Learning Self-regulated L2 Writing Under a Cognitive Model

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Abstract

This research study has been conducted to experiment an innovative teaching approach believing that when less use of self-regulated learning strategy leads to lower metacognitive learning attitude which results in low proficiency. This study has investigated the consequences of instructionally aroused cognitive involvement load for self-monitoring and self-assessment through facilitation of metacognitive learning strategy use for improving L2 writing skills of Thai undergraduate students. This innovative instructional model for teaching self-regulated L2 writing has been named as Strategic Self-Regulated Metacognitive Activities or S²RMCA. The approach of this model has been developed to promote self-regulated learning management. For stimulating the use of learning strategies, a set of self-monitoring and self-evaluating assessment rubric named Strategy Inventories for Learning L2 Writing (SILL2W) has also been devised. A set of questionnaire, pre-post-tests, checklist, and interviews were employed for collecting and analyzing the data. Results of data analyses have shown effectiveness and feasibility of the S²RMCA model for teaching self-regulated L2 writing. Satisfactory results have also been shown by participants in their L2 writing skills. So far, research studies conducted on cognitive involvement load, a continuing challenge has always been there regarding the accurate measurement of load via self-reporting and this study has also faced that challenge.

1. Introduction

Several research studies have shown solid correlation among self-regulation, language learning strategies, metacognition and cognitive involvement load from different angles and viewpoints. Cubukcu (2009) has portrayed the relationship between self-regulation, metacognition, and autonomy and demonstrated that low autonomy is closely related to low self-regulated behaviors in learning. Chamot and Harris (2019) have asserted that promising evidence is still anticipated relating to how to design and implement the language learning strategy mediations. Evans, Kirby, and Fabrigar (2003) have claimed that there is synchronous interplay among the processes of writing, learning approaches and self-regulation. Farrington and colleagues (2012) have directed at researcher specified learning strategies as the limitations of existing studies that are not essentially selected by teachers or learners. Raya (2011) has discussed about the important role played by teachers in creating learning opportunities that can support self-regulation and reflectivity of learners. In the domain of language learning strategies and self-regulated learning, research has rarely been meant to have an influence on classroom practices (Conley, 2014). As asserted by Conley, it is even hard to design such research. There are not enough models to train teachers on instructional models that can foster self-regulated learning of L2 writing. This study has come forward with an innovative model of teaching and learning L2 writing — Strategic Self-Regulated Metacognitive Activities (S²RMCA) for fostering self-regulated and metacognitive learning strategies through instructionally stimulated cognitive involvement load on learning processes. S²RMCA is designed to engage learners in self-controlling their participation in planning, self-monitoring, and self-evaluation.

2. Literature Review And Conceptual Framework
Literature engaging learners to achieve their goals through self-regulated learning, explaining, modelling, and scaffolding of the learning strategies to students in regular classrooms are needed (Pressley, Lindsay, Fingeret, Reffitt, & Raphael-Bogaert 2007). Issues like relationship of theoretical underpinnings with strategy training and successful learning need attention (Gkonou & Inceçay, 2016). Focus of some recent studies have been the relationships among the language learning strategies and self-regulation (Rose, 2012; Chamot, 2018; Griffiths, 2013; Oxford, 2018). Requirements of active engagement and involvement of the learners in the process of learning were discussed (Cotterall, 2000; Zimmerman & Schunk, 2008). Very little is explored about associating learners’ thinking with the production in texts. Sub processes included in the Hayes and Flower’s (1980) model were translating thoughts into texts and examining in relation to a learner’s long-term memory and a task environment. Hayes (2012) has restructured his previous model and formed 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). Some 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 looked at self-regulated learning as learners having control over their own thinking, using metamemory, choosing learning strategies and learning behavior to solve problems in developing L2 writing. Pour-Mohammadi, Zainol and Cheong Lai, (2012) have claimed that useful and strategic mediations of language learning strategies can support to improve L2 writing. In the S2RMCA model, concentrating, processing information, extracting meaning, organizing ideas, composing texts, or developing sentences and paragraphs, monitoring own compositions, engaging with study aids, and understanding the tasks are listed as metacognitive strategies. Tseng, Dörnyei, and Schmitt (2006) have not included the learning strategies in their effort to evaluate “strategic-learning”. R. Oxford and Amerstorfer (2018) have claimed that there has been still a void particularly in the instructional modelling of teaching self-regulated L2 writing. Lack of resources as well as guidance for quantifying use of learning strategies by learners in classroom environments is a significant challenge at present (Gunning, 2011). For facilitating self-regulated and metacognitive learning strategy use, this study has developed a self-questioning checklist – Strategy Inventories for Learning L2 Writing (SILL2W) with 40 inventory items. SILL2W has been designed especially in self-questioning form to help facilitate self-monitoring and self-evaluation of L2 writing. Oxford (2017) has claimed that there are less information sources of cultivating self-regulated and metacognitive learning strategies for L2 writing skills. The S2RMCA model is inspired by S-W-SR (Weinstein and Palmer, 2002) and ER-GO-CA (Olejnik and Nist, 1992). The study of Phoocharoensil, S., Moore, B., Gampper, C., Geerson, E., Chaturongakul, P., Sutharoj, S., and Carlon, W. (2016) has revealed some problems that Thai EFL undergraduate students often encounter in L2 writing are due to not only L1 influence, but also due to confusion over the target language and its complex grammatical system. As cited in Nopmanotham (2016, p. 37), the study conducted by Pimsan (2003) has revealed that mainly metacognitive, cognitive, social, and affective strategies in L2 writing have been the lower strategies used by Thai graduate students. Table 1 below shows the components and the self-regulated and metacognitive learning strategies of the S2RMCA model.
| 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    |
| S²RMCA (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.        |
|                          |                                   | Study aids                |

