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Using Mind Mapping Strategy to Improve Reading Comprehension Ability to Intermediate Iranian Student

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Abstract. Reading is one of the language skills that should be mastered by the students after following a set of English Instruction at school. One of the targets of national curriculum for English at junior high-school (SMP) level is students' comprehension on various types of texts, such as recount, descriptive, and narrative. However, it is common that most students are observed being reluctant to read reading texts, even the short ones. Their lack of vocabulary mastery also limits their effort to achieve reading comprehension. The objective of this research is to find out whether using Mind Mapping technique is an effective way to increase the students' ability in reading comprehension. The population of this research was the second year students of Iranian classes that consists of seven classes and two classes were chosen as the experimental class and the try-out class. This research is quantities research. The research design was one group pretest posttest design. In collecting data, the researcher administered pretest, treatments, and posttest. In analyzing the data, the T- Test was employed to reach the significant value. Finally, comparing the RT of correct and wrong answers in the eight semantic maps, it was revealed that series of events chain was found to be the only map which demanded slow RT in processing wrong answers. Thus, it seems that the map demanded more cognitive load for processing expository texts. That is, wrong answers RT for series of events chain (M=6.32 Ms) was found to be more than correct answer RT (M=1.31 Ms).

Keywords: Mind Mapping, Reading, Reading Comprehension, EFL students

1. INTRODUCTION

Reading has been the subject of research study for over a century. Clarke (1980: 35) calls reading 'the most thoroughly studied and least understood process in education today'. Reading can be seen as an interactive process between a reader and a text. In this process the reader interacts dynamically with the text as he/she tries to elicit the meaning. Reading is the recognition of printed or written symbols, which serve as stimuli for the recall of meanings built up through the reader's past experience. It has also been described as a process of translating alphabetical symbols into a form of language from which the native speaker has already derived the meaning. According to Lawal (1996), readers use the symbols to guide the recovery of information from their repertoires and subsequently use this information to construct interpretations of the message. Adewole (2001) describes critical reading skill, which students need to read, explore, and appreciate a literary text effectively. The ability to read is a crucial skill for information retrieval (Dike, 2006). Oyerokun (1993) emphasizes the need to use appropriate techniques and materials in teaching. She further states that in order to achieve this, the school, teacher, and parents should work together to ensure improvement in reading performance. Reading comprehension is the ability to understand what one read where words have context and texts have meaning. Comprehension becomes especially important to students in the later elementary grades (Sweet and Snow, 2003) because it provides the foundation for

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further learning in secondary school. A students' academic progress is profoundly shaped by the ability to understand what is read. Reading comprehension can be understood as the process through which the recognized words are transformed into a meaningful idea (Hoover and Gough, 1990). Reading is vital for academic achievement and is an important and necessary skill for successful functioning as a competent adult in today's society (Human Resources and Social Development Canada, 2003c).

Comprehension is the reason for reading, comprehension is a highly complex cognitive process involving the intentional interaction between the reader and the text to meaning (National Reading Panel, 2000). Effective learning which comes from active students' participation can ultimately shape their language development (Vygotsky, 1978). In the traditional method students are expected to read a variety of texts which differ in content, and readability. They are not interested in what they are reading. They do not interact with the text they read. The teaching style is heavily teacher-centered and many of the activities in their classrooms are focused on rote learning. Learners who struggle with comprehension possess inefficient strategies and use them inflexibly. They are usually unaware of what good comprehenders do and need to be shown how and when to apply a small repertoire of comprehension strategies (Vygotsky, 1978).. As Baker and Brown (1984) point out, such kind of awareness and control of one's reading activity, or the ability to monitor one's own comprehension, is highly important. This is supported by Brown and Smiley (1978) who noted that only about half of the eighth graders in their analysis, when given an opportunity to study content material, revealed any sign of strategy use. Providing students with explicit instruction in comprehension strategies can be an effective way to help them overcome difficulties in understanding texts (Graham and Bellert, 2004). Teaching reading has not been given much care in our schools and universities. However, a large number of EFL students still have poor reading comprehension.

The problem occurs not only at the Elementary level but also at the high school education and the higher education. Our students are not taught how to learn; rather the burden of learning is dependent upon the students' own ability in organizing and structuring information into memory. They also have difficulty tying information throughout a text together and making inferences with that information the students who have low ability in reading comprehension cannot reorganize the information learned from the text and cannot connect their own knowledge to the new information received from the reading text, and most students lack motivation to read (Baldick, 2001).

Teachers are always looking for innovative ways to help students improve their reading comprehension. From among various types of learning strategies, reading comprehension strategies have long been recognized by researchers of second/foreign language reading (Brantmeier, 2002; Janzen, 1996; Slataci and Akyel, 2002).

Reading strategies have been defined by some theorists. They are referred to as mental operations which are used by readers when they read a text and try to understand it effectively (Barnett, 1988). In the past, reading was considered a relatively static activity. General meaning was imbedded in the text, and the readers job was to understand what was being transmitted via the words on the page.(Childs, 2006).

Current researches view reading as a more dynamic process in which the reader constructs meaning based on information s/he gathers from the text.

The teacher acts as both the facilitator and instructor where the learners are engaged in active interactive strategic processes that develop meaningful comprehension (Cassidy et al., 2010). Anderson and Pearson (1984) contented that the reader comprehends a text by actively

constructing meaning internally from interacting with the materials that are read. Reading is a process that involves numerous mental activities; therefore, in order for students to understand the main idea of a text, they need to employ tools which can advance text comprehension (Kang, 2004). Many studies have been conducted in recent years regarding how to find ways influential in enhancing reading comprehension of students.

