should not overload the

working memory. Guidelines of Cognitive Load Theory have been useful for designing teaching and learning materials to control and manage learners' working memory for effective learning. Involvement Load Hypothesis (ILH) proposed by Laufer and Hulstijn (2001) has claimed that when there is higher involvement load on the learning processes, there is more effective learning than the ones with lower involvement load. This study has developed instructional materials specially to induce cognitive involvement load on learners to manage self-regulated learning of L2 writing. Learners can reflect metacognitive thinking or use of metacognitive learning strategy while conducting self-correction or reflect on self-initiated descriptions about their own learning strategies (Conley, 2014). Conley (2014) has suggested that students should be trained to monitor the use of learning techniques or strategies through self-evaluation and peer feedback. Oxford and Amerstorfer (2018) have claimed that the relationships of multiple factors of self-regulated language learning strategies, contexts, and individual differences can be brought together in strategy instructions to meet the needs of learners with diverse proficiencies. Studies have attempted differentiating strategy instructions to meet individual learners' goals and characteristics (Oxford, 2018; Chamot & Harris, 2019). To induce cognitive involvement load on learning processes, this study has designed a set of L2 writing assessment rubric (see Appendix B) for self-monitoring, self-assessment, and grading. The rubrics cover five main learning goals in L2 writing. Learning goals of the rubric include the linguistic features that represent a total of 33 common errors made by Thai L2 learners in English writing.

The main objective of this study has been to develop a theoretical model (S²RMCA) for teaching and learning self-regulated L2 writing under a multi theoretical construct of Cognitive Load Theory and Involvement Load Hypothesis. And, the objective was aimed to achieve by promoting and controlling execution of self-regulated and metacognitive learning management through instructionally induced cognitive involvement load under the S²RMCA model. Based on the discussions and objectives narrated above, this study has attempted to answer the following two research questions.

- 1 Whether S²RMCA model can be used practically and effectively to teach self-regulated L2 writing in a regular classroom setting?
- 2 Can instructionally induced cognitive involvement load facilitate learners' use of

self-regulated and metacognitive learning strategies for improving L2 writing?

In the field of self-regulated learning, the number of studies conducted on L2 writing in a formal classroom setting has been remaining relatively fewer.

Method

This study has been conducted as an experiment about facilitating use of self-regulated and metacognitive learning strategies by 26 Thai undergraduate students to improve L2 writing in a regular academic semester of 17 weeks during September 2019 till January 2020. The 26 participants of this study were enrolled in three different writing in English courses and labelled as Group A, B and C. The course objectives of the three courses included writing skills development in English language focusing on accuracy in both language forms and grammar beneficial to careers and academic purposes. Groups A and B were taught in the self-regulated learning approach using the instructional materials developed for this study. Group C was identical with Group A and B in terms of reading sample texts before writing a new text, in using online applications to write and edit and in receiving teacher's assistance without corrective

feedback. However, Group C did not receive the instructional treatment designed to induce cognitive involvement load to facilitate self-regulated and metacognitive learning strategies for improving L2 writing. Group C learned about process writing, Group B learned to write reports only and Group A learned to develop writing skills in English for report, summary, paragraph, and translation. By looking at the nature of participation, Group C can be labelled as the control group of this study. Students were briefed about self-regulated learning approach and use of self-regulated and metacognitive language learning strategies in the beginning of the semester after a survey was conducted about self-regulated and metacognitive learning strategy use by the students. It is noteworthy that the ultimate action expected from self-regulated learning is self-correction. Whereas motivation is one of the deciding factors of self-regulated learning. Therefore, the survey on use of language learning strategies by learners included motivation and self-correction strategies in the questionnaire SILL2W. Research instruments of this study were divided into Instructional and Testing types, based on an integrated approach of teaching strategies as suggested by Conley (2014). Steps of the research procedure of this study are shown in figure 2 below.

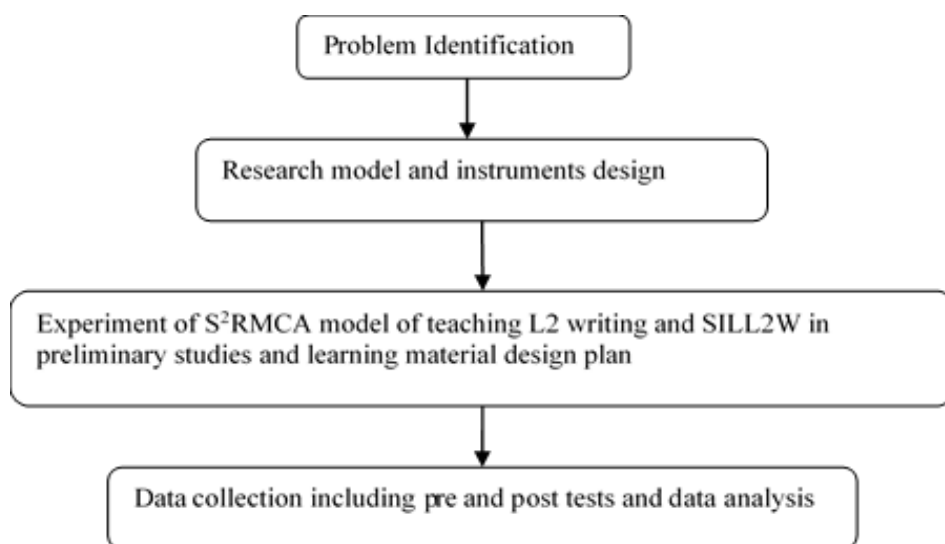


Figure 2 Steps of research procedure

Figure 3 displays the weekly teaching plans for all three groups of participants along with the data collection plan and procedure.

