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The Effects of Computer-Assisted Instruction Based on Top-Level Structure Method in English Reading and Writing Abilities of Thai EFL Students

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Abstract

This research aims to study the development of ninth grade students' reading and writing abilities and interests in learning English taught through computer-assisted instruction (CAI) based on the top-level structure (TLS) method. An experimental group time series design was used, and the data was analyzed by multivariate analysis of variance (MANOVA) with repeated measures as well as basic statistical and line graphs. The results demonstrate that the experimental group attained significantly higher development in English reading and writing at the .001 level and registered significantly higher interests at the .01 level.

Keywords: Computer-Assisted Instruction (CAI), Top-Level Structure method (TLS), English, reading, writing, interest in learning English

1. Introduction

1.1 Statement of the Problem

According to a report by the National Institute of Educational Testing Service (NIETS), the Ministry of Education (2015) reported that the average English test scores of ninth grade Thai students in ordinary national educational test (O-NET) at secondary schools during 2010 to 2014 were below the standard at approximately 16.19, 30.49, 28.71, 30.35, and 27.46 out of 100, respectively (NIETS, O-NET report, 2010-2014). In addition, the NIETS reported that the general aptitude test (GAT) showed that the mean in the 2012-2014 English test scores were 52.98, 53.63, and 59.26 out of 100, respectively (NIETS, GAT report, 2012-2014). All reports showed that Thai students, especially ninth grade students, were below the standard in English as well as other subjects. This is primarily because most Thai students use little English in daily life, and they worry about grammar; therefore, they do not attain enough exposure to a variety of learning experiences through practice. Further, they have very little time to practice English outside of class. Another issue is the lack of motivation to learn English, which is one of the obstacles in their English learning development. Although, they have learned English for longer than 10 years, their English skills are still not well developed. Meanwhile, other impediments include unchallenging English lessons, passive learning, shyness in speaking English with classmates, and the lack of responsibility for their own learning. Moreover, the qualifications of Thai English teachers are insufficient, as they also have poor quality English skills, both spoken and written. They speak only Thai during class, use the grammar translation method, and are teacher-centered. They also have heavy teaching loads as well as inadequately equipped classrooms and education technology. In collaboration with the University of Cambridge, Thailand (Education in Thailand, 2014) conducted a survey measuring the qualifications of 400 Thai teachers of English that found that a full 60% had lower knowledge of English and teaching methodologies than the syllabus level at which they were teaching. Of the remaining top 40%, only 3% had a reasonable level of fluency, and only 20% were teaching class levels for which they were both qualified and competent. Noopong (2002 cited in Noom-Ura, 2013) also reported that 65% of primary school teachers who were teaching English had not majored in English in their studies, and only around 70% of secondary school English teachers graduated with a bachelor's degree in English. Although the Ministry of Education supports training in current trends, such

as CLT, student-centered, or other active learning techniques, English teachers find it difficult to adopt new approaches or teaching techniques because they lack the communication skills required (Rattanavich, 2013, p. 1; Noom-Ura, 2013, p. 140; Promnont, 2015, pp. 1-2). Furthermore, the Ministry of Education (2013 cited in Yamwagee, 2014) announced policy to reform teaching and learning English at the basic education level to achieve the following:

1) Use the international standard of the Common European Framework of Reference for Languages (CEFR) as the main yardstick for managing teaching and learning the English language, designing curriculums, defining the goals of learning, and developing teaching and learning, testing and assessment, and the training of teachers.

2) Adapt the teaching and learning of English by focusing on communicative language teaching (CLT), starting from listening, speaking, reading, and writing, respectively.

3) Promote English teaching and learning, according to the main standard framework by considering curriculums, teaching and learning media, teachers, equipment, aptitudes of students, and the readiness of each educational institute.

4) Promote the enhancement of ability in the English language by expanding special projects in teaching and learning English, such as English programs, mini English programs, English for integrated studies, etc.

5) Enhance the teaching and learning management skills and knowledge of teachers in order to be consistent with CLT and CEFR by starting with assessing the teachers' English language skills.

6) Promote the use of information and communication technology (ICT) media for education as a tool to develop the abilities of teachers and students.

Thus, there is an urgent need to conduct an effective English teaching program for students who will soon use English to learn and work that will encourage Thai students to improve their communication skills and knowledge as well as promote their self-motivation to improve their English, which will eventually become a live-long learning experience.

1.2 Research Questions

a) Is there a significant improvement in English reading and writing based on the study of the experimental group after instruction through the computer-assisted instruction (CAI) based on top-level structure (TLS) method?

b) Are the ninth grade students' interests in English significantly boosted after the training?