Dörnyei and Ryan (2015) have argued that research have not achieved any answer to the primary concerns about what splits strategic learning activities from regular learning activities. Macaro (2006) has stated that learning strategies are located in the working memory and Oxford (2017) has argued that application of learning strategies requires working memory. On the other hand, Sweller (1988) has hinted that working memory has limited ability to keep information. Recommendations of Cognitive Load Theory have been beneficial for designing teaching and learning materials to handle learners’ working
memory for successful learning. Involvement Load Hypothesis (ILH) of Laufer and Hulstijn (2001) has stated that when there is higher involvement load on the learning processes, there is more effective learning. This study has developed instructional materials to stimulate cognitive involvement load on learners to manage self-regulated learning of L2 writing. Conley (2014) has advised that students should be trained to monitor the use of learning 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 up the requirements of learners with distinct proficiencies. Studies have tried to meet individual learners’ goals and characteristics (Oxford, 2018; Chamot & Harris, 2019). Cao, Y. (2012) has reported that training of metacognitive strategy could show positive results in web-based English learning. Grounded on the thoughts as described above, this study has made an effort to response to the following research questions.

1. Can the S²RMCA model help L2 writing learners to be self-regulated in a regular classroom environment and improve L2 writing skills?

2. Whether instructionally induced cognitive involvement load can promote learners’ self-regulated and metacognitive learning strategies?

3. Method

This study was carried out as an experiment to promote use of self-regulated and metacognitive learning strategies by 26 Thai undergraduate engineering students divided into three groups. Duration of the research was an academic semester of 17 weeks. Groups A and B were taught under the instructional model of this study. Group C students did not receive the treatment of task demands for stimulating cognitive involvement load. Because of the nature of participation, Group C can be marked as the control group. In the starting of the semester, students were informed about self-regulated learning approach and use of self-regulated and metacognitive language learning strategies. A survey was conducted to assess the self-regulated and metacognitive learning strategy use by the students. Research tools of this study were of two types – Instructional and Testing. Data analyses were done to gather information regarding the influence of instructionally induced cognitive load on the learners thinking processes and to notice the impacts of using self-regulated and metacognitive learning strategies in L2 writing. Tools of data collection were self-reports, a semi-structured questionnaire, observation, a survey questionnaire, pre-post test scores, and two online tools.

4. Data Analyses And Findings

The analyses started with examining the reliability and validity of the instructional instrument SILL2W through multiple statistical tests for each group of participants and for each category of learning strategies independently. Total 40 learning strategies have been included in the SILL2W construct covering the areas of motivation, self-correction, self-regulation, and metacognition. Table 2 below 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 results of the Cronbach’s Alpha for self-regulation strategy use of Group B students demonstrate 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 therefore “acceptable”. For items \([1, 3, 7]\), the reliability coefficient is \([0.702]\) which is higher than \([.70]\) and therefore “acceptable” for Group B. The results 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 higher than \([.70]\) indicates that the items \([1, 2, 7]\) have relatively high internal consistency and are therefore “acceptable”. The Cronbach’s Alpha finding for items \([4, 5, 6]\), shows the reliability coefficient as \([0.700]\) which is statistically “acceptable” for Group C. It is noteworthy that SILL2W is domain and context specific because its variables include common errors of Thai L2 learners in English writing.

