

Effects of Multi-Component Training of Text Structure Intervention and Self-Regulated Strategies on Iranian Upper-Intermediate EFL Learners' Reading Comprehension

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Abstract

This experimental study attempted to examine the potential influence of multi-component training interference of text structure awareness along with self-regulated strategies on Iranian upper-intermediate foreign language learners' reading comprehension. One hundred and twenty undergraduate students in the domains of English translation and English literature at the University of Rudbar, Iran were selected based on Oxford Placement Test scores and were classified into four groups at random (one control and three experimental groups). The instructional design was based on cognitive load theory. Treatment groups received text structure awareness, self-regulated strategies, and the combination of text structure awareness and self-regulated strategies that lasted for twelve weeks. The control group received a placebo. Data were obtained from a pretest and post-test of reading comprehension. One-way analysis of covariance showed that multi-component training intervention of text structure and self-regulated strategies was more beneficial in developing learners' reading comprehension. Students' knowledge of text structures and their ability to regulate their goal setting and learning facilitated their reading comprehension. Self-regulated strategy instruction can be combined with text structure awareness raising to remove the induced extraneous cognitive load and can be implemented in foreign language reading classes to support comprehension of texts.

Keywords: Multi-component, reading comprehension, self-regulated strategies, text structure, training

1. Introduction

This section begins with a brief explanation of information processing theory. Then, in an attempt to extend it to reading classes, the importance of self-regulatory strategies will be explained in terms of lowering the complexity of text structure (TS). The introduction of information processing in the cognitive field has sparked many types of research that deal with standards of instructional schemes (Cooper, 1998; Sweller, 1988). This information processing theory can be applied to foreign language teaching classes. More specifically, it can be used for teaching reading comprehension (RC) and lead to an automatic information process in reading.

Reading can be considered a thinking process (Liu, 2010). Now, the teachers' role has been changed from knowledge distributors to promoters of self-regulated learners, thinkers, and problem solvers (Randi, 2004). Readers need to develop a plan before reading, monitor their comprehension of text while reading, and evaluate their thinking after reading (Zumbrunn et al., 2011). They need to receive support to go through the three stages of planning, monitoring, and evaluating. Careful integration of self-regulated learning (SRL) with the purpose of improving learners' monitoring of

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the learning process with cognitive load theory (CLT) can promote students' self-regulation strategies such as self-awareness, enthusiasm, and confidence. Studies on SLR and CLT have been two of the most important lines of research (Seufert, 2018). Sweller et al., (2019) define the overall mental charging as the number of resources that are spent in a particular learning situation for dealing with a task that might be intrinsic, extraneous, or germane. The complexity of TS can be considered as an intrinsic load. When teachers give awareness of TS and enhance learners' preliminary information, the complexity of the task is lowered. Text structure awareness (TSA) can help learners have a wide range of schemata available for them so that they can use them to integrate new information into their previous experiences. The more schematic knowledge learners have, the better they can make inferences about a text (Gilakjani & Ahmadi, 2011). This in turn will reduce the degree of intrinsic load. Thus, effective RC requires readers to self-regulate their reading process by investing cognitive and metacognitive resources while trying to lower the cognitive load.

Previous research has established that TSA assists readers in better recognition of main ideas and the inclusion of those ideas across passages when reading texts (Butler, et.al., 2021; Strong, 2022). Teaching readers to generate main ideas during reading while reflecting on their learning through regulating their thoughts and emotions may improve the reading outcomes while lowering the cognitive load on working memory. Having in mind these assumptions, a multi-component training intervention was implemented in this study while integrating self-regulated strategies with TSA to foster EFL learners' RC. Research suggests that multicomponent interventions are vital for the complex processes that are involved in text comprehension to help learners regulate their understanding (Edmonds et al. 2009). The concept of multicomponent in our study represents types of training that include decoding and linguistic comprehension (Hoover & Gough, 1990).

The traditional approaches to reading merely focus on look-and-find learning strategies and involve learners at a very low cognitive level (Chen, & Julie, 2020). In addition, Iranian university English textbooks and classroom practices mainly target lower-order thinking skills than higher-order ones (Zareian et al., 2015). Therefore, language learners are not competent to achieve the necessary information from reading passages. Equipping readers with sufficient practical RC strategies that improve their cognition can assist them in monitoring their learning.

Although strategic reading instruction and its effect on learners' comprehension has recently sparked a lot of interest, the issue is less understood concerning how teachers can reduce the possible cognitive loads that are imposed on students' working memory because of using strategies through working on automatic self-regulation. To put it simply, we know that TSA is useful for developing EFL learners' interpretations of reading texts. However, conscious self-regulated learning of scheme construction like the one that is present in TSA occurs in working memory, which increases mental effort, and results in a decrease in performance effectiveness when compared with unconscious learning (Feldon, 2007). Therefore, the processes that are involved in mere TSA impose high cognitive loads on students' working memory (Sweller 1988). While working memory is extremely bounded, the power of long-term memory to acquire information is unlimited (Cooper, 1998). The problem remains that how TSA can be implemented through unconscious self-regulated processes of ascertaining information in long-term memory.