1.3 Objectives of the Study

a) To study the development of ninth grade students' reading and writing abilities after instruction through the CAI based onTLS method.

b) To study ninth grade students' interests in English after learning through the CAI based on TLS method.

1.4 Hypotheses of the Study

a) A study of the development of ninth grade students' English reading and writing abilities taught through the CAI based on TLS method will result in posttest (1), posttest (2), and posttest (3) scores that are higher than pretest (1) and pretest (2) scores.

b) The ninth grade students that are taught through the CAI based on TLS method will have higher interests in learning English.

2. Literature Review

2.1 Computer Assisted Instruction

There are many benefits of using technology in learning and teaching. During the past decades, computers have been used as learning tools in education. Computer-assisted instruction provides a better learning environment in education (Lin, 2009). In Thailand, the Basic Education Core Curriculum of the Ministry of Education encourages teaching and learning English or other subjects using ICT, especially in learning English. Therefore, students can become increasingly digitally literate because ICT can promote students 'abilities to use potential languages, find out information, or attain other skills in their lives as well as prepare all students to meet the demands of the 21st century. At present, the dynamic and interactive websites related to mathematics teaching and learning can be easily accessed through the Internet. The idea of using technology to enhance education has

been around for a long time. Computer-assisted instruction refers to instruction or remediation presented on a computer. Many educational computer programs are available online and from computer stores and textbook companies. They enhance teacher instruction in several ways (The Access Center, 2015). Computer programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or to solve problems in a group. Computers provide immediate feedback, letting students know whether their answers are correct or incorrect. If the answers are not correct, the program shows students how to answer the question correctly. Computers offer different types of activities and a change of pace from teacher-led or group instruction.

2.2 Top-level Structure Method

2.2.1 What is Top-level Structure?

Meyer (1975 cited in Rattanavich, 1987, p. 21) divides the content of the text into top level, middle level, and bottom level of importance; the levels are determined by the hierarchy of relationships of the content in a passage. The level of importance of each statement is thus determined by the way in which the writer has chosen to communicate the meaning of the text to the reader. Top-level statements in the text are defined as adscription of a situation or problem, a series of events or actions of characters in a story, or the conclusion or solution to a problem. Middle-level statements support top-level propositions or explain why events in a narrative take place. Bottom-level statements give additional and often unnecessary explanations or support to middle-level statements (Rattanavich, 1987, p. 22). In addition, TLS is a deliberate and definite action pitched at processing textual information by fitting it to a structural framework provided by the reader (Bartlett, 1986). When a reader calls upon knowledge of the text structure to help in the reading process, this is the "top-level structure" or the action of the knowledge. The reader must produce a product from the top-level process, such as a mental picture of what has been read, a recall summary, or a literal retrieval of the remembered text.

The purpose of the top level is to help a reader or a writer make sense of a situation by seeing the relationships present within the situation; that is, how an oral or written text is structured to give meaning (Katherine, 2006, p.33). Therefore, TLS is an alternative teaching method to improve English performance for Thai students. The TLS method is defined by the global organization or writing plan of the text. The TLS method emphasizes teaching students to understand the way that the ideas are ordered in the text. Students learn to locate the organization or plan of the text and to use it to find the main idea and its supporting details easily. This technique can be taught to students both in groups and individually. The benefits of this kind of method are that students can recall and memorize as well as understand how they do this. The TLS method consists of four types of structure, which are listing, problem and solution, cause and effect, and comparison and contrast; each type has a difference purpose. It is very helpful for students to understand how texts are structured because they can understand and recall more key information than readers who do not know how to identify and use the text structures (Bartlett, 1978, 1985; Turner & Mathams, 1981; Meyer, 1975, 1985 cited in Rattanavich, 1987, p.21-23).

2.2.2 Types of Top-level Structure

Top-level structure is a reading strategy that helps students comprehend the writer's idea or the text structure. It is also important to teach and model the use of these components properly. If students have reading strategies that include basic schema or background knowledge, they are able to understand the content in spoken and written format. There are four main organizational patterns, or TLSs, that typically occur in factual texts as follows:

a) Descriptive or listing is when the author describes a topic.

Example: My memory is bad. Before I do the shopping, I write a list. The other day, I needed cheese, tomatoes, cereal, coffee, flour, and sugar.

