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should encourage educators to combine concept mapping with other strategies and cognitive tools to help learners relate the new information to their unique mental models. Furthermore, teachers should be cautious in presenting concepts to students. They should never ask students to memorize prepared concept maps because this could merely promote rote learning and so defeat the purpose of encouraging active meaningful learning on the part of the learner.

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strategy would result in better comprehension of the listening passages. It can be argued that concept mapping provides a visual image of the concepts under study in a tangible form which can be focused very easily. Furthermore, it can consolidate a concrete and precise understanding of the meanings and inter-reactions of concepts and this makes learning an active process, not a passive one. After being trained in concept mapping, the students learn to focus on important and key concepts and information and how they are related to subordinate concepts. By stimulating the integration of new knowledge into existing structures, concept mapping helps the students to learn more easily and more effectively.

The results of the study support the findings of a number of other studies which found that organization enhances comprehension and recall (e.g., Pankratius, 1990). Therefore, it can be concluded that concept mapping may increase the learners' capacity to organize and comprehend the materials.

As far as the second aim of this study is concerned, the assumption was that when the subjects are trained in concept mapping strategy, the evaluation of their comprehension through a concept map rather than a traditional multiple choice test would positively affect their level of understanding of the materials. However, the obtained results may indicate that mapping training has greater impact than test type.

One of the most important implications of this study is that since concept mapping models the way human mind organizes knowledge (Stoyanova & Kommers, 2001), the technique can help readers and listeners organize and externalize information in a way that corresponds to human psychological and mental constructs. In general, the study

In order to provide statistical evidence as to whether or not this difference is a significant one, a two-way ANOVA was employed. As the results of this analysis presented in table 5 indicate, the impact of training is significant ($F(1, 60) = 7.182, p < 0.05$):

Table 5: Results of two-way ANOVA for the impact of training and test-type on EFL learners listening comprehension

source	Type III sum of squares	df	Mean Square	F	SIG.
Training	60.048	1	60.048	7.182	0.001
Test type	0.672	1	0.672	0.080	0.862
Training* Test Type	0.193	1	0.193	0.023	0.912
Error	501.612	60	8.360		
Total	562.525	64			

The effect of test type, however, is not significant ($F(1,60) = 0.080$), indicating that irrespective of test type, the group employing concept map training as a listening comprehension strategy has been more successful than the control group, whether the test was of multiple choice type or concept mapping.

Conclusion

The obtained data revealed that concept mapping as a listening

Results of the impact of test type and concept map training on listening comprehension

Addressing the second research question of the study, the following null hypothesis was tested: there is no interaction between the particular test type taken by the students and the usefulness of concept mapping as a listening strategy. Table 4 represents the descriptive statistics for the two groups of students participating in the study: concept map training and non-concept map training, half of whom received a concept map test and the rest a non-concept map test.

An immediate glance at the results in Table 4 shows that the highest mean belongs to the group trained in mapping technique ($M= 14.571$), while there is not a great difference between this mean score and the mean score for the other group ($M= 14.318$) which received training but differed in its test type ($M\ dif= 0.253$). This may indicate that mapping training has a greater impact than test type. This is supported by this fact that the difference between the mean scores of the two groups which were not trained in mapping but differed in their test type is not great ($M\ dif= 0.095$).

Table 4. Descriptive Statistics: Test type & Concept mapping

Training	Test type	Mean	SD	N
CM Training	CM test	14.571	2.625	16
	Non-CM test	14.318	2.451	16
Non-CM Training	CM test	11.919	2.212	16
	Non-CM test	11.824	2.279	16
Total		13.158	2.391	64

Table 2. Descriptive Statistics: post-test

	Group	N	Mean	Std. Deviation
Comprehension Scores	CM group	32	14.444	2.538
	Non-CM group	32	11.871	2.245

For examining the first null hypothesis of this research concerning the impact of concept map training on listening comprehension of the EFL learners, the scores of the subjects participating in the study on 20 comprehension questions were computed. To examine the significance of the mean difference between the two groups, an independent sample t-test was employed. The results of the t-test analysis showed that concept map group did significantly better on the listening comprehension test than the control group ($t(62) = 3.846, p < .05$). Table 3 presents this result:

Table 3: Independent t-test results for the impact of concept map training

	T-test for equality of Means			
	t	df	Sig.(2-tailed)	Mean Differences
Listening comprehension scores	3.846	62	0.001	2.192

significant difference between the experimental and control groups. Table 1 show the result.