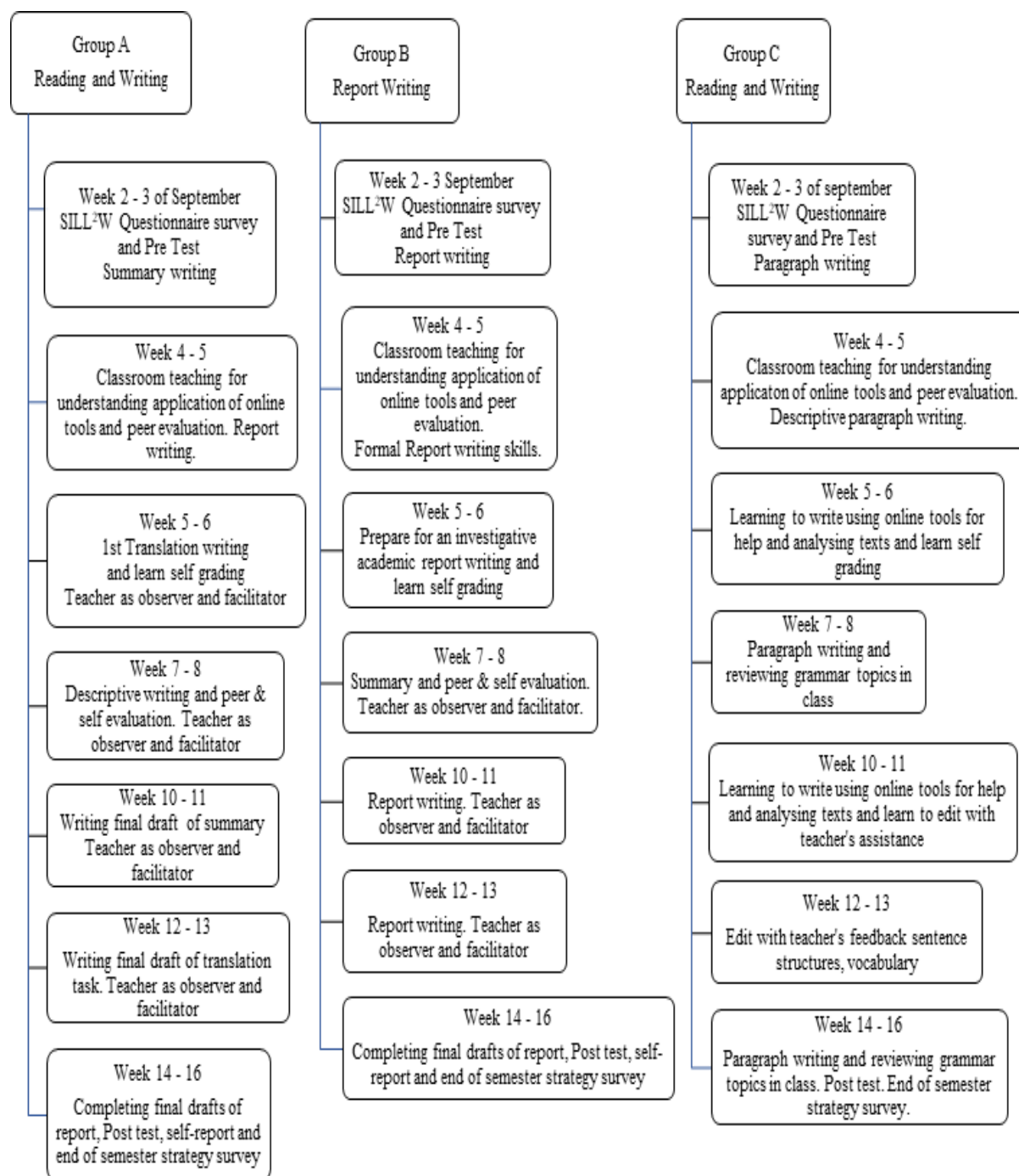
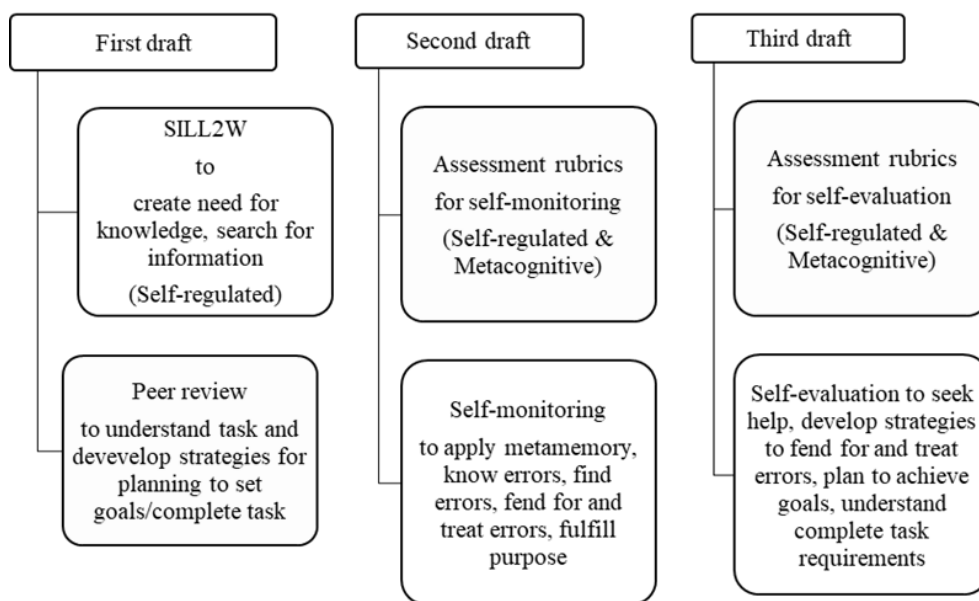


