

The Comparative Effect of Summarizing and Concept Mapping on ESP Learners' Reading Comprehension of EAP Texts

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Abstract

The purpose of the present study was to discover which of the two reading strategies, concept mapping or summarizing, is more effective on ESP learners' reading comprehension of EAP texts. To fulfill the purpose of the study, a sample of 94 undergraduate students of accountancy sat for a standardized sample of Key English Testing (KET). Sixty-two students whose scores fell one standard deviation above and below the sample mean were selected and randomly divided into two equal groups. One group practiced concept mapping and the other group summarizing. A researcher-made reading posttest was finally administered to the students in both groups and the mean rank scores were compared by a Mann-Whitney test. The results led to the rejection of the null hypothesis, indicating that concept mapping had a significantly higher effect on the reading comprehension of EAP texts. The implications of the study for EAP readers and teachers as well as EAP textbook writers are discussed.

Keywords: reading comprehension, concept mapping, summarizing, ESP, EAP texts

Introduction

To catch up with the changing world, students are supposed to be lifelong learners. Reading is in charge at that point. With the supposition that majority of the learning occurs through reading, students need to adopt a meaningful and critical reading process. In other words, without efficient reading comprehension strategies, desired level of learning may not be reached (Yalcin & Sengul, 2004).

At college, reading activities are assigned to the learners to assist them in comprehending the academic materials and learning the conceptual framework. These materials are complex ones with lots of concepts and often huge amount of information. Students are supposed to read and understand the assigned texts on their own before coming to class. Such a reading process requires reading between the lines and thinking critically (Shelton, 2006).

The role of reading is much more striking in comprehension of EAP texts where the reader is actively involved in using available content knowledge (content schemata) and knowledge of the text structure (formal schemata) to construct the meaning of the text (Carrel, Devine, & Eskey, 1988; Rumelhart, 1984; Swaffar, 1985). Byrd (1995) asserts that reading is the main emphasized skill in ESP situations.

Johns and Davies (1983) encapsulated the key principles by stating that for EAP learners, extracting information accurately and quickly is more significant than language details; that understanding the macrostructures comes before language study; and that application of the information in the text is of paramount importance. Therefore, language knowledge is suggested to be the medium of comprehension of content knowledge which is of prime importance.

In order to comprehend accounting texts, like other EAP texts, learners need to employ a variety of reading strategies to cope with the difficulties imposed by the language of the text. Routman (as cited in Hardebeck, 2006) defines reading comprehension strategies as tools or plans for facilitating and extending comprehension.

One appealing strategy is to incorporate concept mapping into the understanding of the text. According to Perkins (1992), pictorial language of thinking, such as concept maps, is advantageous in that they enable students to simplify complex patterns of ideas and minimize the load of information students must hold in their memories.

Another appealing strategy is summarizing, which is in fact a strategy through which students comprehend knowledge and efficiently transfer it to their long term memory because as Senemoglu (2001) maintains, it leads students to a) read to understand, b) distinguish main ideas, and c) express the information by using their own words.

Reading Comprehension and Theoretical Developments

The definition of reading has changed substantially during the past decades from a focus on reading as decoding or as a set of de-contextualized or context-free skills to a view of reading as information. Alternatively, our conception of reading comprehension has shifted to an interactive process in which a reader is actively involved in using available content and formal schemata to construct meaning (Carrel, Devine, & Eskey, 1988; Rumelharts, 1984; Swaffar, 1985).

In turn, this has led to a shift in emphasis, in reading instruction, from a focus on bottom-up processes such as decoding, word attack skills, sounding out and blending (emphasized in phonic approaches) to an emphasis on the top-down processes of prediction and confirmation, and then a more interactive model in which both top-down (knowledge or content driven) strategies and bottom-up (data or text driven) strategies are called upon as needed by readers while interacting with and constructing the meaning of the text (Byrd, 1995, p. 81). Hence, the problems of L2 reading comprehension are no more viewed as being essentially decoding problems deriving meaning from printed page but rather more of equipping readers with appropriate strategies for more efficient reading (Cambers, 1991).

Summarizing

Summarization is a learning strategy that, according to Susar Kirmizi and Akkaya (2009), can help students use deletion and super-ordination to construct and retain a succinct summary of important propositions from the text. They further maintain that summarizing is one of the metacognitive strategies and leads to effective use of mental skills and increases remembering and understanding.