Table 2 Cronbach’s Alpha measure of internal consistency and reliability statistics for the self-regulation strategies of SILL2W

| Group   | Cronbach’s Alpha |
|---------|------------------|
| A       |                  |
| Self-regulation _1,3,4 | 0.633 |
| Self-regulation _5,6,7 | 0.606 |
| B       |                  |
| Self-regulation _4,5,6 | 0.863 |
| Self-regulation _1,3,7 | 0.702 |
| C       |                  |
| Self-regulation _1,2,7 | 0.789 |
| Self-regulation _4,5,6 | 0.700 |

Table 3 below exhibits the outcomes of the Cronbach's Alpha measure of internal consistency and reliability statistics of the metacognitive strategies of SILL2W.

Table 3 Cronbach’s Alpha measure of internal consistency and reliability statistics for the metacognitive statistics of SILL2W
The reliability coefficient for the metacognitive items \([2, 5, 6, 9, 10, 13]\) 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 \(0.756\) which indicates that the metacognitive items \([2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 17]\) are statistically significant and acceptable. The online assessment tools assessed writing performances in terms of CEFR level, IELTS level, number of words, average sentence length, average word length, word complexity, and the Flesch-Kincaid Grade Level. The mean ranks of CEFR and IELTS levels went up from \([11.38]\) of pre test to \([20.083]\) and \([15.333]\) in post test. As seen in table 4, the mean ranks for all the areas of online assessments for Group A have shown improvements. For Flesch-Kincaid Grade levels, the mean ranks went up from \([10.88]\) to \([18.000]\) in week 16. For number of words, the mean rank \([13.69]\) of the first task in week 2 went up to \([17.208]\) in the final drafts and to \([26.333]\) in the post test scores. For average sentence lengths, mean rank scores went from \([10.81]\) of pre test to \([19.250]\) for drafts 3 and \([18.417]\) in post test. Mean rank for average word length was \([10.85]\) in week 2. Whereas the mean rank for the final drafts was \([20.333]\) and the mean rank for the report writing task's average word length was \([18.833]\). The mean rank for ‘word complexity’ scores was \([12.38]\) in week 2 which went up to \([19.333]\) and \([16.042]\) in week 16. Participants were not provided with any readily available or any explicit instructions on the writing tasks. Learning was happening through self-monitoring and self-evaluation. Therefore, it can be interpreted that the improvements in writing show the effect of self-monitoring and self-evaluation. From week 2/3 till week 16, the mean ranks of Group A students’ performances in three different L2 writing drafts have shown mostly upward or improving direction as seen in table 4.

**Table 4** Online test scores comparison with performance indicator arrows for Group A

| 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 |
In table 5 below, the Kruskal-Wallis test mean ranks for three writing tasks of Group B students (pre, mid, and post) are presented. The scores in the Mean Rank column can be used to compare the differences in writing performances of week 2 and week 17. Students were involved in self-monitoring and self-evaluation to fend for and treat errors by using the SILL2W and the writing assessment rubrics. The differences in the mean scores can be interpreted as showing better performances because of increasing scores. The results of Group B show statistically significant differences in scores of pre, mid, and post tests and number of words. However, Group B had 7 students and the sample size was relatively small for statistical analysis. Therefore, the scores of mean ranks (with arrow markers) can be considered for interpretation.