Figure 3 Procedure of data collection

The purposes of data collection has been to gather information about the impact of instructionally induced cognitive involvement load on the learners and to find out the results of using self-regulated and metacognitive learning strategies for improving L2 writing. For qualitative data collection, this study has used self-reporting, a semi-structured questionnaire for interview and observation. For quantitative data collection, this study has used a

survey questionnaire, pre-post test scores, and scores of writing performances obtained through online tools. Pre and Post Tests scores were used to evaluate the learners' performances in five learning areas of L2 writing skills. In addition to the pre and post tests, learners' performances were assessed to compare the outcomes in the quality of writings. Table 2 below displays a sample task-cycle developed for the purpose of this study.

Table 2 Sample of task-cycle

Data analyses and Findings

The first step of data analyses was testing the reliability and validity of the instructional instrument SILL2W to establish the practical effectiveness and usefulness of the S²RMCA model. The purpose of developing the SILL2W was to induce cognitive involvement load on L2 learners to take responsibility of their own learning for improving L2 writing skills. To measure the sampling reliability and data suitability of SILL2W, this study has conducted multiple tests for each group of learners and for each type of learning strategies separately. SILL2W construct has 40 learning strategies categorised under the following four areas.

- Motivation,
- Self-correction,
- Self-regulation, and
- Metacognitive.

Results of Cronbach's Alpha measure for internal consistency and reliability statistics of the SILL2W are shown in table 3 and table 4 below. Table 3 shows the results for the self-regulation strategies and table 4 shows the results for the metacognitive strategies. The reliability coefficient for Group A is [0.633] for self-regulation items [1, 3, 4] and for items [5, 6, 7], the reliability coefficient is [0.606] which are relatively lower than [.70]. The findings of the Cronbach's Alpha for self-regulation strategy use of Group B students show that for items [4, 5,

6], the reliability coefficient is [0.863] which is higher than [.70] indicating that the items [4, 5, 6] have relatively high internal consistency and are "acceptable". For items [1, 3, 7], the reliability coefficient is [0.702] which is higher than [.70] and therefore "acceptable" for Group B. The findings of the Cronbach's Alpha measure for the self-regulation strategy use of Group C students show that for items [1, 2, 7] the reliability coefficient is [0.789] which is again higher than [.70] indicating that the items [1, 2, 7] have relatively high internal consistency and are "acceptable". For items [4, 5, 6], the Cronbach's Alpha finding shows the reliability coefficient as [0.700] which is statistically "acceptable" for Group C. This discussion does not include the motivation and self-correction strategies because the study focuses on the self-regulation and metacognitive learning strategy development. It is noteworthy that SILL2W is domain and context specific because its variables include common errors of Thai L2 learners in English writing.

Table 3 Cronbach's Alpha measure of internal consistency and reliability statistics for the self-regulation strategies of SILL2W

Group A	Cronbach's Alpha
Self-regulation_1,3,4	0.633

Self-regulation _5,6,7	0.606
Group B	Cronbach's Alpha
Self-regulation _4,5,6	0.863
Self-regulation _1,3,7	0.702
Group C	Cronbach's Alpha
Self-regulation _1,2,7	0.789
Self-regulation _4,5,6	0.700

Table 4 displays the findings of the Cronbach's Alpha measure of internal consistency and reliability statistics of the metacognitive strategies of SILL2W for all three groups of participants.

Table 4 Cronbach's Alpha measure of internal consistency and reliability statistics for the metacognitive statistics of SILL2W

For Group A, B & C	Cronbach's Alpha
Metacognitive_2,5,6,9,10,13	0.929
Metacognitive_3,4,8,15,17	0.883
Metacognitive_11,14,16	0.756

For metacognitive items [2, 5, 6, 9, 10, 13] the reliability coefficient is [0.929], for items [3, 4, 8, 15, 17] the reliability coefficient is [0.883] and for the items [11, 14, 16] the reliability coefficient is

[0.756] indicating that metacognitive items [2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17] are statistically significant and acceptable. It can be interpreted that the SILL2W has been tested as a statistically reliable and valid instrument for investigating application of self-regulated and metacognitive learning strategies for L2 writing.