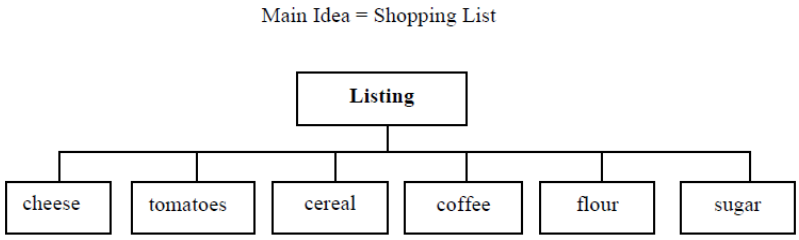

Figure 1. Listing

Figure 1 illustrates the organization of the listing example. The main idea from the top-level organization is the shopping list (Rattanavich, 1987, p. 138).

b) Problem–solution is when the author poses a problem or question and then provides the answer.

Example: When a river receives a lot of extra water, it may flood. During a flood, there is plenty of water, and most people would not think that dehydration was a serious risk, but flood water is mostly polluted and not safe to drink. People who drink the contaminated water may suffer from illnesses or diseases, such as typhoid. You can prepare for flooding by filling many containers with fresh, clean drinking water. You can also use sandbags to protect your house and to soak up the water. Be prepared and be safe.

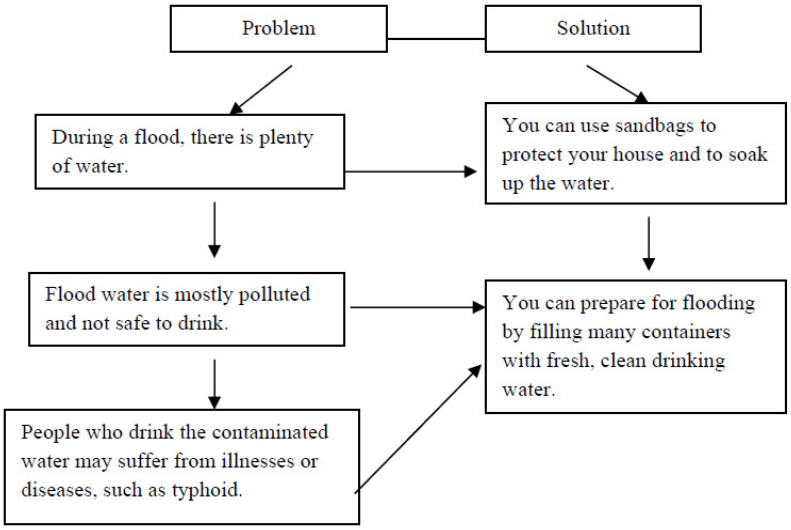

Figure 2. Problem–solution

Figure 2 illustrates the organization of the problem-solution example. The main idea is the problems and solutions of flooding.

c) Cause and effect is when the author delineates one or more causes and then describes the ensuing effects.

Example: In the autumn, some trees lose their leaves. Leaves look green in the spring because of a chemical called chlorophyll, which plants use to make food. In the fall, the chlorophyll starts to disappear. Leaves dry up, and their colors turn from green to gold, red, or brown. Finally, the dry leaves fall from the trees. This is why autumn is called "fall."

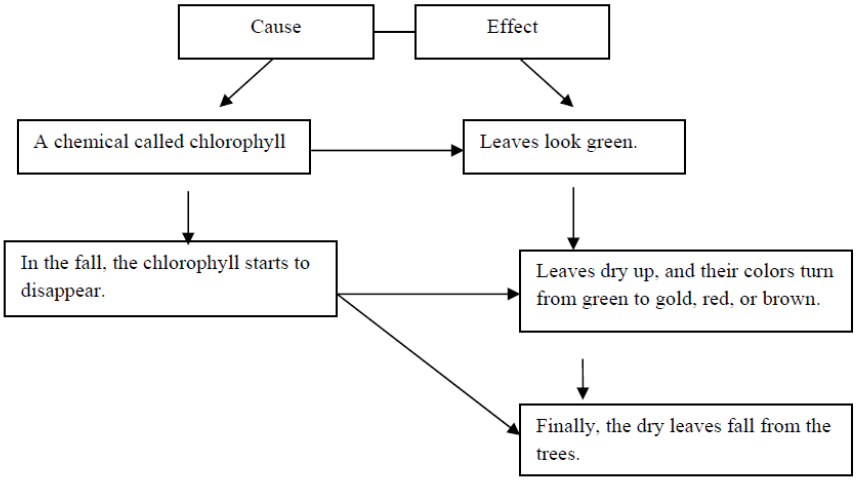

Figure 3. Cause and effect

Figure 3 displays the organization of the cause and effect example. The main idea is the cause and effect of falling leaves in autumn.

d) Comparison–contrast is when the author compares and contrasts two or more similar events, topics, or objects.