Visual illustrations can help EFL students with comprehension. In addition to pictures, teachers can utilize graphic organizers to help students make Connections between key ideas. Concept Maps have been highly recommended and widely used in first language (L1) as well as second language (L2) instruction by language teachers. Concept mapping as a learning strategy changes the learning direction from teacher-based to student-based by activating the learner in learning process. Concept maps are universal in nature. They may be applied to expand learning and success of many students, including those who may be intellectually gifted to those with mild learning problems. The aim of the present study is to find out whether concept mapping as a teaching strategy has influence on EFL reading comprehension. (Ellis, 2004)

A mind map is a graphic organizer in which the major categories radiate from a central idea and sub-categories are represented as branches of larger branches. It is a visual tool that can be used to generate ideas, take notes, organize thinking, and develop concepts. Teachers can use it to enhance learning. It is helpful for visual learners as an illustrative tool. It is a skill that cuts across ability levels and encompasses all subject matters. It enables students to better organize, prioritize, and integrate material presented in a course. Three-dimensional mind maps are a highly effective tool for providing kinesthetic and sensory experiences for young children. (Ashman, 1993)

Mind mapping is a visual form of note taking that offers an overview of a topic and its complex information, allowing students to comprehend, create new ideas and build connections. Through the use of colors, images and words, mind mapping encourages students to begin with a central idea and expand outward to more in-depth sub-topics. Mind mapping helps students structure and order their thinking by creating a visual representation of concepts and their understanding. (Callahn, 1990). In this regard, the purpose of the present study is:

1- To examine whether the use of mind mapping technique can improve intermediate Iranian EFL students' reading comprehension abilities.

2- To investigate the students' attitude towards the use of mind mapping technique.

2. LITERATURE REVIEW

Mind maps go under a variety of names. They are known as concept maps, semantic mapping, knowledge mapping, think-links, graphic organizers or cognitive maps (Svantesson, 1989).According to Buzan (1993), mind maps attempt, visually and graphically, to portray a relationship of ideas or concepts. In this study I will refer to these maps as 'mind maps'.

The term 'mind mapping' was first used by Buzan (1993) who describes it as an instructional strategy where the learner "places supra-ordinate concepts on paper and subsequently links sub-ordinate concepts as appropriate" (p.59). It is seen as a powerful tool to help students overcome problems with the organization of their ideas and thoughts (McGriff, 2000). According to McGriff, "mind maps are an excellent way to help learners organize knowledge, to empower themselves to better comprehend the key concepts, and principles in lectures, readings, or other instructional materials" (2000, p.9).

Buzan (1993) describes mind maps as a representation of cognition and comprehension in the learner, and as an excellent way to help learners to express themselves both verbally and visually. Indeed, in their mind map, learners may use graphic representation which may help in the brainstorming process.

McGriff (2000) found that relating images to concepts is a creative task which requires thinking instead of memorizing. A recent study shows that students who could express their learning with visual skills had a 40% higher retention rate than that of just verbal learners (Adam & Mowers, 2007). This shows the potential importance of using this technique in writing classes, and it seems it is a useful strategy to support students during writing tasks.

Even with the research that has been presented about the advantages of using the mind mapping technique, mind mapping has been considered by some writers not to be a useful skill. For example, sometimes it could be time consuming for the teacher to present and for the student to grasp, especially if the student is inexperienced, or uncreative (Buzan, 1993). This may be especially true when using this strategy in an exam situation if students are not familiar with the concept of the mind mapping strategy in such conditions. Therefore, it could be said that teachers need to give students plenty of opportunities to practice this strategy before the exam so they can use it in exams wisely and effectively.

Many studies have attempted to incorporate the use of mind mapping techniques to improve learners' reading comprehension ability at different levels ranging from elementary to high school. For example, a study (Singtui, 2008) employed mind mapping techniques to develop reading comprehension skills in English for communication of Mattayomsuksa 3 students and found that there were 40 students of which 86.96% passed the prescribed criterion of 75%. A study (Deesri, 2002) conducted with Mathayomasuksa 1 students discovered that the English reading comprehension post-test mean score of students who were taught by mind mapping techniques was significantly higher than those of the pre-test. The students' attitude towards the mind mapping techniques also increased. Maestas&Croll (1985) carried out a study on the effects of training in story mapping procedures on the reading comprehension of poor readers. It was found that there was an increase on the students' ability to answer comprehension questions and increased tendency to maintain story mapping component in their story recall. The results of the aforementioned studies indicate that mind mapping technique can help improve students' reading comprehension ability, especially poor readers. The present work, thus, adopts the use of mind mapping techniques to improve the poor readers' reading ability at Rajabhat University, Songkhla. In addition, an effort is made to investigate the students' attitude towards the use of mind mapping techniques to enhance their reading ability.