The following section discusses the data analyses of the test scores. The set of L2 writing assessment rubrics developed for this study has been specifically designed to assess the common errors of Thai L2 learners in English writing. It includes 33 issues of linguistic features related to five learning goals. One of the common errors in Thai L2 learner's writing is 'incomplete sentences' due to inappropriate or missing punctuation. Thai is a punctuation less language. Due to L1 influence, Thai L2 learners tend to skip or forget punctuating which results in producing syntactically and semantically incomplete sentences. Another common error is using capital letters, which is very often seen missing in Thai L2 learners' writings. Based on the researcher's observations, it can be interpreted that learners have started using punctuation and capital letters more correctly in the edited drafts. It has been observed that as a result of self-monitoring and self-evaluation, the sentence lengths of the edited drafts had lower mean ranks compared to the unedited drafts. A Wilcoxon Signed-Rank non-parametric statistical test was run to assess the pre and post test scores to see whether the group's population mean ranks differed through a paired difference test. Table 5 below shows the Negative and Positive ranks assigned to pre and post test scores of the groups. Results in table 5 show significant differences in pre and post test scores of Group A and B whereas, Group C's Pre and Post test scores show no significant differences in mean and sum of ranks.

Table 5 Negative and positive ranks of pre and post test scores of Groups A, B and C

Pre and post tests Mean Ranks of A, B, and C	N	Mean Rank	Sum of Ranks
Group_A_Post – Group_A_Pre			
Negative Ranks	1 ^a	2.00	2.00
Positive Ranks	12 ^b	7.42	89.00
Ties	0 ^c		
Total	13		
Group_B_Post – Group_B_Pre			
Negative Ranks	0 ^d	0.00	0.00
Positive Ranks	6 ^e	3.50	21.00

	Ties	1 ^f		
	Total	7		
Group_C_Post – Group_C_Pre	Negative Ranks	3 ^g	2.67	8.00
	Positive Ranks	3 ^h	4.33	13.00
	Ties	0 ⁱ		
	Total	6		

Table 6 below shows the results of the Wilcoxon Signed-Rank test based on negative ranks. The results for Group A and B are in two-sided p-values. Group A's p-value is [p=0.002] and Group B's p-value is [p=0.028]. Whereas for Group C, it is [p=0.600]. This gives a convincing evidence that the groups using self-regulated and metacognitive

learning strategies achieved better scores in the tests. Students' performance scores of the pre and post tests obtained through grading with the assessment rubrics were significantly different for Group A and B. Whereas, group C did not show any significant difference between the pre-post test scores.

Table 6 Wilcoxon Signed-Rank test statistic based on negative ranks of Groups A, B and C

Test Statistics

	Group_A_Post – Group_A_Pre	Group_B_Post – Group_B_Pre	Group_C_Post – Group_C_Pre
Z	- 3.050b	- 2.201b	-.524b
Asymp. Sig. (2-tailed)	- 0.002	- 0.028	- 0.600

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Following section discusses the participants' self-reports on self-monitoring and self-evaluation. Self-evaluation and self-monitoring rubrics of this study have been designed to make the learners self-question to understand the task requirements and the common errors. While reviewing texts of peers and self, students have been engaged in identifying and finding ways to do the corrections due to the instructional demands. The SILL2W and the L2 writing assessment rubrics have been used to execute self-regulated learning management for concentration, time management, seeking information, organising ideas, developing

syntactically and semantically accurate texts, monitoring and evaluating the common errors, editing, and understanding the tasks to complete successfully. The self-reporting checklist has been designed to elicit students' opinions and experiences of self-regulated learning. Table 7 shows the results of Chi-Square statistical difference in strategy use based on the data of self-reports. A Chi-Square with low value means high correlation between two sets of data. The self-report results of Mann-Whitney U test in table 7 show the mean ranks of strategy use by the students of three groups in the beginning of the semester.

Table 7 Chi-Square statistic of strategy use by Group A, B, and C in the beginning of the semester

Beginning of semester results		Values				
Strategies	Learners	N	Mean Rank	Chi-Square	df	Sig.
Motivation	Group A	13	13.69	8.720	2	0.013
	Group B	7	25.71			
	Group C	12	14.17			
Self-correction	Group A	13	16.58	7.120	2	0.028
	Group B	7	23.93			
	Group C	12	12.08			
Self-regulation	Group A	13	15.81	2.890	2	0.236
	Group B	7	21.64			
	Group C	12	14.25			
Metacognitive strategies	Group A	13	15.69	2.284	2	0.319
	Group B	7	21.14			
	Group C	12	14.67			

The Chi-Square statistic results display significantly different use of motivation and self-correction strategies whereas no significantly different use of Metacognitive and Self-regulation strategies in the beginning of the semester. In table 8, self-reports show only Group A's mean ranks of cognitive load at the beginning of the semester as [7.00] and at the end of the semester as [20.00]. The self-reporting ranks in table 8 indicate Group A students' experience of having cognitive involvement load [0.000], use of learning strategies

related to motivation [0.001], self-regulation [0.005], metacognitive strategies [0.000] including use of technology [0.027] and doing self-correction [0.343]. Among the factors, according to students' self-report, the highly significant ones are cognitive load, motivation strategies, self-regulated and metacognitive strategies. Students reported significant differences in using technology as well except doing self-correction. Most of the self-reports mentioned not knowing how to correct the mistakes.