Example: Both hurricanes and tornados are amazing, yet deadly natural phenomena. Both generate deadly conditions but in different ways. Tornados are likely to damage people and property with high winds, which can be up to 300 miles per hour, but hurricanes are generally more feared for their flooding. Additionally, hurricanes can produce a tornado, which makes them dangerous.

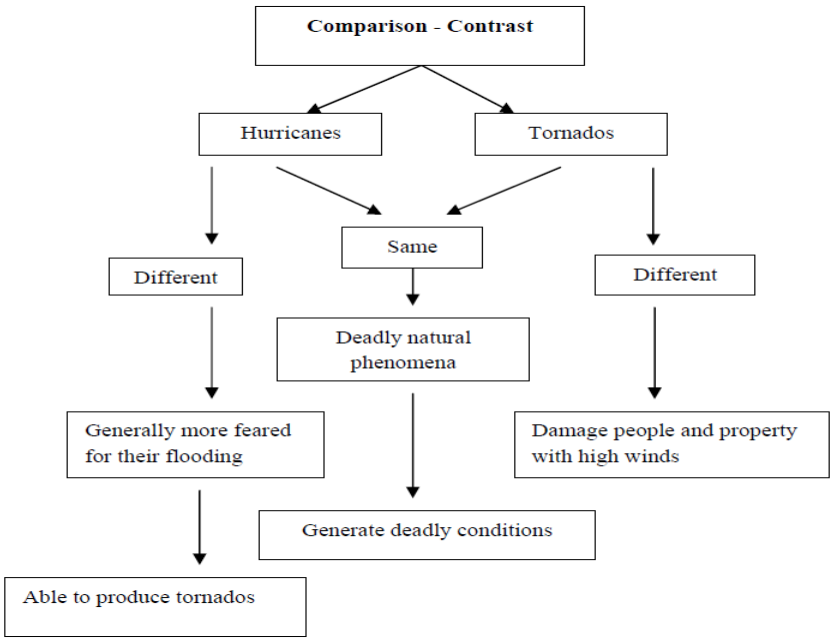

Figure 4. Comparison and contrast

Figure 4 depicts the organization of the comparison and contrast example. The main idea is the comparison between hurricanes and tornados.

2.2.3 Signaling Words

It is very helpful for students to understand how texts are structured because they can understand and recall more signal information than readers who do not know how to use text structures. When students read texts, they will know what the text is about because the writer often uses signaling words to signal the four main TLSs that they use to organize their ideas. Thoughtful student readers can take note of these signaling words to facilitate understanding or identification of the written text (Bolton, 2007; Boon-On, 2006, p. 61-65). The example signaling words in the main TLSs are shown in Table 1.

Table 1. The signaling words in the main TLSs

Top-level Structures	**Signaling Words**
Descriptive or Listing	*the following, first, as well as, then, second, and, another, third, many, finally, besides, in addition, furthermore, likewise, several*
Problem – Solution	*a problem is…*
	a solution is…
	have solved this problem...
	this had to be done…
	this is how we did it…
Cause and Effect	*for, this, reason, so, in order to, hence, since, thus, because, consequently, so that, accordingly, therefore, because of this*
Comparison – Contrast	*even though, both…..and, but, rather yet, not, however, in spite of, otherwise, in contrast, although, on the contrary, on the other hand, whereas, just as different*

2.2.4 The Key Steps in Teaching TLS

Bartlett (1986 cited in Rattanavich, 1987, p. 32-33) also listed the key steps in teaching students how to develop a working knowledge of text structure to assist their reading as follows:

1) An awareness of the concept of structure or organization is necessary; if the student does not have this at a level that can be verbalized, this is where teaching starts.

2) Knowledge of the four common types of top-level organization is also necessary. It is important to help students talk about and develop what they know of listing, comparison, cause and effect, and problem solving.

3) When reading, readers should be primed to find the TLS of a passage. At first, they may need help to do this. Later, this will be self-regulating.

4) They should confirm the presence or absence of a familiar structure during reading. The instructor will need to check that the students have a procedure for doing this and an opportunity for describing uncertain connections and guesses.

5) After reading, they should check that the knowledge of structure has been used properly to maximum advantage. This is a "proof reading" of their own processing performance. Again, the teacher should help them to talk about how they do this.