It was assumed that if the information on text structure was delivered at once, the students might fail to make use of that information later. Thus, we combined text structure with self-regulated strategies to reduce the cognitive load. This survey compared the effects of four techniques for developing EFL learners' interpretations of the texts that have expository organizations. The purpose of selecting expository TS is that in Iranian university contexts, the reading materials are mainly selected from the expository texts and reading strategies are taught within teaching expository texts (Akhondi et al., 2011).

What inspired the researchers for implementing multi-component training intervention was that CLT supports the view that unconscious self-directed learning of making propositions in working memory accelerates the comprehension process (Wirth et al., 2020). Therefore, the purpose was to engage learners through rational design of multi-component training of RC strategies that did not

engender cognitive charges in terms of the information that working memory could hold. In this way, the information on TS could successfully contribute to RC unconsciously before being moved up to short-term memory so that it would not generate cognitive charges on working memory.

One challenge facing EFL teachers is how to teach RC (Mudzielwana, 2014). The relatively recent findings on RC show that TSA improves learners' comprehension (Strong, 2022) but at the same time the complexity of the material and the learners' prior knowledge in terms of the organization of the text may cause cognitive loads (Sweller et al., 2019). However, the previous studies done on TSA raining have not considered the role of self-regulated strategies in reducing cognitive loads.

The effect of the traditional RC instruction was compared with the effects of the multi-component training intervention. TSA, which is geared towards text particularities by means of graphic organizers, was examined against self-regulated strategy expansion intervention (SRS) and integrated TS and self-regulated strategy intervention (TSA + SRS).

2. Literature Review

2.1. Cognitive Load Theory

The focus of CLT as a pedagogical notion is on predicting the outcome of learners' performance by considering the potential and constraints of human cognition (Sweller et al., 2011). Human cognition includes both working memory, which has not great potential for processing new data, and long-term memory, which has endless space for keeping cognitive schemas. In CLT, human working memory has a fundamental role since it gets information sent by sensory memory into the cognitive schema and sends it to long-term memory for memorizing.

Sweller et al., (2019) maintained that the information-processing model of individual cognitive formation is formed of working memory, sensory memory, and long-term memory. Studies have shown that individuals can regulate their brain regions activities, such as the amygdala, insula, cortex, and hippocampus (Zotев et al., 2011). The hippocampus and the amygdala are involved in different types of knowledge acquisition. While the hippocampus is responsible for making and keeping declarative memory and conscious learning, the amygdala is responsible for non-declarative unconscious learning (Bijoch, 2015). Therefore, the hippocampus has a vital role in declarative memory and learners gain declarative knowledge consciously. In contrast, non-declarative learning happens in Amygdala and learning takes place outside of awareness (Niestorowicz, 2018). Studies have shown that unconscious processing is practically more complex than conscious processing (Bargh and Morsella, 2008). In addition, complex materials that are beyond the capacity of working memory can be handled through unconscious processing (Paas et al., 2003). The next section deals with TS and explains how cognitive charges on working memory can be reduced in the process of awareness-raising.

2.2. TS Awareness-Raising

The TS is referred to the way information is arranged in a text (Roehling et al., 2017). Meyer et al., (1980) introduced the first model for teaching TS and claimed that good readers benefitted from signals within the text for getting the main ideas and creating meaning.

As it was noted earlier, the study was concerned with TSA of expository texts. Expository texts have various organizational arrangements that are called text structures. The main reason for the inclusion of the text structures in teaching expository texts is that many academic texts have expository nature (Nambiar, 2005). Research has shown that when readers have information about the structure of expository texts, they have fewer problems with comprehension (Dymock & Nicholson, 2010). The CORE model (Connect, Organize, Reflect, and Extend) suggested by Dymock (2005) provides a framework for teaching the text structure of expository texts. CORE model states that an effective lesson connects students to the topic and keeps the lesson simple. In addition, chances

are given to the students to reflect in which they explain or critique content, structures, and strategies and finally, a chance is given to help learners extend learning to new topics.

Here, we briefly mention researchers' views on how teaching TS improves learners' capacity to comprehend the content. TSA helps the reader understand the writer's intention (Zarrati et al., 2014). This is done by becoming aware of the way the writer organizes information. Besides, readers can make use of text structures to arrange their ideas in order of importance following the writer's goals and the relationships communicated by the text (Fontes et al., 2015). The time used by the readers to process the text is also important. According to Meyer (1985), TSA saves processing time for the readers since they can make use of the same schema as the author employed when writing the text.