Table 8 Results of the Mann-Whitney U test comparing the strategy use of Group A

Strategies	Duration	Students number	Mean Rank Of Strategy	Sum of Ranks	Mann-Whitney U	Sig.
Cog Load	End	13	14.23	185.00	0.000	0.000
	Beginning	13	7.00	91.00		
	End	13	20.00	260.00		
Motivation	Beginning	13	17.73	230.50	29.500	0.001
	End	13	9.27	120.50		
	Beginning	13	17.35	225.50		

Self-regulation	End	13	9.65	125.50		
Technology	Beginning	13	16.85	219.00	41.000	0.020
	End	13	10.15	132.00		
Metacognitive	Beginning	13	18.58	241.50	18.500	0.000
	End	13	8.42	109.50		
	Beginning	13	16.62	216.00	44.000	0.027
	End	13	10.38	135.00		
Self-correction	Beginning	13	14.77	192.00	68.000	0.343
	End	13	12.23	159.00		

Figure 4 displays Group A's self-report on cognitive load experience. 38.5% students rated their experience at 4 out of [1 to 6]. 23.1% commented optionally [more than 6 or 6+] that they

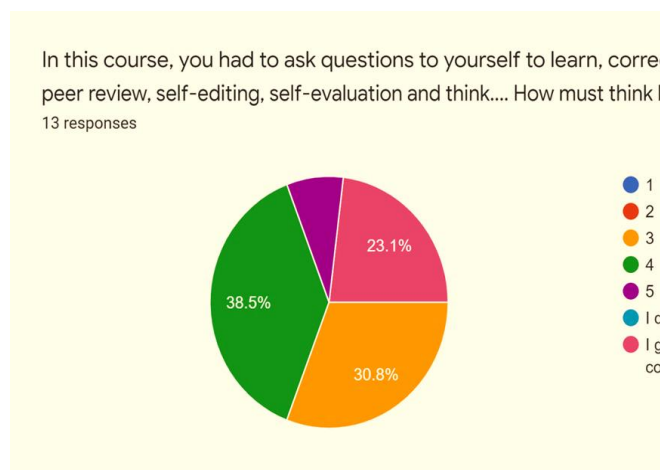


Figure 4 Group A's self-report on cognitive involvement load

Figure 5 displays self-report of Group A's using metacognitive strategies at the end of the semester. The question was whether they learned about planning, organising, monitoring, and evaluating own writing to improve. 84.6% students reported as "YES", and 15.4% students reported as "LEARNED SOME" of the metacognitive strategies.

were exhausted because of cognitive involvement load, but they could learn. 30.8% students rated their experience at 3 and rest of the students rated their cognitive involvement load at 5.

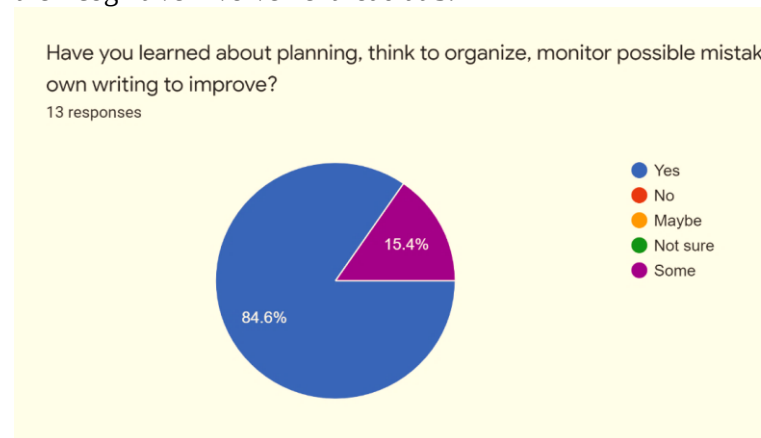


Figure 5 Group A's self-report on metacognitive strategy use

Figure 6 demonstrates Group B student's self-report on using metacognitive strategies. 42.9% students confirmed trying to understand the task requirements before writing the draft 1, 14.3% students chose "STRONGLY YES", and 14.3% students chose "SOMEWHAT NOT". 18.6% students were neutral about using the metacognitive strategies before starting a writing task.

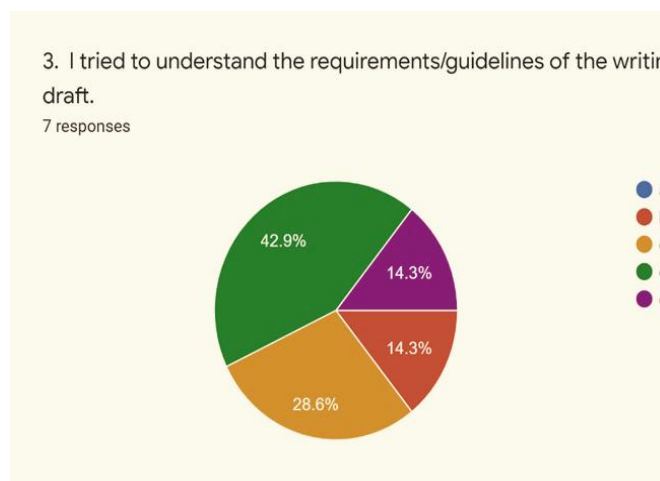


Figure 6 Group B's self-report on application of a metacognitive strategy after pre test

Figure 7 shows Group B's self-report on application of the metacognitive strategies during the midsemester week. 57.1% students confirmed "SOMEWHAT YES" about trying to understand the task requirements before starting a task and 42% students confirmed being "Neutral". But no student chose "NOT" for using strategies, which confirms students' being aware of using metacognitive strategies after receiving cognitive involvement load.