3. READING

Reading can be seen as an interactive□ process between a reader and a text which leads to automaticity or (reading fluency). In this process, the reader interacts dynamically with the text as he/she tries to elicit the meaning and where various kinds of knowledge are being used: linguistic or systemic knowledge (through bottom-up processing) as well as schematic knowledge (through top-down processing). Since reading is a complex process, Grabe argues that many researchers attempt to understand and explain the fluent reading process by analyzing the process into a set of component skills □(1991, p. 379) in reading; consequently researchers proposed at least six general component skills and knowledge areas:

1. Automatic recognition skills
2. Vocabulary and structural knowledge
3. Formal discourse structure knowledge
4. Content/world background knowledge

5. Synthesis and evaluation skills/strategies
6. Meta cognitive knowledge and skills monitoring

The Cognitive Tasks Involved in Reading

Carrell and Eisterhold outline the processes involved in this interactive process where both bottom-up and top-down processing occur simultaneously at all levels:

The data that are needed to instantiate, or fill out, the schemata become available through bottom-up processing; top-down processing facilitates their assimilation if they are anticipated by or consistent with the listener/readers conceptual expectations.

Bottom-up processing ensures that the listeners/readers will be sensitive to information that is novel or that does not fit their ongoing hypotheses about the content or structure of the text; top-down processing helps the listeners/readers to resolve ambiguities or to select between alternative possible interpretations of the incoming data. (1983, p. 557)

Researchers, however, are still investigating the ways through which these two kinds of knowledge interact with each other during the process of reading. Jeanne S. Chall, an advocate of the phonics approach, is known for her continued struggle with the war between those advocating phonics instruction [bottom-up processing] and those advocating whole language [top-down processing], which relies in part on instruction using sight words. a (Abraham, 2002, p. 1) Chall argues that systematic direct teaching of decoding should be part of initial reading instruction (Orasanu, 1986, p. 114). Other bottom-up theorists included Gough (1972), LaBerge and Samuels(1974). Carrell and Eisterhold (1983) state that accessing appropriate content schemata depends initially on â€œthe graphic display which must be somehow reconstructed by the reader as meaningful language (p. 562). Therefore, readers can improve reading comprehension by expanding their vocabularies and gaining greater control over complex syntactic structures. Contemporary insights believe that grammar facilitates learning and its presentations to learners should be through contextualization of linguistic forms in situations of natural use (Hedge, 2003, p. 159)

Iversen & Tunmer list the five stages for developing word recognition which were proposed by Spencer and Hay:
i) Glance and guess;
ii) Sophisticated guessing;
iii) Simple phoneme-to-grapheme correspondences (e.g. letter sounding out);
iv) Recognition of analogy (recognition of word patterns within a word, such as and in sand);
v) later word recognition, involving compound words and syllabification (e.g. Recognizing playground as play plus ground). (Spencer & Hay, 1998, p. 223).
When a child is confronted with an unfamiliar word, he/she is first encouraged to look into the word for familiar letter and spelling patterns, and then to use context as back up support to confirm hypotheses as to what that word might be, e.g. make is m plus ake, as cake is c plus ake.

Moorman and Ram (1994, p. 646) propose their functional theory which aims at Describing the cognitive tasks involved in reading through the ISAAC (Integrated Story Analysis and Creativity) system.

3.1. Types of Reading
3.1.1. Extensive Reading

There have been conflicting definitions of the term extensive reading. (Hedge, 2003, p. 202) Some use it to refer to describe skimming and scanning activities, others associate it to quantity of material. Hafiz and Tudor state that:

The pedagogical value attributed to extensive reading is based on the assumption that exposing learners to large quantities of meaningful and interesting L2 material will, in the long run, produce a beneficial effect on the learners command of the L2. (1989,p. 5).

Inspired by Krashens Input Hypothesis, researchers have shown renewed interest in extensive reading in recent years. This is seen most clearly in various trends adopted by ELT institutions. Students are urged to read independently by using the resources within their reach (Hedge, 2003, p. 200-201). Besides, there has been a growing interest in researching the value of extensive reading. Hafiz and Tudor (1989) conducted a three-month extensive reading programme as an extra activity. The subjects were Pakistani ESL learners in a UK school and their parents were manual workers with limited formal education. The results showed a marked improvement in the performance of the experimental subjects, especially in terms of their writing skills. The subject's progress in writing skills may be due in part to exposure to a range of lexical, syntactic, and textual features in the reading materials as well as the nature of the pleasure-oriented extensive reading. (Hafiz & Tudor, p. 8).

Hedge believes that extensive reading varies according to student's motivation and school resources. A well-motivated and trained teacher will be able to choose suitable handouts or activities books for the students. The Reading Teacher journal, for example, publishes a list (Appendix A) every November of over 300 newly published books for children and adolescents that have been reviewed and recommended by teachers.

Hedge (2003) also states that since extensive reading helps in developing reading ability, it should be built into an EFL/ESL programmes provided the selected texts are authentic i.e. Not written for language learners and published in the original language (p. 218) - and graded. Teachers with EFL/ESL learners at low levels can either use pedagogic or adapted texts. Moreover, extensive reading enables Learners to achieve their independency by reading either in class or at home, through sustained silent reading (SSR). Carrell and Eisterhold (1983) argue that SSR activity can be effective in helping learners become self-directed agents seeking meaning provided an SSR program is based on student-selected texts so that the students will be interested in what they are reading. Students select their own reading texts with respect to content, level of difficulty, and length. (p. 567).

Hedge (2003), however, argues that one is not sure whether Krashens comprehensible input hypothesis facilitates intake in SL learners since it is difficult to know exactly how any learner will actually use the input available (p. 204). However, it can be seen as an input-enabling activity. (ibid) No one can deny the fact that extensive reading helps greatly in exposing SL learners to English and especially when the class time is limited. Hedge briefs the advantages of extensive use in the following lines:

Learners can build their language competence, progress in their reading ability, become more independent in their studies, acquire cultural knowledge, and develop confidence and motivation to carry on learning. (ibid, p. 204-205).