Senemoglu (2001) asserts that summarizing helps students to “comprehend knowledge, transfer it to long term memory significantly because it leads students to read to understand, distinguish important ideas, and express the information by using their own words” (p. 569).

The ability to summarize information seems to be an essential skill in academic contexts and higher education. In these contexts students often need to summarize information from lectures, journals, textbooks, and other sources in order to fulfill certain assignment in their own field of study. Some

researchers have investigated the effect of summaries on students' learning. For example, Garner (1982) showed further that efficient summarizers "integrate important pieces of information into semantic wholes...and lose track of unimportant pieces of information" (p. 279).

Like any other strategy, however, summarizing needs to be carried out efficiently to lead to desirable outcomes. In this regard, Brown and Day (1983) proposed five basic rules of summarization. The first two rules require the deletion of unnecessary material. The third rule, super ordination, requires the substitution of a super ordinate term for a list of items or actions. The fourth and fifth rules deal with topic sentences for each paragraph. Likewise, Wormeli (2005) and Michaelis and Garcia (1996) suggest certain steps that can be outlined as follows:

1. Setting main and secondary ideas of each paragraph within the text.
2. Setting the most important paragraph within the text.
3. Discovering and setting the main ideas of the text in general.
4. Referring to the concepts and ideas of the text by paraphrasing the text using one's own words.

Concept Mapping

In simple terms, concept maps are visual representations of concepts and their categorizations. Jonassen, Beissner, and Yacci (1993) define concept maps as spatial representation of concepts and their interrelationships that are intended to represent the knowledge structure that humans store in their minds.

According to Novak and Musonda (as cited in Novak & Cañas, 2008), concept maps were developed in 1972 by Novak in a research program where he sought to follow and understand changes in children knowledge of science. Novak and Cañas (2008) maintain:

This program was based on David Ausubel's theory of meaningful learning. The fundamental idea in Ausubel Cognitive psychology is that learning takes place by the assimilation of new concepts and propositions into exiting concepts and propositional frameworks held by the learner... Out of necessity, to find a better way to represent children's conceptual understanding emerged the idea of representing children's knowledge in the form of a concept map. Thus was born a new tool not only for research but also for many other uses. (p. 3)

According to Novak and Cañas (2008, pp. 3-4), meaningful learning requires three conditions:

1. The material to be learned must be conceptually clear;
2. The learner must possess relevant prior knowledge; and
3. The learner must choose to learn meaningfully.

Reviewing Ausubel's assimilation theory of cognitive learning, Asan (2007) explains that, "Most new learning occurs through derivative and correlative subsumption of new concept meanings under existing concept or propositional frameworks. Learning that is meaningful involves reorganization of existing beliefs or integration of new information with existing information" (p. 187). Asan further maintains that with less inclusive concepts being subsumed under more inclusive ones, cognitive structures are organized hierarchically.

Certain advantages are named for concept maps in the literature. For example, Huang (2005) suggests that concept mapping can stimulate one's metacognitive awareness while processing information and thus, assists the learner to integrate the bottom-up and top-down processing while monitoring the whole process. Moreover, Liu, Chen, and Chang (2010) write:

Concept mapping can enable learners to recall and organize the messages from essays; thus, it can strengthen integration efficiency. As identified in Mayer's (1996) concept mapping can also reduce the tendency of poor readers to forget the content they have read as a result of constantly checking vocabulary meaning. (p. 437)

Concept mapping is also claimed to be beneficial in increasing the use of retrieving and memorizing knowledge (Beyerbach & Smith, 1990; Chen & Chang, 1997; Chiu, Huang & Chang, 2000; Liu, 1998; Mayer, 1991; Novak, 1990; Novak & Gowin, 1984). As for its more direct influence on reading, Griffin, Malone, and Komeenui (1995) state that it helps readers in a more systematic and organized way to clarify the important concepts of an article. Others (e.g., Ruddell & Boyle, 1989; Carrel & Pharis, 1989) have also underscored the benefits of concept mapping strategy for ESL students. Finally, Chularut and DeBecker (2003) propose that the benefits of concept maps may extend beyond achievement gains to include positive effects on achievement-related variables such as academic self-regulation and self-efficacy.