### Table 5: Kruskal-Wallis Test Mean Ranks for Group B Students (pre, mid, and post)

|                          | Number of student | Mean Ranks | Mean Ranks of Sill2W | Mean Ranks of Sophia |
|--------------------------|-------------------|------------|----------------------|----------------------|
| Group A SANTORINI        |                   |            |                      |                      |
| compared with Sophia     |                   |            |                      |                      |
| drafts and Post test     |                   |            |                      |                      |
|                          | Draft 2           | 12         | 20.083               | 11.38                |
|                          | Draft 3           | 12         | 20.083               | 15.62                |
|                          | Week 16 - POST    | 12         | 15.333               |                      |
| IELTS level              |                   |            |                      |                      |
|                          | Draft 2           | 12         | 20.083               | 11.38                |
|                          | Draft 3           | 12         | 20.083               | 15.62                |
|                          | Week 16 - POST    | 12         | 15.333               |                      |
| Flesch-Kincaid Grade     |                   |            |                      |                      |
| level                    | Draft 2           | 12         | 19.042               | 10.88                |
|                          | Draft 3           | 12         | 18.458               | 16.12                |
|                          | Week 16 - POST    | 12         | 18.000               |                      |
| Number of words          |                   |            |                      |                      |
|                          | Draft 2           | 12         | 11.958               | 13.69                |
|                          | Draft 3           | 12         | 17.208               | 13.31                |
|                          | Week 16 - POST    | 12         | 26.333               |                      |
| Average Sentence length  |                   |            |                      |                      |
|                          | Draft 2           | 12         | 17.833               | 10.81                |
|                          | Draft 3           | 12         | 19.250               | 16.19                |
|                          | Week 16 - POST    | 12         | 18.417               |                      |
| Average Word length      |                   |            |                      |                      |
|                          | Draft 2           | 12         | 15.833               | 10.85                |
|                          | Draft 3           | 12         | 20.833               | 16.15                |
|                          | Week 16 - POST    | 12         | 18.833               |                      |
| Word complexity          |                   |            |                      |                      |
|                          | Draft 2           | 12         | 19.625               | 12.38                |
|                          | Draft 3           | 12         | 19.833               | 14.62                |
|                          | Week 16 - POST    | 12         | 16.042               |                      |
A Wilcoxon Signed-Rank non-parametric statistical test was also run to evaluate the pre and post test scores in order to determine whether the group’s population mean ranks varied through a paired difference test. Table 6 below shows the mean rank and sum of rank along with the negative and positive ranks in pre and post test scores of Group A, B and C.

Table 6 Negative and positive ranks of pre and post test scores of Groups A, B and C

|                      | N  | Mean Rank | Chi-Square | df  | Asymp. Sig. |
|----------------------|----|-----------|------------|-----|-------------|
| **Report Writing**   |    |           |            |     |             |
| scores               | Pre_test | 7 | 7.57 | 9.745 | 2.000 | 0.008       |
|                      | Mid test  | 7 | 8.57 |     |      |             |
|                      | Post test | 7 | 16.86|     |      |             |
| **Number of**       |    |           |            |     |             |
| **words**            | Pre_test | 7 | 7.71 | 11.273| 2.000 | 0.004       |
|                      | Mid test  | 7 | 17.43|     |      |             |
|                      | Post test | 7 | 7.86 |     |      |             |
| **Sentence length**  |    |           |            |     |             |
|                      | Pre_test | 7 | 11.93| 1.456 | 2.000 | 0.483       |
|                      | Mid test  | 7 | 8.71 |     |      |             |
|                      | Post test | 7 | 12.36|     |      |             |
| **Word length**      |    |           |            |     |             |
|                      | Pre_test | 7 | 10.29| 2.312 | 2.000 | 0.315       |
|                      | Mid test  | 7 | 13.79|     |      |             |
|                      | Post test | 7 | 8.93 |     |      |             |
| **Word complexity**  |    |           |            |     |             |
|                      | Pre_test | 7 | 12.43| 0.675 | 2.000 | 0.713       |
|                      | Mid test  | 7 | 9.71 |     |      |             |
|                      | Post test | 7 | 10.86|     |      |             |
| **Flesch Kincaid**  |    |           |            |     |             |
|                      | Pre_test | 7 | 11.50| 2.681 | 2.000 | 0.262       |
|                      | Mid test  | 7 | 8.07 |     |      |             |
|                      | Post test | 7 | 13.43|     |      |             |

Table 7 below shows the results of the Wilcoxon Signed-Rank test based on negative ranks. 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 presents a
convincing indication that the participants of the experiment groups have shown improvement in the test scores. Experiment groups’ performance scores attained through grading with the assessment rubrics showed significant differences whereas the control group’s performance did not show any significant difference between pre and post test scores.

**Table 7** 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                   | -3.524b                   |
| Asymp. Sig. (2-tailed) | 0.002                      | 0.028                      | 0.600                      |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The self-reporting checklist has been designed to elicit students’ opinions on experiences of cognitive pressure for self-regulated learning. Table 8 below shows the results of Chi-Square statistical difference in use of learning strategies based on the self-reports. A Chi-Square with low value means high correlation between two sets of data.