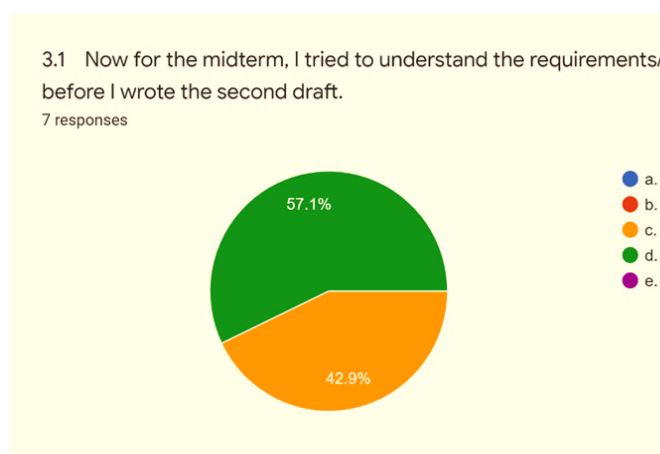


Figure 7 Group B's self-report on application of a metacognitive strategy after midterm test

The pie charts above provide some evidence of learners developing self-regulated and metacognitive learning strategies for improving L2 writing skills. From the self-reports, as seen in the pie charts, it can be interpreted that the SILL2W could create some awareness and preparedness for self-regulated learning and apply metacognitive

learning strategies. Self-reports have confirmed about learners experiencing cognitive load and using the self-regulated and metacognitive learning strategies for improving L2 writing. Based on the findings, the answers to the research questions are provided below.

To answer the first research question, it can be claimed that the scales used in SILL2W to measure the students' use of learning strategies can be claimed as a valid and reliable way. The comparison of test scores between the beginning and the end of the semester show statistically significant differences in writing skills and use of the learning strategies. Therefore, it can be claimed that the S²RMCA model can be used practically and effectively to teach self-regulated L2 writing in a regular classroom setting.

To answer the second research question, it can be suggested that instructionally induced cognitive involvement load can facilitate use of self-regulated and metacognitive learning strategies for improving L2 writing.

Students of both A and B groups have reported experiencing high cognitive load. The development and improvement in the writing qualities of the learners have confirmed that self-regulated and metacognitive learning strategy training if integrated in pedagogy can facilitate learner's self-regulated learning of L2 writing. Learners of this study have executed their learning management as planned in the S²RMCA model through instructionally demanded and controlled self-regulated metacognitive actions. The SILL2W seemed to be practically effective for creating awareness and preparedness for facilitating self-regulated and metacognitive learning strategies. The instructional model S²RMCA and the instructional instrument SILL2W, both have been useful for teaching and measuring self-regulated and metacognitive learning strategies for improving L2 writing.

Recommendations and Limitations

Based on the findings and experience of this study few suggestions can be offered. For pedagogy, teacher education programmes should provide training on developing teaching approaches for enhancing self-regulation and metacognition. Education should start training for executive management of learner's thinking capacity and process from early stages of learning which is a prerequisite for self-regulated learning at higher level of education. Pedagogical frameworks should be developed for educators and material developers

to enhance self-regulation and metacognition in both formal and informal learning environments. Cognitive aspects of learning should not be excluded by theoretical considerations while developing pedagogical framework and teaching-learning materials for self-regulated learning. Further studies may be conducted for strategic learning of all the skills of language learning. This study would like to recommend that education should provide support and guidelines for using internet-based and skill-based applications for facilitating self-regulated learning at appropriate

learning stage. This study has tried a cluster model of research to fill more than one research gap. Findings of the study have shown implementation of a new and feasible teaching and learning approach by integrating cognitive construct into pedagogy for enhancing learners' self-regulated and metacognitive learning strategies to improve L2 writing. Accuracy in self-reporting and a brief duration to train learners to use learning strategies have been the main limitations of this study. However, inclusion of strategy training in pedagogy can be always valuable for learning.