2.3 Conceptual Framework of the Study

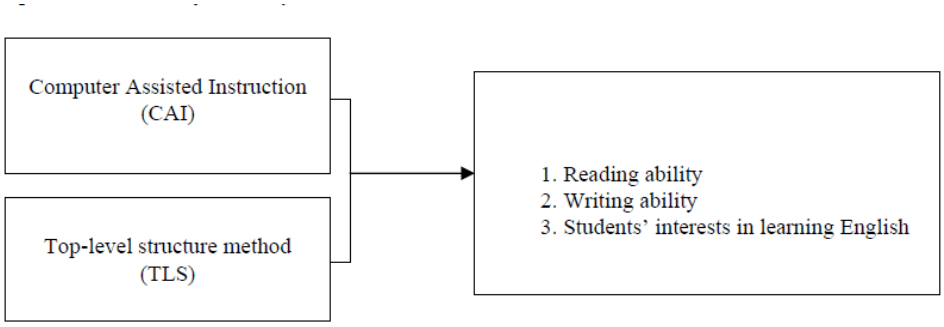

Figure 5. Conceptual framework of the study

3. Methodology

In the study, the researcher attempts to study the effects of ninth grade students' English reading and writing abilities, and students' interests in learning English when taught through the CAI based TLS method. The research procedures follow.

3.1 Research Design

A group time series design was used in the study. The sample group was taught through the CAI based TLS method for10 weeks with 20 teaching hours, including a pretest and a posttest session, as shown in Table 2.

Table 2. Research design

Ex	T_1	T_2	X_1	T_3	X_2	T_4	X_3	T_5

Ex = Experimental group

T_1 = Pretest (1)

T_2 = Pretest (2)

$X_{(1-3)}$ = CAI based TLS method

T_3 = Posttest (3)

T_4 = Posttest (4)

T_5 = Posttest (5).

3.2 Population and Sample

The participants in this study were 328 ninth grade students at Santiratwittayalai School, Bangkok, Thailand. The sample included 32 ninth grade students enrolled in basic English in the second semester of the 2014 academic year, using cluster random sampling selected as the sample of this study.

3.3 Research Instruments

The study used the two kinds of instruments (the tests and the questionnaire). The study used three multiple-choice and cloze reading equivalency tests (with a reliability of 0.81, 0.83, and 0.85 calculated by Pearson's correlation coefficient), one writing test (with a reliability of 0.96 calculated by Cronbach's alpha coefficient), and five-choice Likert scale questionnaires on the interest in learning English (with a reliability of 0.85 calculated by Cronbach's alpha coefficient).

3.4 Data Analysis

Each hypothesis was tested using a computer program as follows:

3.4.1 Hypothesis 1

The scores were compared between the three tests for reading and one test for writing of the experimental group's two pre-tests and three post-tests using MANOVA with repeated measures for within group analysis through the processes of a univariate test, multivariate test, simple effect analysis, and analysis of effect size for the results of the treatment in the experimental group (partial η^2). Finally, line graphs were used to summarize the results of the data analyses.

3.4.2 Hypothesis 2

The data of the experimental group was analyzed using the *t*-test and basic statistical analyses ($\bar{X}$ and S.D.), and the satisfaction results were finalized using the rating criteria (least, little, moderate, much, and most). For samples the *t*-test was used to compare the significance of the experimental group.

4. Results and Conclusion of the Study

The results of the study correspond to the two questions as follows.

The results of the first question "Is there a significant improvement in reading and writing based on the study of the experimental group after instruction through the CAI based TLS method?" are shown in Tables 3 through 5.

Table 3. Experimental group reading and writing abilities test using MANOVA analysis with repeated measures

Multivariate Test						
	n	$\bar{X}$	S.D	Λ	F	p-value
Reading	32	12.39	4.10			
Writing		10.59	2.27	.699	8.577***	.000

*** p –value < .001, (n=32).

The data presented in Table 3 indicates that the experimental group registered significantly in reading and writing in English at a .001 level after instruction through CAI based TLS method (multivariate Λ = .699, F-statistic = 8.577, p-value = .000), and Figure 1 demonstrated that the experimental group had more development in reading and writing in English after the training.