**Table 8** 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 for three groups 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 9, 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 9 indicate Group A students’ experience of having cognitive involvement load as [0.000], use of learning strategies related to motivation as [0.001], for self-regulated strategies as [0.005], for metacognitive strategies as [0.000], for use of technology as [0.027] and doing self-correction as [0.343]. Among the factors, according to Group A 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 9: 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               | Beginning| 13              | 14.23                 | 185.00       | 0.000          | 0.000 |
|                        | End      | 13              | 7.00                  | 91.00        | 0.000          | 0.001 |
|                        | End      | 13              | 20.00                 | 260.00       | 0.000          | 0.005 |
| Motivation             | Beginning| 13              | 17.73                 | 230.50       | 29.500         | 0.011 |
|                        | End      | 13              | 9.27                  | 120.50       | 0.000          | 0.020 |
| Self-regulation        | Beginning| 13              | 17.35                 | 225.50       | 34.500         | 0.005 |
|                        | End      | 13              | 9.65                  | 125.50       | 0.000          | 0.020 |
| Technology             | Beginning| 13              | 16.85                 | 219.00       | 41.000         | 0.020 |
|                        | End      | 13              | 10.15                 | 132.00       | 0.000          | 0.020 |
| Metacognitive          | Beginning| 13              | 18.58                 | 241.50       | 18.500         | 0.000 |
|                        | End      | 13              | 8.42                  | 109.50       | 0.000          | 0.027 |
|                        | Beginning| 13              | 16.62                 | 216.00       | 44.000         | 0.027 |
|                        | End      | 13              | 10.38                 | 135.00       | 0.000          | 0.027 |
| Self-correction        | Beginning| 13              | 14.77                 | 192.00       | 68.000         | 0.343 |
|                        | End      | 13              | 12.23                 | 159.00       | 0.000          | 0.343 |

Figure 1 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 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 1 Group A's self-report on cognitive involvement load

Figure 2 displays self-report of Group A's using metacognitive strategies at the end of the semester. The question was whether they learned about planning, organizing, 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.

Figure 2 Group A's self-report on metacognitive strategy use

Figure 3 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 3 Group B’s self-report on application of a metacognitive strategy after pre test

Figure 4 reveals 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 4 Group B’s self-report on application of a metacognitive strategy after midterm test

5. Conclusion

The self-reports in the pie charts above present evidence of the participants developing self-regulated and metacognitive learning strategies. From the self-reports, it can be interpreted that the SILL2W could generate some understanding and willingness among learners for self-regulated learning and employ metacognitive learning strategies. Based on the results, the answer to the first research question would be that the S^2RMCA model can be helpful for L2 writing learners to be self-regulated and improve L2 writing skills. The comparisons of test scores between the beginning and the end of the semester show statistically significant differences in the quality of writing skills and use of the learning strategies. While answering 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 and learning. 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 S^2RMCA model through instructionally demanded and controlled self-regulated metacognitive actions. The instructional model S^2RMCA and the instructional instrument SILL2W have been useful for teaching and learning self-regulated L2 writing in a regular classroom.

6. Recommendations

Based on the results and experience of this study, few suggestions can be offered. Teacher education programs should provide training on developing teaching approaches for enhancing self-regulation and metacognition. Pedagogy should provide guidance for learning management from early stages of learning which is necessary for self-regulated learning at higher level of education. Pedagogical frameworks should be constructed for educators and material developers to enhance self-regulation and metacognition in both formal and informal learning settings. Cognitive aspects of learning should not be
overlooked by theoretical concerns while developing pedagogical frameworks and teaching-learning materials. More studies may be carried out for strategic learning of all the skills of language learning.

**Declarations**

**List of abbreviations defined in the first use in the text.**

1. $S^2$RMCA - Strategic Self-Regulated Metacognitive Activities
2. SILL2W - Strategy Inventories for Learning L2 Writing

**Ethics approval and consent to participate:**

Manuscripts reporting studies involving human participants.

The participants of this study were students, and all the participants were informed, and consents were taken on the strategy survey questionnaire.

**Consent for publication**

Not Applicable.

**Availability of data and materials**

Not applicable. Data is presented in the main paper.

**Competing interests**

“The authors declare that they have no competing interests”.

Not applicable.

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**Authors’ contributions**

Manashi Gogoi Dutta (Researcher)

Dr Uthaivan Danivath (Advisor)

The individual contributions of authors to the manuscript should be specified in this section.

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