References

- Abidin, M. J. Z., & Fong, C. L. (2012). The effect of process writing practice on the writing quality of form one students: A case study. *Asian Social Science*, 8(3), 88.
- Arndt, V. (1987). Six writers in search of texts: A protocol-based study of L1 and L2 writing. *ELT journal*, 41(4), 257-267.
- Boonpattanaporn, P. (2007). A Comparative Study of English Essay Writing Strategies and Difficulties as Perceived by English Major Students: A Case Study of School of Humanities, University of the Thai Chamber of Commerce.
- Chamot, A. U., & Harris, V. (Eds.). (2019). *Learning strategy instruction in the language classroom: Issues and implementation*. Multilingual Matters.
- Chamot, A. U., & Harris, V. (Eds.). (2019). *Learning strategy instruction in the language classroom: Issues and implementation*. Multilingual Matters.
- Chenoweth, N. A., & Hayes, J. R. (2001). Fluency in writing: Generating text in L1 and L2. *Written communication*, 18(1), 80-98.
- Chuenchaichon, Y. (2014). A review of EFL writing research studies in Thailand in the past 10 years. *Journal of Humanities*, 11(1), 13-30.
- Conley, D. T. (2014). Learning Strategies as Metacognitive Factors: A Critical Review. *Educational Policy Improvement Center*.
- Cotterall, S. (2000). Promoting learner autonomy through the curriculum: Principles for designing language courses. *ELT journal*, 54(2), 109-117.
- Cubukcu, F. (2009). Learner autonomy, self-regulation and metacognition. *International Electronic Journal of Elementary Education*, 2(1), 53-64.
- Cumming, A. (1983). "Teachers' Procedures for Responding to the Writing of Students of English as a Second Language". Paper Presented at the 16th Annual Canadian Council of Teachers of English Convention, Montreal, May 1983.
- De Larios, J. R., Murphy, L., & Manchon, R. (1999). The use of restructuring strategies in EFL writing: A study of Spanish learners of English as a foreign language. *Journal of Second Language Writing*, 8(1), 13-44.
- Deveney, B. (2005). An investigation into aspects of Thai culture and its impact on Thai students in an international school in Thailand. *Journal of research in international education*, 4(2), 153-171.
- Dhanarattigannon, J. (2008). Thai college students' response to non-traditional writing instruction in a Thai university. PhD dissertation, University of Florida.
- Dörnyei, Z. (2009). The L2 Motivational Self-system. *Motivation, language identity and the L2 self*, 36(3), 9-11.
- Dörnyei, Z., & Ryan, S. (2015). *The psychology of the language learner revisited*. Routledge.
- Dutta, M. G., & Danvivath, U., (2015). L2 Writing Practice in Thai Public High Schools: A case Study of Khon Kaen Province. Retrieved on December 29, 2018, from https://drive.google.com/file/d/0B3VT1cVu7rRb251c3ViVDVWNkk/view?usp=drive_web
- Ericsson, K. A., & Simon, H. A. (1980). Verbal reports as data. *Psychological review*, 87(3), 215.
- Ertmer, P. A., & Newby, T. J. (1996). The expert learner: Strategic, self-regulated, and reflective. *Instructional science*, 24(1), 1-24.

- Evans, C. J., Kirby, J. R., & Fabrigar, L. R. (2003). Approaches to learning, need for cognition, and strategic flexibility among university students. *British Journal of Educational Psychology*, 73(4), 507-528.
- Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Shaping School Performance--A Critical Literature Review*. Consortium on Chicago School Research. 1313 East 60th Street, Chicago, IL 60637.
- Gkonou, C., Tatzl, D., & Mercer, S. (Eds.). (2016). *New directions in language learning psychology*. Springer International Publishing.
- Gkonou, C., Tatzl, D., & Mercer, S. (Eds.). (2016). *New directions in language learning psychology*. Springer International Publishing.
- Griffiths, C. (2013). *The strategy factor in successful language learning* (Vol. 67). Multilingual Matters.
- Gunning, P. (2011). *ESL strategy use and instruction at the elementary school level: A mixed methods investigation* (Doctoral dissertation, McGill University Library).
- Hall, C. (1990). Managing the complexity of revising across languages. *Tesol Quarterly*, 24(1), 43-60.
- Hayes, J. R., & Flower, L. S. 1980. "Identifying the organization of writing processes." *Cognitive processes in writing*, 31-50.
- Hayes, J. R. (2012). Modeling and remodeling writing. *Written communication*, 29(3), 369-388.
- Hulstijn, J. H., & Laufer, B. (2001). Some empirical evidence for the involvement load hypothesis in vocabulary acquisition. *Language learning*, 51(3), 539-558.
- Macaro, E. (2006). Strategies for language learning and for language use: Revising the theoretical framework. *The modern language journal*, 90(3), 320-337.
- Nopmanotham, N. (2016). *A Study of Writing Strategies Used by Thai EFL High School Students*. Thammasat University.
- O'malley, J. M., O'Malley, M. J., Chamot, A. U., & O'Malley, J. M. (1990). *Learning strategies in second language acquisition*. Cambridge university press.
- Oxford, R. L. (2017). 'The craft so long to lerne': aspects of time in language learning. *Innovation in Language Learning and Teaching*, 11(3), 282-297.
- Oxford, R. (2018). Language learning strategies. *The Cambridge Guide to Learning English as a Second Language*, 81-90.
- Oxford, R. L., Rubin, J., Chamot, A. U., Schramm, K., Lavine, R., Gunning, P., & Nel, C. (2014). The learning strategy prism: Perspectives of learning strategy experts. *System*, 43, 30-49.
- Oxford, R. L., & Amerstorfer, C. M. (Eds.). (2018). *Language learning strategies and individual learner characteristics: Situating strategy use in diverse contexts*. Bloomsbury Publishing.
- Phoocharoensil, S., Moore, B., Gampper, C., Geerson, E. B., Chaturongakul, P., Sutharoj, S., & Carlon, W. T. (2016). Grammatical and Lexical Errors in Low-Proficiency Thai Graduate Students' Writing. *LEARN Journal: Language Education and Acquisition Research Network*, 9(1), 11-24.
- Pressley, M., Mohan, L., Fingeret, L., Reffitt, K., & Raphael-Bogaert, L. (2007). *Writing instruction in engaging and effective elementary settings*.
- Puengpipattrakul, W. (2013). Assessment of Thai Efl Undergraduates' Writing Competence Through Integrated Feedback. *Journal of Institutional Research South East Asia*, 11(1).
- Raya, M. J. (2011). Enhancing pedagogy for autonomy: the potential of a case-based approach in promoting reflection and action. *Innovation in Language Learning and Teaching*, 5(2), 151-163. Retrieved 7 7, 2020, from <https://tandfonline.com/doi/full/10.1080/17501229.2011.577531>
- Rose, H. L. (2012). Language learning strategy research: Where do we go from here? *In Studies in Self-Access Learning Journal*, 3(2).
- Sasaki, M. (2000). Toward an empirical model of EFL writing processes: An exploratory study. *Journal of second language writing*, 9(3), 259-291.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, 12(2), 257-285.