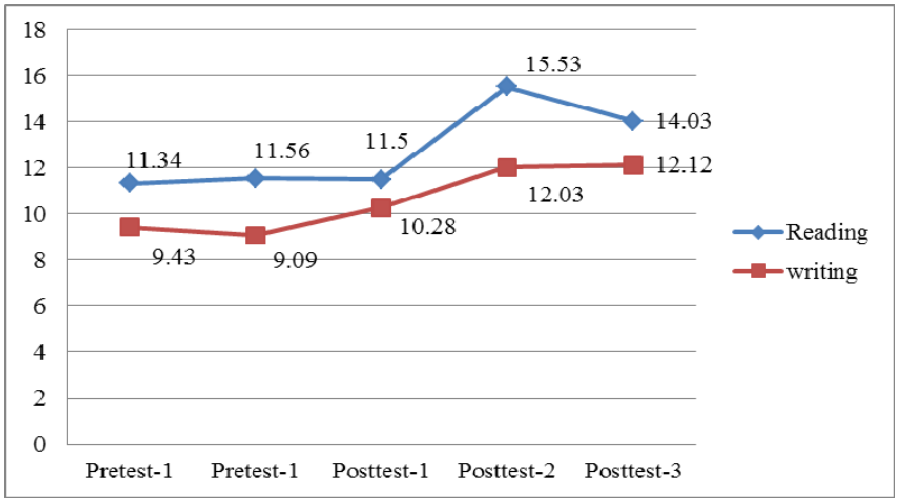

Figure 6. Line graph of the comparison of the experimental group development in English reading and writing

Table 4. Experimental group development test on reading using ANOVA analysis with repeated measures

Reading Ability					
Times	Pretest (1)	Pretest (2)	Posttest (1)	Posttest (2)	Posttest (3)
Mean（X）	11.34	11.56	11.50	15.53	14.03
Standard Deviation (S.D.)	3.73	4.66	3.50	3.91	4.02
	Λ = .512, F-statistic = 6.667*** p – value = .001				
UnivariateTest	$F_{(Pretest\ 1 - Pretest\ 2)}$ = .219 p – value = 1.000				
		$F_{(Pretest\ 2 - Posttest\ 1)}$ = .063* p – value = .038			
			$F_{(Posttest\ 1 - Posttest\ 2)}$ = 2.030** p – value = .007		
				$F_{(Posttest\ 2 - Posttest\ 3)}$ = .500 p – value = 1.000	
	$F_{(Posttest\ 3 - Pretest\ 1)}$ = 2.688** p – value = .009				
Treatment Effect (effect size)	Partial η^2 = .488				

* p –value < .05 ** p –value < .01 *** p –value < .001.

In Table 4, the comparison of the development in reading indicated that the experimental group registered higher development in reading at a .001 level (Λ = .512, F-statistic = 6.667, p-value = .001). A univariate test comparison between Pretest 1 and Pretest 2 was not significant ($F_{(Pretest\ 1–Pretest\ 2)}$ = .219, p-value = 1.000).The comparison between Pretest 2 and Posttest 1 was significant at a .05 level ($F_{(Pretest\ 2–Posttest\ 1)}$ = .063, p-value = .038), and the comparison between Posttest1 and Posttest 2 was significant at a .01 level ($F_{(Posttest\ 1–Posttest\ 2)}$ = 2.030, p-value = .007). In addition, the comparison between Posttest 2 and Posttest 3 was not significant ($F_{(Posttest\ 2–Posttest\ 3)}$ = .500, p-value = 1.000), while the comparison between Posttest3 and Pretest 1 was significant at a .01 level ($F_{(Pretest\ 1–Posttest\ 3)}$ = 2.688, p-value = .009).

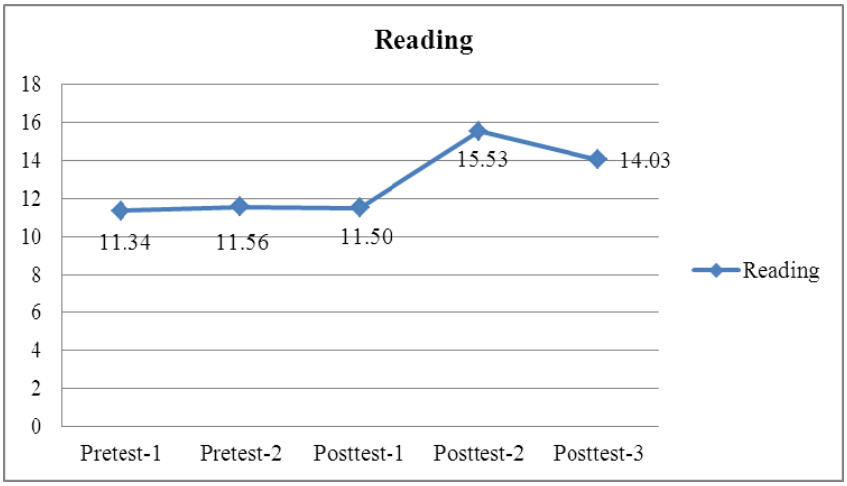

Figure 7. Line graph comparison of the development in reading of the experimental group

Table 5. Experimental group development tests in creative writing using ANOVA analysis with repeated measures