Heinze-Fry and Novak (1990) suggest that meaningful learning is facilitated because concepts are seen not as isolated entities, but as existing

in a network of relationships. Based on Ausubel's account (1968), visual representation also allows the development of a holistic understanding that words alone cannot convey because the graphical form allows representation of different parts and whole in a way that is not available in the sequential structure of the text.

In science education, concept mapping has been widely recommended and used in a variety of ways. It has been used to help teachers and students to build an organized knowledge base in a given discipline (Pankratius, 1990) or on a given topic (Kopec, Wood, & Brody, 1990). It has been used to facilitate middle level student's learning of science content (Guastello, Beasley, & Sinatra, 2000). Findings of these studies indicate that concept mapping is an effective tool for aiding student comprehension and retention of science material.

Various concept mapping strategies have been developed throughout the years. The strategy linked with the related nodes in concepts maps is the most widely used (Novak & Gowin, 1984). According to Novak, it takes one concept at the center, and the related concepts and details emerge as the mapping develops from the central to the external. This kind of concept mapping can be classified into two categories; one is the development from inner to outer; the other is the development from upper to lower.

Gull and Boman (2006) claim that the hierarchical method is preferred over other designs of concept maps, because it is clearer and easier to comprehend. They explain that it presents more general and more inclusive concepts at top of the map and more concrete and specific ones at the bottom by:

1. Identifying a central word or theme;
2. Identifying all of the concepts, items, descriptive words, or questions;
3. linking the sub-concepts to the main concepts; and
4. Identifying the cross links between the information in the map.

Comparing Concept Mapping and Summarizing

The first and the most immediately noticed point in the comparison of concept mapping and summarizing is that both strategies have the same theoretical underpinnings. As explained earlier, Novak (1990), who is the pioneer of concept mapping, has based the theoretical foundations of concept maps on David Ausubel's theory of meaningful learning which claims meaningful learning occurs while learners try to anchor the newly learned contents and

concepts into their prior knowledge. Similar to concept mapping, summarizing uses the same theoretical basis in calling for interrelating new ideas with the old ones and putting forward authentic ideas (Friend, 2000).

The second point to be considered is the similar procedure which is followed in order to construct concept maps and write summaries. The process of constructing concept maps starts from skimming the text and moves to finding the main concepts, subsuming them, relating the sub-concepts to the main ones, and finding the cross-links between concepts, which is developed through both top-down and bottom-up processes (Novak, 1990). Nearly the same path would be followed in order to summarize the same given text (Wormeli, 2005; Michaelis & Garcia, 1996).

English for Academic Purposes

EAP and ESP are closely linked to each other. According to Gillet (1996), EAP is a branch of ESP in which the teaching content is matched to the requirements of the learners and is also considered to be ESP if one takes Robinson's (as cited in Gillet, 1996) features which are usually thought of as being criterial to ESP courses.

Dudley-Evans and St. John (1998) maintain that ESP is designed to meet specific needs of the learner, make use of the underlying methodology and activities of disciplines it serves, and is centered on the language (grammar, lexis, and register), skills, discourse, and genres appropriate to these activities.

According to Howatt (1984), the study of language for specific purposes has a long and interesting history going back, some would say, as far as Roman and Greek Empires. Howatt further states that, since the 1960s, ESP has become a vital and innovative activity within the teaching of English as a foreign or second language movement.

Nunan (1988) asserts that ESP courses use language as a vehicle for communicating about content from other subjects. However, he claims that these courses have some difficulties as very often the learner has extensive knowledge in the content domain and is frustrated by what is considered a trivialization of that content.

For most of its early life ESP was dominated by the teaching of EAP; most of the materials produced, the course descriptions written, and the

research carried out were in the area of EAP (Dudley-Evans & St. John, 1998, p. 2). Dudley-Evans and St. John maintain that EAP refers to any “English teaching that relates to a study purpose. Students whose first language is not English may need help with both the language of academic disciplines and the specific study skills required of them during their academic course” (p. 34).