3.1.2. Intensive Reading

In intensive (or creative) reading, students usually read a page to explore the meaning and to be acquainted with writing mechanisms. Hedge argues that it is only through more extensive reading that learners can gain substantial practice in operating these strategies more independently on a range of materials. (ibid, p. 202) These strategies can be either text-related or learner-related: the former includes an awareness of text organization, while the latter includes strategies like linguistic, schematic, and meta-cognitive strategies. Hafiz and Tudor (1989) differentiate between extensive and intensive reading:

In intensive reading activities learners are in the main exposed to relatively short texts which are used either to exemplify specific aspects of the lexical, syntactic or discoursal system of the L2, or to provide the basis for targeted reading strategy practice; the goal of extensive reading, on the other hand, is to flood learners with large quantities of L2 input with few or possibly no specific tasks to perform on this material. (p. 5)

3.1.3. Purposes for reading

The two main purposes for reading at the middle primary level are described in Box 4.1. PIRLS-05/06 used two numerical scales to look at student achievement in the two purposes for reading: reading for literary purposes and reading for informational purposes. To enable countries to compare their students' relative performance in each of the purposes for reading, the international mean for each purpose was scaled to 500, the same as for the PIRLS international scale mean.

Table 1. The PIRLS-05/06 purposes for reading.

Reading for literary experience	Reading to acquire and use information
The reader becomes involved in imagined events, settings, actions, consequences, characters, atmosphere, feelings, and ideas; he or she brings an appreciation of language and knowledge of literary forms to the text. This is often accomplished through reading fiction.	The reader engages with types of texts where she or he can understand how the world is and has been, and why things work as they do. Texts take many forms, but one major distinction is between those organized chronologically and those organized non-chronologically. This area is often associated with information articles and instructional texts.

Source: Mullis, et al., 2006.

The following study attempts to answer the following questions:

1-What is the mind mapping imply on EFL student's reading skill?

2- Can mind map technique improve EFL students' reading comprehension?

3- Which strategies should be picked up by EFL teachers in order of applying an effective mind mapping?

4- What are the students' responses toward the use of the mind mapingp technique?

4. METHODOLOGY

4.1. Participants

The subjects will be 35 Iranian Intermediate students that attend English institute in Tehran in order of learning English for communication and reading skills.

SongkhlaRajabhat University, MuangSongkhla who were learning "English for communication and reading skills" as a compulsory subject were asked to do pre- test in order to check the students' reading ability before the treatment and their mean score on the pre-test were 11.17. After the explanation of writing mind mapping, they were taught by the lesson plans for mind mapping technique for 4 plans and were asked to do post- test to assess their reading progress and their post-test mean score were 12.25. The questionnaires were launched after the post- test and followed by oral interview.

4.2. Instruments

To assess the progress of reading comprehension the pre- and post- test will be used. The tests will be designed to assess understanding or reading comprehension rather than vocabularies. These tests consist of 30 items with 4 multiple choices. The tests will last 1.30hours. A questionnaire will be conducted to gain the information about teaching reading comprehension using mind mapping technique in various aspects. There will be 16 questions asking about the satisfaction of reading ability both in speed and accuracy, the enthusiasm for group work activities, the importance of mind mapping technique in practicing post reading activities, the problems that the students have from constructing mind maps, the mind mapping teaching process, and the application of mind maps in other subjects. The questionnaire consists of open ended questions inquiring about the skills the students think they have developed and the problems they have while constructing mind maps. To obtain in-depth information, I will conduct oral interviews with representative of the students from 3 groups. There will be the students who receive higher score, lower score, and the students who receive the same score.

4.3. Procedures

4.3.1. Data Collection procedure

The experiment will be carried out with one class of intermediate students at English institute. During the experiment, the students will receive some texts of *English for Communication and Reading Skills...* The course focus will be on reading comprehension. The overall data collection procedure consists of the following (1) administration of the pre- test,(2) administration of post- test (3) questionnaire and (4) oral interview.

4.3.2. Data Analysis procedure

The data on the pre- and post- test will be collected, and analyzed with the SPSS program. Percentages and mean scores on the pre- and post- test will be calculated to identify the progress in reading comprehension. T- Test for dependent samples will be utilized to determine significant differences between the mean scores on the pre- and post- test. The data from questionnaire will be analyzed by categorizing and using frequencies and percentages. The data from the oral interviews will be categorized.

5. RESULTS

5.1. Validity Test

In this study, the validity formula is computed by using Pearson Product Moment Correlation (Field, 2000). It is used to analyze the validity of each item and it was calculated through SPSS 19 for windows. Sugiyono (2011) states that an item is considered as a valid item if its r value is 0.3 or higher than 0.3. In addition, a high r value of an item shows a high level of validity.

5.2. Reliability Test

A good instrument does not have tendency to direct the respondent to choose particular answers. Hence, this study uses Cronbach's Alpha formula to measure the reliability of the instrument. George and Mallery (2003), as cited in Gliem and Gliem (2003:87), provide the following rules of Cronbach's Alpha reliability coefficient: _ > .9 "Excellent, _ > .8 - Good, _

> .7 Acceptable, _ > .6 Questionable, _ > .5 Poor, and _ < .5 Unacceptable.