Tseng, W. T., Dörnyei, Z., & Schmitt, N. (2006). A new approach to assessing strategic learning: The case of self-regulation in vocabulary acquisition. *Applied linguistics*, 27(1), 78-102.

Whalen, K., & Menard, N. (1995). L1 and L2 writers' strategic and linguistic knowledge: A model of multiple-level discourse processing. *Language learning*, 45(3), 381-418.

Zimmerman, B. J., & Schunk, D. H. (2008). An essential dimension of self-regulated learning. *Motivation and self-regulated learning: Theory, research, and applications*, 1.

Appendix A

Strategy Inventories for Self-regulation in L2 Writing

Background information

1. What was your GPA in English while completing high school (M-6)?
2. Have you ever been to any native English-speaking country to learn English?
3. Where did you go and for how long?
4. Are you having any regular contact with any English-speaking person? How often do you talk?
5. How often do you learn?

Motivation, goal setting

1. I want to improve my English writing skills.
2. I have positive thinking about English language learning.
3. I like to learn writing in English.
4. I am committed to myself to learn writing in English.
5. When I write in English, I try my best to write well.
6. When I do not feel like writing in English, I force myself to write.
7. I always want good grades.
8. I try to overcome difficulties in English writing.
9. Doing a good job is important to me.
10. I guide and help me to learn and improve my English writing skills.
11. I work hard to improve my English writing.

Self-regulatory

1. I try to understand the task of writing.
2. I guide and help me to understand the task.

3. I plan how to do the task. I plan how to begin, explain and conclude.
4. I set my goals for the number of words, length of paragraph or paragraphs, content, level of the writing task before I try to answer.
5. If I do not know then I prepare me to learn a new skill.
6. I know that I need to plan my action to write.
7. I confirm that my writing has fulfilled all the set goals for a task.
8. Have you ever corrected any of your mistakes by yourself without your teacher's help?

Metacognitive

1. I know about my own thinking/knowledge about English writing.
2. I knew how much to write to complete.
3. I try to understand the requirements/guidelines of the writing task before I try to answer.
4. I use my own knowledge of writing in English that I have learned before.
5. I know about the technique or strategy in English writing.
6. I keep track of my progress and, if necessary, I change my techniques or strategies in writing English.
7. I make sure that I understand everything to write and how to write it.
8. I check and compare my own writing to evaluate.
9. I organize in mind what and how to write.
10. I always check the accuracy of my writing.
11. While writing in English, I follow the grammatical rules of English grammar.
12. I just translate word to word from Thai to answer questions in English.
13. I select and organise relevant information to answer questions.
14. While writing, I take care of my writing style (CONTENT/ORGANIZATION/APA/MLA) of writing
15. After writing a sentence or a paragraph, I always check or read to confirm that my writing is clearly understood by my readers.
16. While writing, you take care of my MECHANICS (spelling, punctuation, space after full stops, capital letters) of my writing.
17. While writing, I try to confirm that my sentences are grammatically correct.

Self-correction

1. I always want to correct my own mistakes.
2. I always take strong action to correct my own mistakes.

3. I always use online resources to write, edit and check grammar.
4. I can always notice my mistakes.
5. I read my own writing again and again and I change my techniques or strategies to improve.

Responses Received in a. Strongly NOT b. Somewhat NOT c. Neutral d. Somewhat YES e. Strongly YES f. Other.

Appendix B

Assessment grid

Learning goals	Self-evaluation / Assessment grids	1	1.5	2	2.5	3
Grammar & Vocabulary	Use of tenses					
	Use of persons					
	Subject Verb agreement					
	Correct word order					
	Range of vocabulary (variety and sophistication)					
	Use of vocabulary is consistently correct and appropriate					
	Use of prepositions and conjunctions					
	Parallel structure and incomplete sentences					
Content	Task achievement					
	Audience is addressed					
	Subject matter is dealt					
	Title is appropriate					
	Topic development					
	Work completed					
Organization (The way a piece of writing is put together)	Introduction with orientation who/when/where					
	Identify the main idea that pervades the composition.					
	Does everything in the composition contribute to the main idea?					
	Paragraphing					
	Ending is suitable					
	Overall progression of ideas and writing					
Mechanics	Cohesion (appropriate use of cohesive devices)					
	Clear conceptual and referential relationships between and within sentences					
	Use of punctuation					
	Use of capital letter (including Title)					
	Space between word and sentences					
	Sentence formation (Ease and communication)					
Fluency (Style and ease of communication)	Consistent grammatical control of complex language					
	Syntactically fluent and appropriate for the genre					
	Easy to read expressively					
	Variety in length of sentences with accuracy					
	Edit for conciseness, run on sentences, and fragments					
	Correct adverbial expressions					
	Show how no two sentences start alike					

Corresponding author:

Manashi G. Dutta (manashi.du@kmitl.ac.th).

Dr. Uthaivan Danvivath (uthaivand@gmail.com)