They further delineate that unlike general English courses which begin with the language, EAP commences with the learners and the situation and whereas General English tends to teach learners conversational and social genres of the language, EAP courses tend to teach formal and academic genres. They further explain that the key determinant of what an EAP course should contain is whether the subject course is taught in English and therefore, classify EAP situation to four types summarized hereunder (1998, pp. 34-41),

- *Situation 1*: EAP in English speaking countries such as UK, USA, Australia where students come from another country with a foreign system; for them both general and academic culture may be different; everything around them operates in English.
- *Situation 2*: EAP in ESL contexts such as Zimbabwe where education at all levels is mainly in English; the civil service uses English, but people mostly use their L1 in everyday life.
- *Situation 3*: EAP in contexts where subject courses are taught in the national language (e.g., Jordan); in tertiary education, some subjects are taught in L1, but others, such as medicine, engineering, and science, are taught in English.
- *Situation 4*: EAP in contexts where subject courses are taught in the national language in countries like Brazil; all tertiary education is taught through L1 and English is the auxiliary language.

The current EAP context in Iran represents the fourth situation and thus the present study may not have generalizability to the other three situations explained above. In our country, EAP is often referred to as technical English and the courses are focused almost exclusively on reading. Since EAP encompasses a large domain of many different academic fields of study in our country, the focus of this study was narrowed down to one academic field, that is, Accountancy. With this focus, this study intended to examine the comparative effect of summarizing and concept mapping on ESP learners' reading comprehension of EAP texts. For this purpose, the following question was raised:

- *Is there any significant difference between the effect of concept mapping and summarizing on ESP learners' reading comprehension of EAP texts?*

Method

Participants

The participants were selected from 94 male and female students of accountancy in Payameh Noor University in Aligoodarz. Their ages ranged between 18 and 39 and since all of them were non-EFL learners, their level of language proficiency was considered to be elementary. Due to the fact that the focus of the study was only on students of accountancy and the number of the students in that field was limited, the researchers had to include all of the available students in a convenient non-random basis. Out of the available students, 62 whose scores fell one standard deviation above and below the sample mean were selected and randomly assigned to two equal groups, each practicing one of the two strategies for reading their EAP texts during their instructional period.

Instrumentation

The following tests, textbooks, and handouts were used in this study.

Proficiency Test of Key English Testing (KET)

The English language proficiency test used in this study was a sample KET, the reliability and item facility of which were checked in the piloting phase of the study and the test proved to be reliable for the main purpose of homogenizing the participants. Since the participants were non-EFL learners and on the assumption that ESP students normally do not have enough competency in oral skills and are mainly exposed to the written materials and are chiefly expected to read and comprehend them, only reading and writing sections of the test, consisting of 55 questions to be answered in 60 minutes, were administered.

English Texts for Accountancy

The course book "English for Students of Accounting" written by Moghadam, Ghalamikian, and Salim (2007) is developed and written for the students of accountancy in Payameh Noor University and was used to teach both experimental groups of the study. It includes 14 units each consisting of four to six short texts followed by multiple-choice items, fill in the blanks items, and open-ended questions to be answered. Included at the end of every unit are extra short texts for further study.

Handouts on Concept Mapping

A handout was distributed among the participants in concept mapping group. It consisted of the definition and advantages of concept mapping, followed by a detailed explanation on different ways to construct them.

Along with the handout, a hierarchical model of concept mapping adopted from Gull and Boman (2006) was presented to the participants. It presented more general and inclusive concepts at the top of the map and more concrete and specific ones at the bottom as shown below:

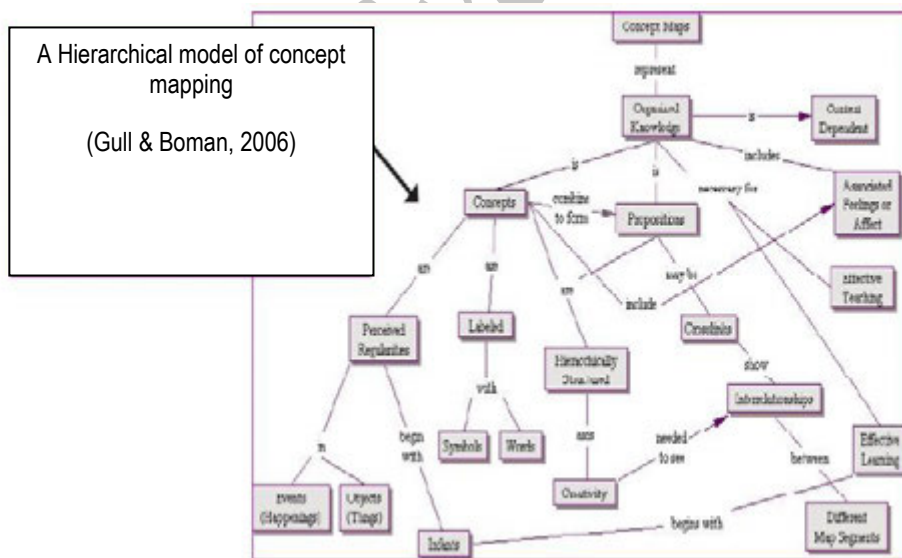


Figure 1 – A hierarchical model of concept mapping

Handouts on Summarization

Similar to what was presented to the participants in the concept mapping group, a handout on the definition, advantages, and the procedure for construction summarization was distributed among the participants in the summarizing group.

Reading Comprehension Posttest

In order to measure the reading comprehension of both groups at the end of the treatment, a researcher-made reading comprehension test consisting of ten reading passages was utilized. The ten reading comprehension texts were selected by the researchers from authentic texts of accountancy. Each text was followed by five multiple-choice comprehension questions. Total time given to the participants to answer the questions was 75 minutes.

Procedure

At first, a sample of 94 undergraduate students of accountancy, who were selected through a convenient non-random sampling, sat for a piloted sample of KET. On the basis of the result, 62 students whose scores fell one standard deviation above and below the mean were selected for the actual study. The selected participants were then randomly assigned to two equal groups, one as the concept map group and the other as the summarizing group. The study was conducted in Aligoodarz Payameh Noor University and lasted for 15 sessions of 90 minutes and the class met twice a week. The textbook in both groups was the same.

Treatment in the Concept-Map Group

At the very beginning, concept maps and the way they are developed, constructed, and interpreted were introduced to the students. Therefore, they not only could learn from concept maps, but also were able to construct the maps by themselves. They were told how this reading strategy could help them tackle the problem of language, recognize key concepts of the text, bring them out of the text, and inter-relate them through links, cross-links, and nodes. A hierarchical model of concept map was introduced to the

participants. It presented more general and inclusive concepts at the top of the map and more concrete and specific ones at the bottom.

Along with these instructions, a handout on concept mapping was distributed among the students, which was adopted from Gull and Boman (2006). It consisted of three parts. The first part was about different definitions of concept mapping. The second part was about the advantages of concept mapping. The last part was about different ways to construct concept maps.

The instructional period began with the teacher-constructed concept maps and proceeded toward student-constructed concept maps. For homework assignment, students were asked to construct the pertinent concept maps related to the assigned exercises. Feedback was individualized through marginal written comments on students' products. Oral feedback was also provided generally to all of the students. During the instructional period, the students were also encouraged to share their concept maps, give and receive feedback to and from each other, and construct collaborative concept maps.

Treatment in the Summarizing Group

Participants in the other group were exposed to summarizing strategy. At the very outset, the strategy was introduced in detail. Similar to what was pursued in the concept map group, the definition of reading comprehension and its nature was described to the participants. Furthermore, reading strategies and their importance, especially in reading comprehension of EAP texts, were explained in detail to the participants and they were told how to use summarizing strategy and that it could help them tackle the problem of language and have a faster and better way to get to the content information which is otherwise hard to comprehend.

Along with these instructions, a handout on summarization was distributed among participants. It consisted of three parts. The first section was about different definitions of summarization. The second part was about advantages of summarization, and the last part was about different ways to summarize texts.

The instructional period began with teacher-made summaries and proceeded toward student-made summaries. For homework assignment, students were asked to write the summaries related to the assigned

exercises. Both written and oral feedback was provided to the students during the instructional period. The students were also encouraged to share their summaries, give and receive feedback to and from each other, and write collaborative summaries.

At the end, a piloted researcher-made achievement posttest was administered among the participants in both groups to see which of the strategies had a significantly higher effect on the learners' reading comprehension of EAP texts.

Results

At the outset, the selected reading and writing sections of KET was piloted among 30 students with very similar characteristics to the target group. The test included 35 reading and 20 writing items to be answered in 60 minutes. The format of the reading section was multiple-choice and the format of the writing section was fill-in-the-blank. All items went through an item analysis and 10 malfunctioning and non-functioning items were discarded.