Learning some text structures is easy for some readers without any instruction, but some need direct and explicit instruction. Hence, the point is how readers process information in a text. In compliance with generative learning theory, readers create concept maps or make use of graphic organizers to identify relevant information and then organize them into a logical construction while combining the new information with their relevant initial information by identifying the structure of the text. In this way, they become involved in integrative mental processes and fulfill deeper academic achievement (Wang et al., 2021). However, the first type of information about TS that learners achieve is raw sensory data. Then, they need to encode the sensory data and file them. If the information in sensory memory is not encoded in a short time before it deteriorates, it is lost (Brotchie et al., 1995). Nevertheless, the point is that as specified by the CLT, the power of working memory for perceiving the new data that is acquired through sensory memory is constrained. In contrast, when the information that is stored in long-term memory is sent into short-term memory in a form of activated schemata, this limitation does not exist (Sweller, 2010).

In this study, the researchers assumed that learners could benefit from the limited working memory resources when they integrate automatic self-regulation strategies to retrieve TS information into their working memory. The assumption was that the multicomponent training would not cause a high cognitive load (Kalyuga et al., 1998). In line with Baddeley's (1983) model of working memory, self-regulation strategies were used to allow learners to make use of information that they have in their repertory in long-term memory along with the data obtained from the sensory memory. The next section will elaborate on self-regulated strategies.

2.3. *Self-Regulated Strategy*

Self-regulation is represented as the mental expertise to adjust people's attitudes, emotions, and actions in accordance with their principles, standards, beliefs, and ideals (Forster & Jostmann, 2015). Several conceptual paradigms of self-regulation have been proposed. Two popular models include Kirschenbaum's (1987) model, which has five stages, and Zimmerman's self-regulation model. The five stages in Kirschenbaum's (1987) model are problem recognition, commitment, execution, environmental management, and generalization. According to Kitsantas & Zimmerman (1998), Kirschenbaum's (1987) model has important concepts but it has limited validity. In the present study, Zimmerman's model which was mainly adopted from Bandura's (1997) social cognitive perspective was used as a theoretical framework. Bandura (1997) noted that enhancing students' self-regulatory competence and supporting them to guide themselves in the learning process should be the main goal of training. He made associations among the environment, the person, and the behavior and suggested that learning is the result of the relationship among these three factors. Self-regulation relates to self-generated thinking, emotions, opinions, and actions to support the mental process of goal-directed behaviors (Nota et al., 2004).

Theorists like Boekaerts and Corno (2005) and Schunk and Zimmerman (2007) claim that learners who are skillful in monitoring their learning in a satisfactory manner, involve actively in acquiring knowledge and employ strategies to make adjustments between their behavior and surroundings in a way that assists their learning and facilitates goal attainment. Boekaerts and Corno (2005) maintained that learners' educational performance is positively influenced with the help of self-regulated tactics like planning, target setting, self-appraisal, self-regulated, and rethinking.

With respect to the role of self-regulated strategies in TSA, the key point is that language learners need to identify steps in implementing a strategy appropriately. Besides, they should be motivated to use the strategies. Particularly, students need to regulate their learning (Fiorella & Mayer, 2016). Concerning regulating strategy use, as mentioned earlier to reduce the cognitive load through an unconscious learning process, Mayer (2014) presented a select-organize-integrate (SOI) model that is a branch of the psychological approach. The SOI model indicates that meaningful learning requires three basic intellectual activities and their interplays with memory stores. Figure 1 shows the SOI model.

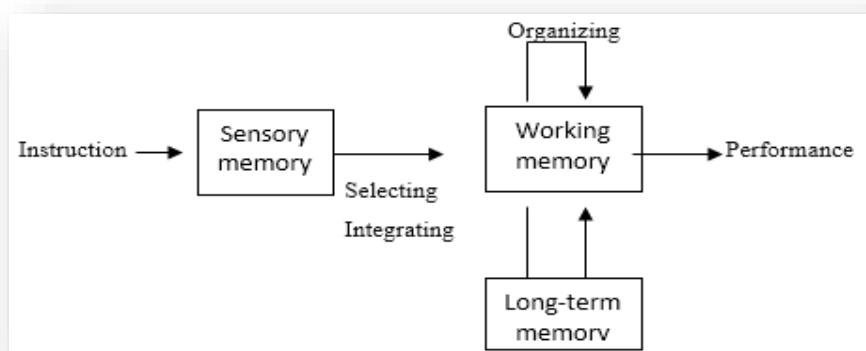


Figure 1: SOI Model of Generative Learning (Adopted from Fiorella & Mayer, 2016)

According to the SOI model, learners choose important incoming sensory information, keep them in sensory memory, and then use them for more intentional manipulation, which is done in working memory. Afterward, the learners use the fundamental structure to put the selected information into a comprehensive mental image in the operant memory. Finally, the new notion formed in working memory is combined with the appropriate schemas kept in their long-term memory. The metacognitive process of regulating takes place after selecting, organizing, and integrating. In our study, meaningful learning (generative learning) happened when the learners generated mind maps for the reading passages or made a summary of the texts.