	Writing Ability				
Time	Pretest (1)	Pretest (2)	Posttest (1)	Posttest (2)	Posttest (3)
Mean (X)	9.43	9.09	10.28	12.03	12.12
Standard Deviation (S.D.)	1.98	2.26	1.87	1.69	1.64
	Λ= .218, F-statistic = 25.13*** p – value = .000				
UnivariateTest	$F_{(Pretest\ 1–Pretest\ 2)}$ = .344 p– value = 1.000	$F_{(Pretest\ 2–Posttest\ 1)}$ = 1.188* p – value = .038	$F_{(Posttest\ 1–Posttest\ 2)}$ = 1.750** p – value = .003	$F_{(Posttest\ 2–Posttest\ 3)}$ = .094 p – value = 1.000	
	$F_{(Posttest\ 3–Pretest\ 1)}$ = 2.688*** p – value = .000				
Treatment Effect (effect size)	Partial η^2 = 782				

* p –value < .05 ** p –value < .01 *** p –value < .001.

In Table 5, the comparison of the development in writing indicated that the experimental group registered higher development in creative writing at a .01 level (Λ = .218, F-statistic = 25.13, p-value = .000). A univariate test comparison between Pretest 1 and Pretest 2 was not significant ($F_{(Pretest\ 1–Pretest\ 2)}$ = .344, p-value = 1.000), while

the comparison between Pretest 2 and Posttest 1 was significant at a .05 level ($F_{(Pretest\ 2–Posttest\ 1)} = 1.188$, p-value = .038), and the comparison between Posttest 1 and Posttest 2 was also significant at a .01 level ($F_{(Posttest\ 1–Posttest\ 2)} = 1.750$, p-value = .003). In addition, the comparison between Posttest 2 and Posttest3 was not significant ($F_{(Posttest\ 2–Posttest\ 3)} = .094$, p-value = 1.000), while the comparison between Posttest 3 and Pretest 1 was significant at a .001 level ($F_{(Pretest\ 1–\ Posttest\ 3)} = 2.688$, p-value = .000).

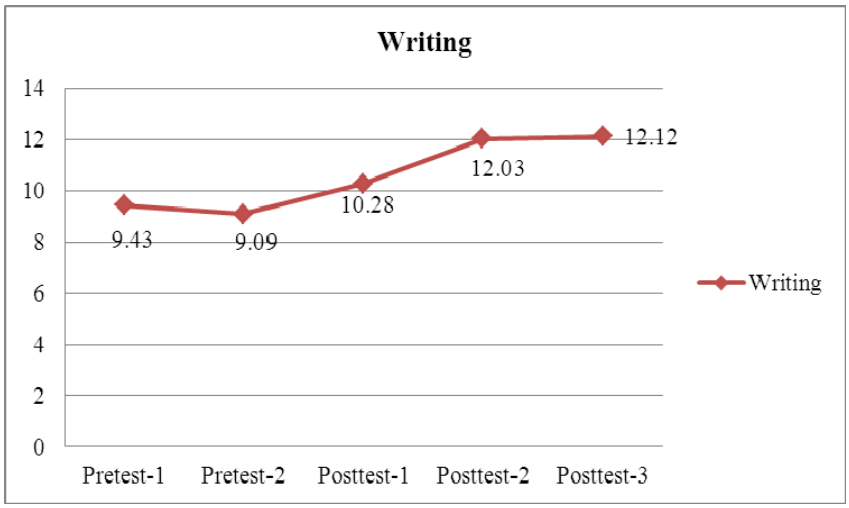

Figure 8. Line graph comparison of the experimental group development in reading

The findings in Tables 1 to 3 demonstrate the conclusion that the experimental group registered significance in reading and writing in English at a .001 level. After the training, the experimental group improved their reading by 48% with significance at a .001 level ($\bar{X}$ = 11.34, 11.56, 11.50, 15.53, and 14.03, respectively) and improved their creative writing by 78% with significance at a .001 level ($\bar{X}$ = 9.43, 9.09, 10.28, 12.03, and 12.12, respectively) after learning through the CAI based TLS method.

The result of the second question "Are ninth grade students' interests in English significantly boosted after the training?" is shown in Tables 6 and 7.

The data presented in Table 4 showed that the experimental group registered a higher overall interest in learning English after learning through the CAI based TLS method.