Following the piloting of the test, the mean and standard deviation were calculated and were found to be 25.23 and 9.71, respectively. Table 1 shows the descriptive statistics of the KET in the pilot phase.

Table 1 – Descriptive statistics of the KET (piloting)

	N	Minimum	Maximum	Mean	Std. Deviation
SCORE	30	8	42	25.23	9.71
Valid N	30				

Table 2 shows the reliability of the test scores gained by the participants in the KET piloting phase. The Kuder-Richardson 20 formula (KR 20) was employed for this purpose and an acceptable reliability of 0.81 was calculated.

Table 2 – Reliability of the KET piloting

Kuder-Richardson (KR 20)	N of items
.81	45

The piloted test was used in order to homogenize the participants in the target sample with respect to their general English proficiency comprising of the reading and writing subtests of the mentioned test. Following the administration of the test, the mean and standard deviation were calculated to be 22.26 and 7.06, respectively. Table 3 demonstrates the descriptive statistics of the main administration of KET.

Table 3 – Descriptive statistics of the KET main administration

	N	Minimum	Maximum	Mean	Std. Deviation
TOTAL	94	8	38	22.26	7.06
Valid N (listwise)	94				

Sixty-two students whose scores fell one standard deviation above and below the sample mean were selected and randomly assigned to two equal groups, each practicing one of the mentioned strategies.

Prior to the actual administration, the reading comprehension posttest was piloted on a group of 30 students of accountancy at Golpaygan Payameh Noor University with very close and similar characteristics to the participants of the target group. The test consisted of 50 multiple-choice items to be answered in 75 minutes.

The mean and standard deviation were calculated to be 24.8 and 11.22, respectively. Table 4 below shows the details of the descriptive statistics of the posttest at the piloting stage.

Table 4 – Descriptive statistics of the posttest (piloting)

	N	Minimum	Maximum	Mean	Std. deviation
TOTAL	30	7	44	24.8	11.22
Valid N (listwise)	30				

All items went through an item analysis, and as a result, five items were modified and the reliability was calculated through Kuder-Richardson formula. According to Table 5, the test proved to be reliable in order to be administered among the participants in the target group.

Table 5 – Reliability of the posttest (piloting)

Kuder-Richardson (KR 20)	N of items
.76	50

Following the piloting of the test, it was administered as the posttest. Table 6 displays the descriptive statistics of the scores obtained by both groups.

Table 6 – Posttest descriptive statistics

	Grouping	N	Mean	Std. Deviation	Skewness		
					Stat.	Std. error	Ratio
Reading Comprehension	Concept mapping	31	35.09	5.95	-1.1	.421	2.39
	Summarizing	31	28	9.46	.034	.421	.08

In order to determine whether the differences between the means of the two groups were significant, an independent samples *t*-test was to be run. Prior to the administration of this test, the normality of the distribution of the scores for each group had to be checked. As depicted in Table 6, the skewness ratio for the concept map group exceeds the acceptable range of ± 1.96 . Therefore, running a *t*-test was not legitimized and the Mann-Whitney U Test, as the nonparametric equivalent, was run instead. Tables 7 and 8 below display the results of the Mann-Whitney U Test.

Table 7 – Mean ranks of the two groups

	Grouping	N	Mean Rank	Sum of Ranks
Reading Comprehension	Concept mapping	31	38.42	1191.00
	Summarizing	31	24.58	762.00
	Total	62		

Table 8 – Mann-Whitney U test

	Reading Comprehension
Mann-Whitney U	266.000
Wilcoxon W	762.000
Z	-3.024
Asymp. Sig. (2-tailed)	.002

Table 8 shows a significant difference between the means of the two groups ($U = 266.00, p = 0.002 < 0.05$). The difference in the mean ranks obtained by the two groups as reported in Table 7 above indicates the superiority of the concept-mapping group in their performance on the reading comprehension posttest. By virtue of the significant difference between the means of the two groups, the null hypothesis stating that there is no significant difference between the effects of concept mapping and summarizing on ESP learners' reading comprehension of EAP texts was rejected. The following bar graph visually shows the mean difference:

Mean reading comprehension

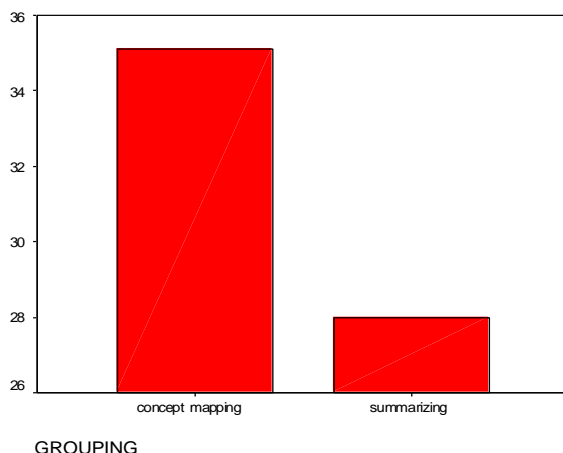


Figure 2 – The mean difference between the two groups

Discussion and Conclusion

Based on the results of the data analysis, the null hypothesis of the study which stated that "there is no significant difference between the effect of concept mapping and summarizing on ESP learners' reading comprehension of EAP texts" was rejected. The researchers came up with the conclusion that teaching EAP texts through concept mapping strategy had a significant superiority over that of summarizing.

The most important factor supporting the findings of this study is the very strong theoretical underpinning of concept mapping. Ausubel's (1963) theory

of meaningful learning, which is based on the premise that meaningful learning happens when new knowledge and already-existing and relevant concepts are bound together, was the most striking impetus for Novak and his colleagues who presented and developed concept map strategy (Novak, 1981; Novak & Gowin, 1984).

Another important reason for the significant superiority of concept mapping in the present study may be the context of use (i.e., EAP). One of the most important developments in the reading comprehension of EAP texts was a shift of focus in reading from text as a linguistic object (TALO) to text as a vehicle of information (TAVI) (Johns & Davies, 1983). Johns and Davies encapsulated the key principle that, for ESP learners, extracting information accurately and quickly is more significant than language details. Such findings entail the importance of specific reading strategies that can disentangle the ESP readers, namely the readers of EAP texts, from the hardships of dealing with linguistic structures and present them with the content information, which is of prime importance in the comprehension of such texts. As explained earlier, concept mapping is a strategy through which linguistic redundancies can be eliminated and main concepts and sub-concepts can be determined and related to each other through hierarchies and cross-links.

This line of argument can be supported even more strongly taking into account the fact that EAP in our country is a sample of the 'fourth situation' depicted earlier, which includes EAP situations where subject courses are taught in the national language of the country and mostly through the routine practice of reading the passages in English and translating them into L1 and summarizing them. Consequently, introducing a totally new technique or strategy might have had a large effect on the participants' overall reading performance.

There is also evidence through research studies that summarizing may at times fail to meet the instructional objective of a course. For example, in their study, Susar Kirmizi and Akkaya (2009) investigated the use of summarizing strategy by university students. The results of the study demonstrated two major deficiencies in the process of students' summarizing of academic texts. The first one was that students mostly digressed from the main concepts. The second deficiency was the fact that they had no glimpse of 'constructive process' or significant learning in these summaries.

Furthermore, findings of the present study can be supported by numerous studies that investigated the impact of concept mapping on

reading comprehension of different academic subject matters. Gahr (2003), for example, in the attempt to have fewer repetitive procedural questions regarding chemistry laboratory exercises, found out that the introduction of a concept map that gives a visual reference as to how the classroom activities are to proceed was an effective tool to enable the teacher to observe the students at work rather than the students observing the teacher in a demonstration.

In addition, Ritchie and Volkl (2000) found that having sixth grade science students create concept maps before working on lab activities produced better 'long-term retention' than using the concept map after the completion of the exercise. This research leads one to the conclusion that making important connections prior to doing any activity will lead to a more effective understanding and learning of the concepts instead of memorizing them.

Research has also proved that concept mapping can help students make cross-curriculum connections. It was found that student nurses in Australia had better knowledge and understanding of the nursing field after incorporating concept mapping into the curriculum to enable them to link concepts in science with concepts in nursing. These connections allowed the student nurses to gain a fuller understanding of how the two fields intertwine. By incorporating this learning procedure, the nurses were also better able to educate their patients about their various conditions (Wilkes, Cooper, Lewin, & Batts, 1999). This demonstrates how concept mapping can be effective for the students as a tool for enhancement of learning and for the teachers as a tool for explanation and promotion of understanding.