Table 1. Independent t-test for the impact of concept map training

	T-test for equality of Means			
	t	df	Sig.(2-tailed)	Mean Differences
Listening comprehension scores	1.699	62	0.001	0.592

The T-value (1.699) shows that there is no significant difference in terms of the two groups' performance at the beginning of the study. Thus, it can be safely concluded that the two groups participating in the study met the condition of homogeneity.

Results of the impact of concept map training on listening comprehension

The main purpose of the present study was to examine whether or not concept map training as a listening comprehension strategy would have any impact on the listening comprehension of the EFL learners.

The scores of the students participating in the study on 20 comprehension questions were computed. A preliminary glance at the mean scores of the concept map training group ($M= 14.444$, $SD= 2.538$) and non-concept map training group ($M= 11.871$, $SD= 2.245$) shows that the concept map group did better on these questions. Table 2 shows the results:

section was conceptually mapped with the subjects' cooperation during the first session. The procedure for training the students on concept mapping was based on the following steps: (a) Identifying the main topics, ideas, the major events, characters or key concepts (b) Designing focus questions or statements to elicit information from the students during the brainstorming sessions (c) Developing concept maps on the board in response to questions asked by the teacher. (d) Allowing the students to change and complete their own concept maps according to their understanding of the passage.

The control group received no training on mapping technique and their practice was confined to answering multiple-choice questions; however, both treatment and experimental groups were given identical pre-listening instructions.

At the end of the course, all subjects took a pre-tested achievement test based on the listening comprehension sections of the New Headway (1999) at the Upper-Intermediate level as the post-test. Half of the subjects in each group received a multiple choice comprehension test including 20 questions and the other half took a concept map test based on five listening comprehension passages including 20 questions. The concept map test was piloted with 30 second-term freshmen university students and the necessary modifications were made. The objective as mentioned before, was to examine the effectiveness of concept mapping across different test types.

Results of the Pre-test Stage

The technique of T-test was employed to see if there was any

They were randomly selected from among those who had passed their lab (I). The subjects were randomly assigned to two different classes each consisting of 32 female subjects serving as the experimental and the control group of the study.

Instrumentation

The instruments used for data collection included a multiple choice listening comprehension test serving as the pre-test as well as a multiple choice listening and a concept map listening comprehension test both functioning as the post-test of the study.

Procedure

The following steps were followed in the process of conducting the study:

First, at the very beginning of the course, a pre-test listening comprehension consisting of 20 multiple-choice questions based on the contents of NEW HEADWAY (1999) at the Intermediate level was administered to all subjects participating in the study. The purpose was to ensure the homogeneity of the subjects with respect to their listening comprehension proficiency in particular.

To check the homogeneity of the two groups at the outset of the experiment, a t-test was performed.

Then, through the six sessions devoted to listening comprehension practice in the Lab (II) course, the procedure for conceptually mapping a heard conversation or talk was explained to the subjects in the experimental group, and as an example, a listening comprehension

Reutzel (1984) investigated the effect of a story mapping as a post-reading review strategy on comprehension. He found that the strategy significantly improved students' comprehension over the control.

Although the use of story maps and other mapping techniques are becoming common classroom practice, research specifically examining the effectiveness of maps to facilitate comprehension has been relatively limited. Furthermore, no research so far has investigated the impact of concept mapping strategy on EFL learners' listening comprehension. This study aims at answering the following research questions:

Research Questions

- 1) Does concept map training as a post-listening strategy have any impact on EFL learners' listening comprehension?
- 2) Is there any interaction between the particular test taken by the students and the usefulness of concept mapping as a listening strategy?

To examine the two research questions of this study two null hypotheses were formulated:

Ho₁: Concept mapping as a listening strategy has no impact on EFL learners' listening comprehension.