Table 6. Test of significance in the overall satisfaction of learning through CLE instruction model III in the experimental group using the *t*-test.

	n	**Interest in Learning English**		**t**	**p-value**
		X	S.D.		
Experimental group	**32**	3.66	0.82	2.890**	.008

** p-value< .01.

Table 7. Analysis of basic statistical data regarding the experimental group's interest in learning English through the CAI based TLS method

Interest in learning English		X	S.D.	Level
1)	I am always enthusiastic when I turn to English class.	3.81	0.91	Much
2)	I feel happy and funny while learning English.	3.92	0.76	Much
3)	Learning English course helps open our vision.	4.3	0.74	Most
4)	I like to help my classmates in learning English when I understand the lesson deeply.	3.46	1.02	Much
5)	I do not like any instruction taught in English.	3.3	1.24	Moderate
6)	I always participate in English activities intently.	3.54	0.84	Much
7)	I think that English is not important and useful to me.	3.95	1.29	Much
8)	The English instruction taught in the class activates me to be an active learner.	3.51	0.90	Much
9)	English brings stress to learners.	3.24	1.14	Moderate
10)	I feel that I was forced by the teacher to participate in English activities.	3.14	1.25	Moderate
11)	English knowledge supports learning in every subject.	4.0	0.82	Much
12)	I always ask the teacher some questions when I do not understand the lesson.	2.95	1.05	Moderate
13)	I do not like to review and do any English assignment.	2.84	0.96	Moderate
14)	English is difficult and has so many rules that bring some confusion to learners.	3.16	1.34	Much
15)	The English instruction provided is suitable with technology progress.	3.86	0.82	Much
16)	The English instruction provided is sequenced step by step which learners can understand easily.	3.92	0.76	Much
17)	The English instruction provided is useful and is able to communicate in daily life.	4.16	0.80	Much
18)	English is important for every career.	4.41	0.76	Most
19)	The English instruction taught through the Computer Assisted Instruction with Top-level Structure method helps develop both English reading and writing skills.	4.14	0.71	Much
20)	I always study more about what I have learned to understand deeply after finishing the class.	3.35	0.92	Much
21)	The instruction provided is not complicated to understand.	3.62	0.76	Much
22)	English skills help us progress in our careers.	4.11	0.77	Much
23)	I always use knowledge that I have learned in class to practice in daily life.	3.41	1.01	Much
24)	I always feel unhappy when I have to present any presentation in front the class.	2.78	1.23	Moderate
25)	All assignments provided help support both English reading and writing skills to be better.	3.92	0.83	Much
26)	The instruction provided is clear and consecutive.	3.97	0.69	Much
27)	The computer assisted program helps motivate interest in learning increasingly.	4.27	0.69	Most
Total		3.66	0.82	Much

The data interpretation; 1.00-1.80 = Least, 1.81-2.60 = Little, 2.61-3.40 = Moderate, 3.41-4.20 = Much, and 4.21-5.00 = Most.

5. Discussion

The results of the study are useful in the field of English language reading and creative writing education using the CAI based on the TLS Method. The experimental group registered significant results in reading, writing, and students' interests in learning. The results of this study may be explained by ninth grade students having significantly more development in English performance, especially in reading and writing skills at a .01 level (Λ = .699, F-statistic = 8.577, p-value = .000). The experimental group is able to read and create their own writing. The TLS method emphasizes teaching students to understand the way that ideas are ordered in the text. Students learn individually or in groups to locate the organization of the text and to use it to easily discover the main idea and supporting detail. Students benefit by learning to recall and memorize information and by knowing how to read and write effectively. Students not only know how to identify the main idea and how to summarize the text but also can understand the writing plan or text outline, which helps them understand the writer's purpose and text organization. When students learn and practice reading enough, they can be good writers because they can easily identify the main idea, symbols, idioms, etc. of the text and have better long-term memory. While students read the text, they can memorize the structure, understand the written plan, and identify the keywords of the different types of text along with the different purposes. Moreover, the TLS method can promote critical and creative thinking skills and can be practiced during class. The learning process of the TLS method focuses on active learning, providing more chances to use the language with the teacher's assistance. In addition, learning English reading and writing through CAI is flexible and interesting and facilitates learning in any location.

In addition, according to the findings, the posttest mean scores of the experimental group were higher than the pretest scores in reading (except posttest 1, [11.34, 11.56, 11.50, 15.53, and 14.03]), developing in reading at 48% (effect size = .488), and writing (9.43, 9.09, 10.28, 12.03, and 12.12), developing in writing at 78% (effect size = .782). Furthermore, the experimental group had higher interests in learning English after the training ($\bar{X}$ = 3.66, see data interpretation). The finding scores respond to many studies on TLS in Thailand and elsewhere, which have also shown that students are able to communication in English and Thai language in reading and writing, including listening and speaking (Bartlett, 1978; Rattanavich, 1987; Zhengfang, 2006; Sirirat, 2000; Lebsawasdi, 2002; Bamrung, 2005; Boon-On, 2006). After studying the development of ninth grade students through the findings, it can be concluded that the CAI with TLS can significantly improve learning English.

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