Three studies (Alvermann & Boothby, 1983; Armbruster, Anderson, & Meyer, 1991; Griffin, Malone, & Kameenui, 1995) in the area of social studies used concept-mapping tool to help students organize information from expository texts and comprehend content area reading. Findings from these studies concluded that concept-mapping tool helped students select, organize, and recall relevant information as measured by posttests. Students were also able to transfer thinking and learning skills to novel situations and content.

One experimental study (Braselton & Decker, 1994) with sixth-grade mathematics students found concept mapping to be advantageous in the improvement of students' problem-solving skills. Moreover, DeWispelaere and Kossack (1996) found that applying concept mapping in a junior high and high school Spanish as a second language class improved students' higher

order thinking skills as measured by performance on chapter quizzes, tests, and student projects.

The above-mentioned research increasingly supports the idea that the use of concept mapping tools can extend and enrich students' learning in various academic fields because in the world of science, concepts are very inter-related and many concepts are built on many others. Therefore, concept mapping would be very useful in content classrooms as a learning tool. Concept mapping has been widely recommended and used in a variety of ways in science education in advanced countries such as UK, USA, or Japan, however, it is still a new method and not adopted by EAP teachers in Iran. The reason could be the probable problems in developing Novak's style concept maps in Farsi due to the linguistic differences between Farsi and English.

Nevertheless, due to the importance and the necessity of employing reading strategies in reading EAP texts, it seems essential for EAP teachers to first do away with word-by-word translation as a reading comprehension technique. The often heard complaint of most of undergraduate and graduate students in our country is that they cannot get anything out of the word-by-word translation of EAP texts by EAP teachers. This complaint becomes more striking when we know that in such EAP contexts, comprehension of content information is of prime importance.

Therefore, the first step in order to tackle this problem must be taken by EAP teachers themselves. Teachers need to familiarize themselves with the most useful reading strategies such as concept mapping in order to break the dull and boring translation routine in EAP classes, involve participants in active reading, and enable their students to both remember and categorize information. As Guastello, Beasley, and Sinatra (2000) put it, teachers are better prepared to make connections between difficult scientific concepts that are understood by students with the use of concept maps.

It must be cautioned here that a teacher must not only provide the students with the best fish (teach through the best strategies), but also teach the fishing itself (teach the strategies). The idea of whether it is better for the readers to be supplied with already-constructed concept maps or ask them to construct their own concept maps was brought into question by Chang, Sung, and Chen (2002). It has been stressed that for concept maps to be effective learning or reading comprehension tools, the process of creating these maps must be taught to the students in a manner that they can repeat the process on their own. It is important for students to understand the purpose of using

concept maps to bolster their learning experience. If the students are unaware of the various methods or of the goal of this learning technique, then the experience of using them is lost on the untrained mind (Mikulecky, Clark, & Adams, 1989).

Another important implication for language teachers is that they should not expect perfection on the part of the students right from the first shot. The main barrier for students in the process of constructing concept maps is the recognition of main concepts, concepts, sub-concepts, and the interrelationships among them. Therefore, through practice students can learn how to locate main them. One effective way is to make students aware that main ideas are usually stated in titles, topic sentences mostly in the beginning of every paragraph, words in italics, and the key words.

The second practical step would be to help students learn how to connect these concepts and sub-concepts through different nodes, links, and cross-links. Providing two forms of individualized and whole-class feedback in written and oral form is also required. Promoting collaboratively constructed concept maps both in and out of the class also seems to be very effective.

The last important implication for language teachers is that working with concept maps in the class is much more timesaving and practical since in the process of constructing concept maps most of the linguistic redundancies are eliminated through nodes, links, and cross-links.

One can finally conclude, as Chularut and DeBecker (2003) have rightfully asserted that students may optimize their learning by adopting concept mapping as a learning strategy. Since concept mapping is a student-directed strategy that does not rely on teacher involvement or other formal or complex technological supports, it is easily adopted by the users. Furthermore, concept mapping is flexible enough to be useful in a variety of learning settings. Thus, for EAP readers to be strategic and also aware of their strategies in order to be able to handle the linguistic barriers to achieve the content information of the EAP texts, they need to be instructed on how to use concept mapping strategy and how to develop concept maps. However, constructing efficient concept maps requires much time, practice, and patience on the part of both the teachers and the students.

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