Bargh's (1994) theory of automaticity signifies the notion of automatizing self-regulatory strategies without the individuals' awareness. This does not mean that self-regulation is present in all learning environments, but that regulation takes place when students are intellectually driven, and strongly interested in their learning activities (Artino Jr & McCoach, 2008). In the following section, the empirical studies done about TSA and self-directed strategies are given.

2.4. Empirical Studies

Several studies have shown that knowing about TS supports RC. Hebert et al., (2016) presented mediations in relation to text organization to see the effects on learners' comprehension of expository texts. They showed that working on TS promoted learners' understanding of texts.

Ghorbani et al., (2019) applied awareness-raising activities to investigate the possible effects on learners' mastery of expository texts. They found that when the organization of text was brought to the learners' attention, they had a better understanding of them. Giving information on TS familiarized learners with syntactic and semantic text features. Ghorbani et al., (2021, in press) explored if textual awareness-raising had an influence on EFL learners' RC. They showed that when students were supplied with information about textual aspects of linguistically and cognitively complex as well as linguistically complex and cognitively simple texts, their RC was positively affected.

Teng (2019) compared the effects of giving students information in relation to the organization of texts with self-regulated strategy instruction and traditional writing instruction. The model that was used focused mainly on self-directing strategies and comprised of self-regulation writing procedures,

content and genre information, and verbalization of thoughts. Results revealed that the students who practiced text organization and exercised self-regulated strategies achieved better results than the traditional group. Implementing self-regulated tactics was effective in improving writing quality, and TS was influential in developing main ideas contained in the written summaries. In particular, this study addressed the following research question:

Research Question One. Does multi-component training intervention of TS and self-regulated strategies have any statistically significant influence on Iranian upper-intermediate EFL learners' RC?

3. Methodology

3.1. Design of the Study

The present study pursued an experimental research design that incorporated a pretest and a post-test. The independent variable was multi-component training of TSA-raising and self-regulated strategies, and the dependent variable was the results of the post-test in RC that was administered following the instruction. The pre-test scores were considered as the covariate.

3.2. Participants

To examine the possible impact of teaching TS and self-regulated strategies on Iranian upper-intermediate EFL learners, convenience sampling was applied and 147 undergraduate students who were studying English translation and English literature from Islamic Azad University in Rudbar took part in this study. They attended a placement test for homogeneity testing and finally 120 upper-intermediate EFL learners were elected (35 male and 85 female students). They were dispersed to the three experimental groups and one control group at random. Their age ranged from 21 to 30. They were native speakers of Persian. The researchers sent a consent form to each participant through email to make certain that they agreed to attend the study.

3.2. Instruments

3.2.1. Oxford Placement Test (OPT)

OPT was given to 147 university students to select upper-intermediate foreign language students. The test included 60 multiple-choice items that examined vocabulary, reading, and grammar. Table 1 presents the results of OPT.

Table 1: Results of OPT

N	147
Mean	40.70
Median	40.00
Std. Deviation	5.11
Range	30.00
Minimum	25.00
Maximum	55.00

The mean of the OPT came to be $M= 40.70$ with a standard deviation of 5.11. Based on the OPT direction, 120 students who scored within the range of upper-intermediate (37-47) were picked as the main sample.

3.2.2. Pretest of RC

RC tests for the pretest were adopted from IELTS RC sample tests. The time determined to answer the questions was 45 minutes. The test comprised of two passages. The first passage titled "*Indian Marriages*" included three multiple-choice and six short-answer items. As concerns the second passage of the pretest, the topic was "El Nino" which included 11 items. This passage had five short-answer items and six multiple-choice items. The total score for the pretest was 21 points.

3.2.3. Post-test of RC

The post-test was also taken from a sample IELTS general reading test and comprised of two RC passages. The first passage titled “railcards” included 8 completion items and 3 true/false items. The second passage titled “Managing the health and safety of seating in the workplace” consisted of 5 matching items and 5 completion items. One single point was allocated for each test item and the total score for the post-test was 21 points.

The RC passages that were used for the class activities were adapted from the textbook General English for university students written by Layeghi and Layeghi (2020) that were appropriate for upper-intermediate EFL learners (CEFR level B2).