5.3. Difficulty Level Test

The difficulty level test is aimed to measure whether an instrument is considered as difficult or easy. The formula below is used to analyze the level of the instrument:

$$P = \frac{B}{Js}$$

Where:
P = index of difficulty
B = the number of students who can answer the item correctly
Js = the number of all students
The index of difficulty level is classified as the table follows.

Table 2. The Classification of Difficulty Level Item

Index of difficulty	Interpretation
0.0- 0.30	Difficult item
0.30- 0.70	Moderate item
0.70- 1.00	Easy item

(Arikunto, 2010)

5.4. Normality Distribution Test

Normal distribution test is used to investigate whether a set of data is normally distributed or not. Kolmogorov-Smirnov test is used in this study using SPSS 19 for Windows (Field, 2000).

In conducting the normal distribution test, there are three steps that as follows.

1. Setting the alpha level. By default, this study test at 5% level of significance (two tailed). Then, stating the hypothesis:

H0: the pretest score are normally distributed

2. Analyzing the data by using Kolmogorov-Smirnov test through SPSS 19 for Windows

3. Interpreting the result of the test. If the significant value (Asymp.Sig) is less than 0.05 (Asymp.Sig < 0.05), the normality assumption is rejected. Meanwhile, if the Asymp.Sig is greater than 0.05 (Asymp.Sig > 0.05), the normality assumption is accepted (Field, 2005).

5.5. Data Analysis on Pre-test and Post-test

The pre-test and post-test scores are analyzed by comparing their means through dependent t-test to find out whether the difference between the pre- test and post-test mean score is significant or not. The dependent t-test is used to determine the degree of relationship between pairs of two or more variables (adopted from Hatch and Farhady, 1982).

The dependent t-test is calculated by using SPSS 19 for Windows. If the result of $t_{obtained}$ was less than $t_{crtitical}$ value at the 0.05 level of significance, the null hypothesis (H0) is not rejected and it can be concluded that there is no significant difference between two means. However, if $t_{obtained}$ is higher than $t_{crtitical}$ value at the 0.05 level of significance, the null hypothesis (H0) is rejected and it can be concluded that there is significant difference between two means (adopted from Field, 2005).

5.5.1. Data Analysis of Questionnaires

After both first and second questionnaires administered, this study used percentage of the students response toward the use of mind map technique.

5.5.2. Data Analysis of Interview

The interview is conducted to obtain the students response toward the use of mind map technique in their reading comprehension. The interview is analyzed by categorizing data into certain categories, presenting, and interpreting the result of interview. The result is used to verify the previous data collected.

5.5.3. Data Analysis

The first research question formulated whether semantic mapping instruction has significant influence on reading comprehension of expository texts by Iranian intermediate EFL learners. To investigate the impact of semantic mapping instruction on the participants reading comprehension, independent samples t-test was run. The descriptive statistics along with the results of the t-test for the two groups are presented in Tables1and 2 respectively.

Table 1. Independent samples t-test descriptive statistics for EG and CG

	group	N	Mean	Std. Deviation	Std. Error Mean
Reading comprehension	experimental	35	24.6000	3.31231	0.85524
	control	35	12.9333	2.01660	0.52068

Given the information in table 1, one can clearly see that the mean score obtained by experimental group (24.60) is higher than the mean score obtained by control group (12.93). However, independent samples t-test was run to ensure that the difference was significant. 2 shows that there is a significant difference in the scores obtained from the two groups because the probability value is substantially smaller than the critical value (0.000<0.05).Accordingly, it can be claimed that semantic mapping instruction was shown to exert a positive effect on the comprehension of expository texts.

The second research question asked whether certain types of semantic maps are more effective on comprehension of expository texts. First, the mean score in eight different semantic maps were analyzed for the probable significance. The descriptive statistics of comprehension scores in eight semantic maps are shown in table 3.The information in table 3 demonstrates that participants in experimental group outperformed in certain types of semantic maps. That is, participants of experimental group had the highest comprehension score in mind mapping questions (3.6). In addition, the participants got high scores in spider map, descriptive or thematic map (3.46), fishbone, network tree (3.2), and series of events chain (3.13).

Table 2. Descriptive statistics for the correct answers on post test of EG

Strategy	Mean	N	Std. Deviation
spider.map	3.4667	15	0.63994
fishbone.map	3.2000	15	0.94112
Mind. Mapping	3.6000	15	0.63246
descriptive	3.4667	15	0.74322
network tree	3.2000	15	0.56061
Problem. Solution	2.4667	15	1.12546
Compare. Contrast	2.0667	15	1.09978
Series of events	3.1333	15	0.74322
Total	3.0750	120	0.95409

Having gained some rudimentary information about the differences in the performance of members in eight semantic maps (eight sets of scores), the researchers had to determine whether the differences were significant at the critical level of $p<0.05$. Therefore, one-way ANOVA was used. The results of ANOVA can be seen in Table 4.

Table 3. The results of one-way ANOVA on the post test for correct answers of EG

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	30.058	7	4.294	6.145	0.000
Within Groups	78.267	112	0.69		
Total	108.325	119			

Given the information in table 4, one can conclude that the comprehension scores on the eight maps differed significantly because the probability value (0.000) is substantially smaller than the specified critical value ($0.00<0.05$). It should be determined where the observed differences lie, therefore a post Hoc Test was run. The test indicates where the differences among the comprehension scores on eight maps occur. Table 5 reveals the results of the Post-Hoc test.