3.3. Data Collection Procedure

First, treatment manipulation was examined through implementing a pretest and a pilot test. The reliability of the instruments was established in a pilot study with 15 participants. OPT was given to 147 undergraduate students and 120 participants were selected appertaining to test direction. Then, they were carved up into four groups at random.

During one academic semester, the first treatment group benefitted from the direct training in the expository text arrangement. The plan for teaching the organization of the text was in accordance with Dymock’s (2005) CORE model, which included connection, organization, reflection, and extension. For the *connection phase*, first, the teacher used questioning strategies to connect students to the topic. They tried to relate their previously known information with new information. The teacher used graphic organizers and diagrams to show how texts were constructed in the *organization phase*. As a class activity, students were given expository texts that had different structures and their graphic organizers were presented. The teacher explained the ideas in the organizer (e.g. Marriage customs) through the appropriate patterns to highlight its structure (“e.g., *today we are going to read about Indian Marriages. So we are going to compare and contrast the wedding customs in India and Iran*”). The students addressed the main ideas in the organizer and the way they were related together. Then, diagramming the text was taught which helped students to see the structure and remember it well. The teacher made use of clue words to help students identify structures by signaling particular relationships among ideas by asking students to circle the clue words. As concerns the *Reflection phase*, the students were asked to explain the structures (e.g., *explain the text type you analyzed? Why did we outline the structure?*). Students were given chances to reflect and think about what they had learned through explanation and summarizing. Afterward, for the *extension phase*, the transfer of learning to new topics was desired to help learners practice and reflect on their learning. Figure 2 displays the core model

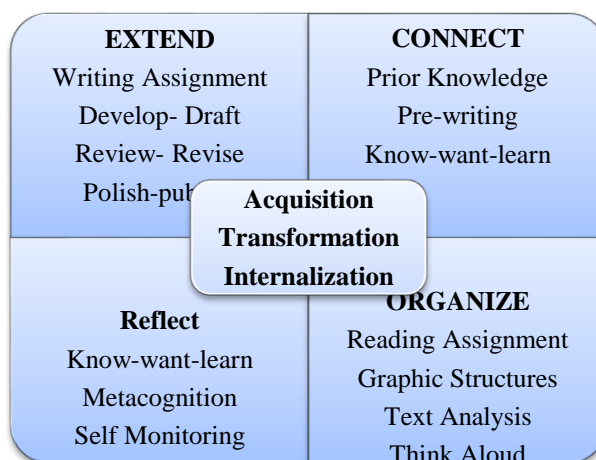


Figure 2: The CORE Model

The second experimental group benefitted from teaching self-regulated strategies in keeping with Zimmerman's (2000) self-regulation paradigm while they were trying to comprehend the reading texts. The full explanation of the model for teaching self-regulated strategies is given in the following section.

For the third treatment group, multi-component training was used. TSA + SRS were implemented through teaching reading passages while focusing on self-regulated strategies. The self-regulation model developed by Zimmerman (2000) was applied to teach self-regulation strategies to develop the learners' RC. One session was devoted to giving a clear explanation of the treatment phase to the students during which the model was put into practice using sample RC passages. Overall, this model for teaching self-regulated strategies was developed in three facets. In the *forethought* phase, learners were required to analyze the task, set their goals, and make plans to achieve the goals and some motivational beliefs were given to them. For this step, which was implemented for self-regulated learning, Housand and Reis's (2008) guidelines were used.

Ex1: *Which strategies do you use to find the meaning of unknown words?*

In the *performance* phase, the students did the reading task, while they controlled how they were improving using several self-regulated strategies. In this phase, some strategies such as concept mapping for the unfamiliar lexical items were explicitly taught. The students were asked to verbalize each step of the strategies they used to comprehend the text. They also worked on time management and as concerns the environmental factors, the students practiced strategies to eliminate distractions. To develop the students' use of metacognitive strategies, they answered some questions posed by the teacher:

Ex2: *Are you successful in finding the appropriate meaning of the unknown lexical items?*

The researchers used Schunk's (1986) guideline for self-instruction. In addition, they applied Zimmerman & Martinez-Pons' (1986) suggestions for environmental structuring and adapted self-regulated behavior suggested by Cleary and Zimmerman (2004).

Finally, in the *self-reflection phase*, the students evaluated their performance in the reading activity, making attributions about their success or failure. Three strategies were implemented at this phase. *Causal attributions* during which the students were encouraged to attribute their failure to successful comprehension to employing wrong strategies or inadequate practicing that was implemented based on Schunk and Zimmerman's suggestions (1998). The next strategy was *Self-reaction* during which the students were encouraged to think about if they did the task successfully that was implemented based on Cleary and Zimmerman's (2004) suggestions. The last strategy was *Adaptive/Defensive Inference* during which the students were encouraged to choose a more effective strategy for dealing with the task. They reflected on their weak points and tried to improve their performance.

The control group received traditional teaching of RC in three phases including pre-reading in which they skimmed the text to find the key ideas, while reading in which the students interacted with the text, and post-reading in which the students reflected on what they read. The teacher activated the learners' previous experiences based on the content of the text "*Have you ever visited India?*" Then, pre-teaching of vocabulary was implemented. Some definitions and examples of new vocabulary items were presented "*What is a submarine?*" The students were urged to preview the text by reading headlines and skimming the text in groups "*the headline indicates that the text is going to talk about differences and similarities.*" Silent reading was also encouraged. To observe the ethical considerations, the control group was exposed to some reading intervention programs by the researchers after the accomplishment of the study.

4. Results

First, the main assumptions of analysis of covariate (ANCOVA) were tested. It was determined that the covariate was not influenced by the treatment. The internal consistency of the RC test was measured by running Cronbach's Alpha formula and the test-retest method. Besides, it was

established that the association between the dependent variable and the pretest was linear by the following Scatterplot.

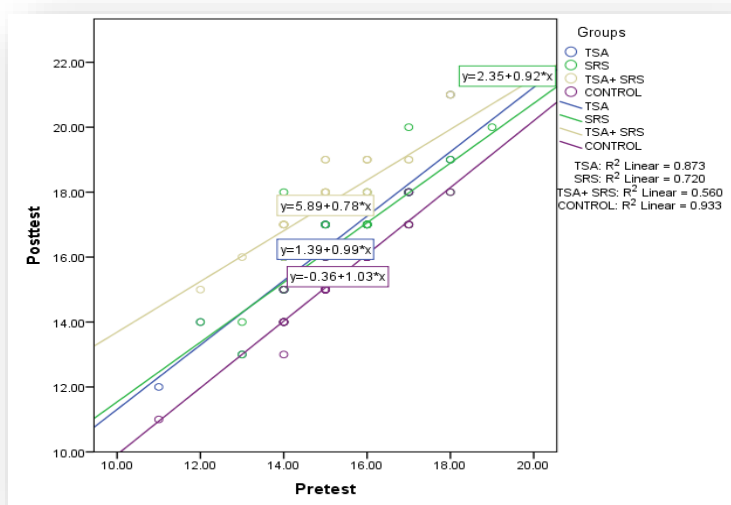


Figure 3: Scatter Plot for the Covariate and the Dependent Variable

As concerns the assumption of the equality of regression slopes, it was found that the covariate did not interact with the post-test scores. In addition, the design of the study indicated that the groups were chosen randomly and the samples were independent. Shapiro-Wilk test was run to explore the normality assumption (See Table 2).

Table 2: Shapiro-Wilks Test

	Groups	Shapiro-Wilk Statistic	Df	Sig.
Pretest	TSA	.94	30	.088
	SRS	.96	30	.359
	TSA+ SRS	.95	30	.176
	Control	.89	30	.006
Post-test	TSA	.94	30	.088
	SRS	.94	30	.148
	TSA+ SRS	.93	30	.078
	Control	.90	30	.011

According to Tabachnick et al., (2007), the conventional alpha levels of ($\alpha=.01$ and $\alpha=.001$) are commonly used to interpret the normality assumption. The results demonstrated that the data had a normal spread ($p \geq .001$). Levene's F Test assessed this assumption if the variances were equal (See Table 3).

Table 3: Homogeneity of Variances Test

	Levene's Statistic	DF1	DF2	Sig.
Pretest	1.36	3	116	.25
Post-test	1.15	3	116	.33

It was found that the independent groups had almost the same variances ($p > .05$). In the next stage, descriptive statistics were computed to make a summary of the results (See Table 4).

Table 4: Descriptive Statistics for the RC Tests

		N	Mean	Std. Deviation
Pretest	TSA	30	15.33	1.68
	SRS	30	15.46	1.65
	TSA+ SRS	30	15.26	1.38
	Control	30	15.30	1.31
	Total	120	15.34	1.50
Post-test	TSA	30	16.60	1.79
	SRS	30	16.56	1.79
	TSA+ SRS	30	17.80	1.44
	Control	30	15.36	1.40
	Total	120	16.58	1.81

In the pretest, the mean differences among the groups varied from .03 to .20 points, which were very small. In the post-test, the control group's mean score was 2.43 points smaller than the mean of the third experimental group that received multi-component training intervention, 1.23 points smaller than the first experimental group that was exposed to TSA, and 1.20 points smaller than the second experimental group. The homogeneity of regression slopes was also examined (See Table 5).