Table 4. The results of the Post-Hoc Test for comprehension (correct answers) of eight maps

(I) strategy	(J) strategy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Spider map	Fishbone.map mind Mapping descriptive network tree problem solution compare contrast	0.26	0.30	0.38	-0.33	0.87
		-0.13	0.30	0.66	-0.73	0.47
		0.00	0.30	1.00	-0.60	0.60
		0.26	0.30	0.38	-0.33	0.87
		1.00*	0.305	0.00	0.39	1.60
		1.40*	0.30	0.00	0.79	2.00
Series of events		0.33	0.30	0.27	-0.27	0.93
Fishbone map spider.map mind mapping descriptive network tree problem solution compare contrast Series of events		-0.26	0.30	0.38	-0.87	0.33
		-0.40	0.30	0.19	-1.00	0.20
		-0.26	0.30	0.38	-0.87	0.33
		0.00	0.30	1.00	-0.60	0.60
		0.73*	0.30	0.01	0.12	1.33
		1.13*	0.30	0.00	0.52	1.73
		0.066	0.30	0.82	-0.53	0.67
Mind Mapping spider map fishbone map descriptive network tree Problem solution compare contrast Series of events		0.133	0.30	0.66	-0.47	0.73
		0.40	0.30	0.19	-0.20	1.00
		0.13	0.30	0.66	-0.47	0.73
		0.40	0.30	0.19	-0.20	1.00
		1.13*	0.30	0.00	0.52	1.73
		1.53*	0.30	0.00	0.92	2.13
		0.46	0.30	0.12	-0.13	1.07
descriptive spider.map fishbone.map mind.mapping network tree problem.solution compare.contrast Series of events		0.00	0.30	1.00	-0.60	0.60
		0.26	0.30	0.38	-0.33	0.87
		-0.13	0.30	0.66	-0.73	0.47
		0.26	0.30	0.38	-0.3381	0.87
		1.00*	0.30	0.00	0.39	1.60
		1.40*	0.30	0.00	0.79	2.00
		0.33	0.30	0.27	-0.27	0.93
network tree spider.map fishbone.map mind.mapping descriptive problem.solution compare.contrast Series of events		-0.26	0.30	0.38	-0.87	0.33
		0.00	0.30	1.00	-0.60	0.60
		-0.40	0.30	0.19	-1.00	0.20
		-0.26	0.30	0.38	-0.87	0.33
		0.73*	0.30	0.01	0.12	1.33

	1.13*	0.30	0.00	0.52	1.73
	0.6667	0.30	0.82	-0.53	0.67
Problem. Solution Spider map Fishbone map Mind mapping descriptive Network tree compare contrast Series of events	-1.00*	0.30	0.00	-1.60	-0.39
	-0.73*	0.30	0.01	-1.33	-0.12
	-1.13*	0.30	0.00	-1.73	-0.52
	-1.00*	0.30	0.00	-1.60	- 0.39
	-0.73*	0.30	0.01	-1.33	-0.12
	0.40	0.30	0.19	-0.20	1.00
	-0.66*	0.30	0.03	-1.27	0 .06
Compare. Contrast spider.map fishbone.map mind.mapping descriptive network tree problem.solution Series of events	-1.40*	0.30	0.00	-2.00	-0.79
	-1.13*	0.30	0.00	-1.73	0.52
	-1.53*	0.30	0.00	-2.13	0 .92
	-1.40*	0.30	0.00	-2.00	-0.79
	-1.13*	0.30	0.00	-1.73	0.52
	-0.40	0.30	0.19	-1.00	0.20
	-1.06*	0.30	0.00	-1.67	-0.046
Series of events spider.map fishbone.map mind.mapping descriptive network tree problem.solution compare.contrast	-0.33	0.30	0.27	-0.93	0.27
	-0.06	0.30	0.82	-0.67	0.53
	-0.46	0.30	0.12	-1.07	0.13
	-0.33	0.30	0.27	-0.93	0.27
	-0.06	0.30	0.82	-0.67	0.53
	0.66*	0.30	0.03	0.06	1.27
	1.06*	0.30	0.00	0.46	1.67

*. The mean difference is significant at the 0.05 level.As indicated by the Post-Hoc Test, comprehension scores in compare-contrast matrix and problem-solution outline is significantly different from the other six semantic maps and there seem to be no significant difference among other six maps-mind mapping, spider map, fishbone, network tree, descriptive or thematic map, and series of events chain. As a result, it can be claimed that certain types of semantic maps lead to improving reading comprehension of EFL learners.

The third research question asked whether certain types of semantic maps demand more RT for processing reading passages. The descriptive statistics of the scores obtained from the on-line post-test demonstrates that certain types of semantic maps require more time for processing texts. In fact, one can see in Table 6 that the mean scores obtained by EG in series of events chain (188418.16 ms) exceeds the mean score of problem-solution (174442.62 ms) which is, in turn, higher than the mean score belonging to compare-contrast matrix (156458.91 ms).

Table 5. Descriptive statistics for total RT (wrong and correct) of EG on the eight semantic maps

Strategy	Mea	N	Std. Deviation
Spider map	93003.841133	35	43344.645874
fishbone.map	124503.21706	35	43975.518947
Mind mapping	115548.42306	35	32874.440854
descriptive	118283.56580	35	55089.669169
Network tree	109332.27013	35	36180.989785
Problem solution	174442.62053	35	65939.698524
Compare contrast	156458.91266	35	58573.414629
Series of events	188418.16886	35	77515.392213
Total	134998.87740	35	61031.066093

Some rudimentary information about the differences in the RT of the members in the eight maps is presented in Table 6. In order to determine whether the observed differences were significant at the critical level of $p<0.05$, the one-way ANOVA was conducted. Table 7 provides the results of the ANOVA.

Table 6. The results of one-way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	120903017818.897	7	17271859688.41	6.00	0.000
Within Groups	322347114572.151	112	2878099237.251		
Total	443250132391.048	119			

The information in table 7 indicates that the eight maps differ significantly because the significant value is observed to be 0.000 which is less than the critical value (0.05). Although the information presented in Table 7 is revealing, it does not show where the observed differences lie. Therefore, a post hoc test had to be run. The results of the Post Hoc Test are provided in Table 8.

Table 7. The results of the Post-Hoc Test

(I) strategy	(J) strategy	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
spider.map	fishbone.map Mind mapping descriptive	-31499.37	19589.45	0.11	-7.031336E4	7314.608857
		-22544.58	19589.45	0.25	-6.135857E4	1.626940E4
		-25279.72	19589.45	0.20	-6.409371E4	1.353426E4
network tree Problem solution Compare contrast Series of events		-16328.42	19589.45	0.40	-5.514241E4	2.248556E4
		-81438.77*	19589.45	0.00	-1.202528E5	-4.262479E4
		-63455.07*	19589.45	0.00	-1.022691E5	-2.464109E4
		-95414.32*	19589.45	0.00	-1.342283E5	-5.660034E4
spider.map Mind mapping descriptive		31499.37	19589.45	0.11	-7.314609E3	7.031336E4

network tree Problem solution Compare contrast Series of events	8954.79	19589.45	0.64	-2.985919E4	4.776878E4
	6219.65	19589.45	0.75	-3.259433E4	4.503364E4
	15170.94	19589.45	0.44	-2.364304E4	5.398493E4
	-49939.40*	19589.45	0.01	-8.875339E4	-1.112542E4
	-31955.69	19589.45	0.10	-7.076968E4	6858.289190
	-63914.95*	19589.45	0.00	-1.027289E5	-2.510097E4
g spider.map fishbone.map descriptive network tree problem.solution compare.contrast Series of events	22544.58	19589.45	0.25	-1.626940E4	6.135857E4
	-8954.79	19589.45	0.64	-4.776878E4	2.985919E4
	-2735.14	19589.45	0.88	-4.154913E4	3.607884E4
	6216.15	19589.45	0.75	-3.259783E4	4.503014E4
	-58894.19*	19589.45	0.00	-9.770818E4	-2.008021E4
	-40910.48*	19589.45	0.03	-7.972447E4	-2.096505E3
	-72869.74*	19589.45	0.00	-1.116837E5	-3.405576E4
spider.map fishbone.map mind.mapping network tree problem.solution compare.contrast Series of events	25279.72	19589.45	0.20	-1.353426E4	6.409371E4
	-6219.65	19589.45	0.75	-4.503364E4	3.259433E4
	2735.14	19589.45	0.88	-3.607884E4	4.154913E4
	8951.29	19589.45	0.64	-2.986269E4	4.776528E4
	-56159.05*	19589.45	0.00	-9.497304E4	-1.734507E4
	-38175.34	19589.45	0.05	-7.698933E4	638.637923
	-70134.60*	19589.45	0.00	-1.089486E5	-3.132062E4
spider.map fishbone.map mind.mapping descriptive problem.solution compare.contrast Series of events	16328.42	19589.45	0.40	-2.248556E4	5.514241E4
	-15170.94	19589.45	0.44	-5.398493E4	2.364304E4
	-6216.15	19589.45	0.75	-4.503014E4	3.259783E4
	-8951.29	19589.45	0.64	-4.776528E4	2.986269E4
	-65110.35*	19589.45	0.00	-1.039243E5	-2.629637E4
	-47126.64*	19589.45	0.01	-8.594063E4	-8.312658E3
	-79085.89*	19589.45	0.00	-1.178999E5	-4.027191E4
n spider.map fishbone.map mind.mapping descriptive network tree compare.contrast Series of events	81438.77*	19589.45	0.00	4.262479E4	1.202528E5
	49939.40*	19589.45	0.01	1.112542E4	8.875339E4
	58894.19*	19589.45	0.00	2.008021E4	9.770818E4
	56159.05*	19589.45	0.00	1.734507E4	9.497304E4
	65110.35*	19589.45	0.00	2.629637E4	1.039243E5
	17983.70	19589.45	0.36	-2.083028E4	5.679769E4
	-13975.54	19589.45	0.47	-5.278953E4	2.483844E4
st spider.map fishbone.map mind.mapping descriptive network tree problem.solution Series of events	63455.07*	19589.45	0.00	2.464109E4	1.022691E5
	31955.69	19589.45	0.10	-6.858289E3	7.076968E4
	40910.48*	19589.45	0.03	2096.504810	7.972447E4
	38175.34	19589.45	0.05	-638.637923	7.698933E4
	47126.64*	19589.45	0.01	8312.657743	8.594063E4
	-17983.70	19589.45	0.36	-5.679769E4	2.083028E4
	-31959.25	19589.45	0.10	-7.077324E4	6854.728590
s spider.map fishbone.map mind.mapping descriptive network tree problem.solution compare.contrast	95414.32*	19589.45	0.00	5.660034E4	1.342283E5
	63914.95*	19589.45	0.00	2.510097E4	1.027289E5
	72869.74*	19589.45	0.00	3.405576E4	1.116837E5
	70134.60*	19589.45	0.00	3.132062E4	1.089486E5
	79085.89*	19589.45	0.00	4.027191E4	1.178999E5

	13975.54	19589.45	0.47	-2.483844E4	5.278953E4
	31959.25	19589.45	0.10	-6.854729E3	7.077324E4

*. The mean difference is significant at the 0.05 level.