Table 5: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Groups	4.85	3	1.61	2.64	.053
Pretest	221.51	1	221.51	361.40	.000
Groups * Pretest	2.05	3	.68	1.11	.345
Error	68.64	112	.61		
Total	33394.00	120			
Corrected Total	393.16	119			

As shown in Table 5, the probability value for the interaction between the covariate and the post-test scores was .345. Since the significance level was greater than .05, it was concluded that the regression slopes were homogeneous. One-way ANCOVA was carried out to explore the impact of the mediations on TSA, SRS, as well as TSA+ SRS (See Table 6).

Table 6: ANCOVA Test (post-test)

Dependent Variable: Post-test						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	322.46 ^a	4	80.61	131.12	.000	.82
Intercept	5.80	1	5.80	9.44	.003	.07
Pretest	233.63	1	233.63	380.01	.000	.76
Groups	91.81	3	30.60	49.78	.000	.56
Error	70.70	115	.61			
Total	33394.00	120				
Corrected Total	393.16	119				

a. R Squared = .820 (Adjusted R Squared = .814)

The results of ANCOVA showed that after adjusting for the covariate, there was a statistically considerable distinction among the treatment groups on the post-test, $F(3, 115) = 49.78$, $p = .00$, partial eta squared = .56. With reference to Cohen's (1988) guideline, the effect size was "strong." Multiple comparisons were made through the Scheffe test to see which pairs differed significantly (See Table 7).

Table 7: Scheffe Test for Multiple Comparisons

(I) Groups	(J) Groups	Mean Difference (I-J)	Sig.
TSA	SRS	.03	1.00
	TSA+ SRS	-1.20*	.046
	Control	1.23*	.038
SRS	TSA	-.03	1.00
	TSA+ SRS	-1.23*	.038
	Control	1.20*	.046
TSA+ SRS	TSA	1.20*	.046
	SRS	1.23*	.038
	Control	2.43*	.000
Control	TSA	-1.23*	.038
	SRS	-1.20*	.046
	TSA+ SRS	-2.43*	.000

* The mean difference is significant at the 0.05 level.

Coming from the results of the Scheffe test, the control group's average differed significantly from the mean scores reported by the three experimental groups in the post-test. The highest mean difference was between the TSA+ SRS group and the control group. In addition, the distinction between the TSA+ SRS group and the other two treatment groups was statistically meaningful ($p \leq .05$). Nevertheless, the distinction between TSA and SRS groups was statistically insignificant ($p \geq .05$). Consequently, research results rejected the null hypothesis and suggested that multi-component training intervention of TS and self-regulated strategies had a statistically considerable impact on learners' perceptions of texts (See Figure 4).

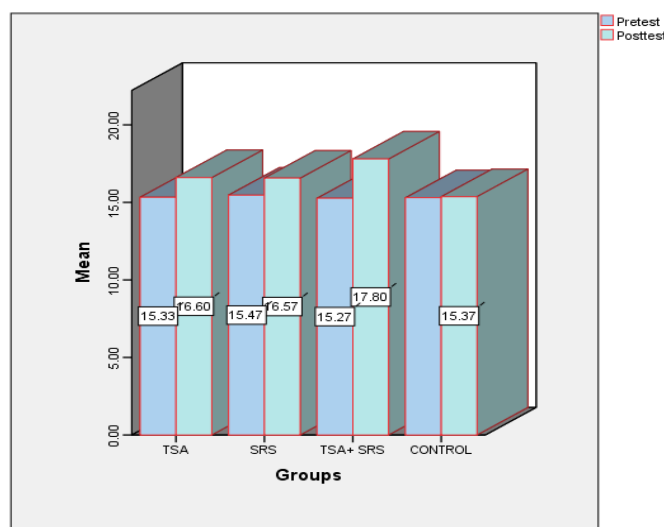


Figure 4: Means of the groups for the RC Test

As it was shown in Figure 4, the students in the intervention groups had better achievements than the subjects in the control group. More specifically, the students who benefitted from multi-component training intervention significantly exceeded the other three groups in the post-test.

5. Discussion

As the results indicate, in the post-test, the students in the three comparison groups who had been trained in TS and self-regulated strategies had higher achievement than the subjects in the control group. In the third treatment group that was more successful than the other groups, both self-

regulation strategies and TSA raising were implemented in their reading classes. The teachers' modeling of self-regulation strategies along with teaching TS strategies and persistent practicing of them led to the students' independent uses of strategies and thus they were more competent in regulating their learning. As a result, the induced cognitive load was low which resulted in improved RC. This can be explained under Coady's (1979) interactive model in which he asserted that the conceptual skills, prior knowledge, and process strategies are the three reciprocal principles that are involved in reading.