By a closer inspection on table, it can be claimed that the mean score of RT in each of series of events chain, compare-contrast matrix, and problem-solution outlines is significantly different from the other six maps. Thus, certain types of semantic maps demanded more RT in processing texts.

The study attempted to investigate the effects of semantic mapping strategy on reading comprehension of intermediate EFL learners. Thus, the main objectives of the study were (a) to investigate the effect of semantic mapping on reading comprehension of expository texts, (b) to explore the effectiveness of certain types of semantic maps which lead to improving reading comprehension of expository texts, and (c) to examine the effectiveness of certain types of semantic maps which demanded faster RT for processing information of expository texts. Thus, the following major results emerged from the study.

First, the fact that learners who received semantic mapping instruction did significantly better on the post-test suggests that semantic mapping technique was effective in leading learners to comprehend expository texts better. This is in line with the previous studies that report the benefits of semantic mapping instruction (Scanlon et al., 1992; Zaid, 1995; El Koumy, 1999; Kim et al., 2004; Mede, 2010; Mohammadi et al., 2010). Moreover, applying different type of semantic maps for the comprehension of expository texts is in compliance with the findings of Schmidt (1986).

Second, the results for EG demonstrates that certain types of semantic maps – mind mapping, spider map, fishbone, network tree, descriptive or thematic map, and series of events chain – are more effective on comprehension of expository texts. Using different types of semantic maps for classroom instruction is in line with previous studies: Schmidt believes that the shape of maps alone communicates some essential relationships. Moreover, the present study indicated that applying mind mapping with semantic aspect was the best strategy. The significant improvement of EG comprehending texts with use of mind mapping can be justified considering the findings of Sok Fun and Maskat(2010) that student-centered mind mapping indicated significant increase in the students' test score.

Third, certain types of semantic maps demand faster RT for processing expository texts. The study revealed that the students read faster through the application of spider map, network tree, mind mapping, descriptive or thematic, and fishbone, whereas they read more slowly through the use of series of events chain, problem-solution, and compare-contrast matrix. Thus, it can be claimed that as types of semantic maps – series of events chain, problem-solution, and compare-contrast matrix – need more time for processing expository texts. Although series of events chain worked well for comprehension, it requires more time for processing information.

Finally, comparing the RT of correct and wrong answers in the eight semantic maps, it was revealed that series of events chain was found to be the only map which demanded slow RT in processing wrong answers (see Appendix A). Thus, it seems that the map demanded more cognitive load for processing expository texts. That is, wrong answers RT for series of events chain (M=6.32 Ms) was found to be more than correct answer RT (M=1.31 Ms).

4. CONCLUSION

The findings clearly demonstrate that semantic mapping may serve as a useful graphic strategy for improving reading comprehension. More specifically, certain types of semantic maps not only were more effective on reading comprehension process but also demanded faster RT in processing texts. In light of the present study certain pedagogical implications can be proposed. First, EFL instructors should integrate semantic mapping strategy instruction to their EFL/ESL classes in order to improve comprehension and enhance reading speed. Instruction on different types of semantic maps should be operational zed and implemented by second language instructors. As Macalister (2010) suggests, it is likely that a speed reading course may not, of itself, be sufficient to enhance and maintain reading speed. Thus, the challenge for teachers is to decide how best to reinforce the reading gains that a speed reading course can deliver speed. Second, Syllabus designers can design sections for mapping in the text books. In this way, they can introduce different types of semantic maps that are incompatible with different expository texts. The present study opens up a new dimension of research by introducing certain types of semantic maps as an effective technique to reading comprehension and reading speed. Exploring more about the application of various semantic maps remains a fertile ground for further research.

Based on the basis of the research findings, some suggestions are proposed for teacher, students, and future research. The suggestions are as follows:

1) It is suggested to English teachers to apply mind mapping technique in descriptive text to make the students well prepared with the ability to identify the language feature and generic structure from the text. The teachers also suggested giving brainstorming before asking the student to make mind mapping. It is important to make students know what they have to do with the text, what kind of information that they need to find from the text.

2) Teachers are also suggested not too much do intervention to the students when they make mind mapping. It is because if the teachers do too much intervention, it is make the student can lose their confidence and they may not enjoy the reading process anymore.

3) It is suggested that before having mind mapping technique, the teachers better to make group to the students for discussing the text before applying mind mapping technique in order to make the students be well organized in making mind mapping. At the last activity, it will be better if the teachers can discuss the mind mapping that has been made by the students and give reward for the most interesting one.

4) For further researcher, it would be very good if mind mapping technique can be implementation in other genres. In addition, the researcher also suggested conducting the next research which is deal with the effectiveness of mind mapping technique in increasing other language skill such as speaking and writing.

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