The participants in the first experimental group received TSA, benefited from using graphic organizers for preparing an outline of the passages, and showed text organization. They learned how to identify multiple text structures so they could expect the information type that was incorporated within the text. Processing texts deliberately while reading helped students visualize text structure, which is also emphasized by McGee & Richgels (2005). The findings are also in line with Cheng (2019), Dymock and Nicholson (2010), and Pearson and Duke (2002) in that they also agreed that teaching expository TSA is effective in promoting RC. In addition, the findings proved that TSA can be considered an effective RC strategy that should be taught systematically (Sweet & Snow, 2003) so that the strategy can be retained and applied beyond the immediate instructional setting (Graham & Perin, 2007). The success of the learners in the first treatment group in the post-test can be related to their skill in determining the right TS and then immediately planning and arranging the data in the content with the help of the specified text organization. Eason et al., (2012) asserted that planning and organizing text information is essential to successful reading.

The subjects in the second treatment group just worked on self-regulated strategies. They realized how to follow up on their own educational path. In simple words, working on self-regulated strategies helped the participants in this group to be autonomous learners and managed to be strategic learners. However, they did not demonstrate much improvement in RC contrasted with the third experimental group who enjoyed multi-component training. This might be related to the participants' lack of adequate linguistic knowledge since they did not work on text organization. This meant that no good linguistic competence was achieved because the participants were not aware of some linguistic features of the texts.

The research outcomes demonstrated the usefulness of the multi-component training intervention of self-regulated learning and TSA raising by lowering the induced cognitive load that is usually present in implementing mere awareness-raising. Both conscious and unconscious self-regulation strategies are involved in self-regulated learning. When conscious regulation of the learning process takes place, resonant states come into play (Wirth et al, 2020). This suggests that in conscious learning, the learning starts in conscious states in the brain in sensory memory and thus prevents cognitive charges on working memory. This helps language learners easily develop their RC. Thus, the study highlighted the significance of sensory memory in education.

In the first treatment group, the participants were merely exposed to TSA which led to a high working memory load when the learners' previous knowledge was not adequate. In the second experimental group since there was no training on text structure, the learners could hardly relate the new information to their previous knowledge. Besides, they had problems in terms of generating schemata that might result in a high cognitive load (Kalyuga et al., 1998). Hence, in the third treatment group, the multi-component manipulation of TS and self-regulated strategies provided RC instruction that was at the learners' working memory capacity. Overall, the huge amounts of information presented as text structure awareness may function as an extraneous cognitive load and negatively impede learning by causing distraction. However, if this awareness-raising is accompanied with self-regulated strategies they might lower cognitive load and thus improve comprehension.

6. Conclusion and Implications

What can be concluded in implementing CLT concerning the present study is twofold. First, the instructional material should not go beyond the scope of the learners' working memory that is bounded in nature. Second, unconscious learning is more productive than conscious processing. Thus, the study showed that self-regulating the learners' awareness of the TS reduced the induced cognitive

load and encouraged unconscious learning. Thus, working memory performance was facilitated through unconscious learning processes. When self-regulated learning is combined with TSA, the emphasis is both on conscious learning in working memory and long-term memory and unconscious processes in resonant states where the sensory information is stored (Grossberg, 2019).

Teachers have a major part in supporting language learners to grow their comprehension of texts. Training successful readers requires that teachers use strategies that enhance readers' language knowledge as well as their processing and cognitive abilities (Nhapulo, 2016). Educators are suggested to integrate TSA by self-regulation strategies in their reading classes. Accordingly, teachers need to know how to implement multi-component training interventions for identifying text structures and self-regulation strategies. The language learners' failure to comprehend a text might be related to their deficiency to recognize the primary organization and structure of the text. Some students just focus on the words and ignore the whole structure of the text (Dymock & Nicholson, 2010). Language learners require explicit teaching on how to attempt to comprehend far more difficult expository text structures (Hoch & McNally, 2019). Language learners' ability to comprehend, and analyze expository texts can be used as a yardstick to gauge their academic reading attainment (Akhondi et al., 2011).

In conclusion, regarding CLT, optimal learning can take place through the regulation of the working memory load imposed by the instructional materials. For effective learning to take place, learners need to experience instruction that does not induce cognitive over-or-under load (Gerjets et al., 2014). Thus, presenting instruction in relation to TSA raising in a way that the working memory load is appropriate for the learners' working-memory capacity through a self-regulating learning process might be helpful in generating optimal learning conditions. The limitation, which took place while collecting the qualitative data, involved having access to the participants to conduct interviews as the university was stopped for some time due to the coronavirus outbreak. Finally, the primary objective of RC instruction should be the prevention of cognitive overload. Educators are recommended to specifically address both TSA as well as self-regulated strategies to remove the extraneous cognitive load. Future research may examine other strategies that can be implemented along with TSA to diminish the inducing cognitive load on learners' working memory to enhance learners' comprehension of texts.

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8. Declaration of Conflicting Interests

The researchers do not have any conflicts of interest to declare.

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