Ho₂: There is no interaction between the particular test taken by the students and the usefulness of concept mapping as a listening strategy.

Research method and procedure

Subjects

The subjects participating in this study were 64 Iranian female second-term freshmen studying English as their major at Zahedan University.

between them and assess its meaning, analyze the nature of the relationship, and from the link or connection which engages the most critical thinking (Jonassen, 1996).

As it was mentioned before, a concept map visually describes the relationship between ideas in a knowledge domain. Visual representation has several advantages (Plotnick, 1997) which are alone sufficient to justify the employment of concept mapping as a useful strategy. The first benefit of visual representation is that visual symbols are quickly and easily recognized. The second advantage is that minimum use of text makes it easy to scan for central words and concepts. The last important benefit is that it provides the learner with a holistic understanding that words alone can not convey.

Research on Mapping Strategy and the significance of the study

Several studies have found support for the use of mapping strategy to enhance comprehension. Pankratius (1990) found that mapping concepts prior to, during, and subsequent to instruction led to greater achievement for high school physics students. A meta- analysis of 19 studies on the use of concept mapping as an instructional tool revealed that concept mapping had positive effects on both student achievement and student attitude toward science (Horton, Gallo, Woods, Senn & Hamelin, 1993).

Beck, Omanson, and McKeown (1982) investigated the effectiveness of a redesigned reading lesson, which included the use of a story map as a pre-reading treatment, on students’ recall. Students taught using the redesigned story lesson, of which a story map was a part, significantly outperformed the controls on the dependent measures.

form. There are several types of methods that all currently go by names like “concept mapping” (Novak & Gowin, 1984), “mind maps” (Buzan & Buzan, 1993), “concept circles” (Wandersee, 1990), semantic networks” (Fisher, 1990) and mental mapping. All of them are similar in that they result in a picture of someone’s ideas.

In essence, concept maps are tools for organizing and representing knowledge. However, they go beyond the typical outline in that they show relationships between concepts, including bi-directional relationships. They include concepts, usually enclosed in circles or boxes of some type (nodes), and relationships (links) between concepts, indicated by a connection between two concepts(Novak, 1990). A node is a simple geometric object such as an oval, a circle, or a box, containing a textual concept name. Inter-node relationship links are represented by textually labeled lines with an arrowhead at one or both ends. So, the links between the concepts can be one-way, two-way or non-directional. The line specifies the relationship between two concepts. Words used to label the links help depict relationships more explicitly (Anderson, Inman, & Zeitz, 1993). Together, nodes and links define propositions. Thus, propositions are two or more concepts linked by words to form a semantic unit.

Mapping technique falls into the large category of mediating tools (Stoyanova & Kommers, 2001). The concept of mediation refers to the fact that our relation with the outside world including other people is always mediated by signs and artifacts. The technique forces students to think meaningfully about the content domain in order to identify and verify important concepts, classify them, describe the relationship

which one or more participants create a map using keywords that are representative of a specific concept. The result of a concept mapping session, he adds, is a concept map: “a series of words laid out in a graphical representation, with reciprocal connections and links” (p. 153).

What is a Concept Map?

Fundamentally a concept map provides a visualization of how an individual’s procedural or declarative knowledge is organized (Lavoie, 1997). This commonly involves concepts that are connected to other concepts in some hierarchical manner by propositional statements describing the relationship between such concepts. Concepts and propositions, as for knowledge in any domain, constitute the building blocks of concept mapping. Therefore, before dealing with the definition of a concept mapping technique, it is necessary to know what concepts and propositions are.

It can be said that concepts are like the atoms of matter and propositions are like the molecules of matter. In essence, a “concept” means a regularity in an object or event that is labeled with a word, like “books”, “air”, and “pollution”. It is simply a mental representation of something (Neath, 1998).

A concept is given new meaning when it is linked with other concept, as in “pollution in the air”, thus forming a proposition. A proposition is simply a relationship between two concepts that has a truth value (Neath, 1998, p.262).

Concept mapping is a general method that can be used to help any individual or group to describe their ideas about some topic in a pictorial

Description of Concept Maps

According to Oxford (1990), concept mapping is classified under memory strategies. She defines it as follows:

..... making an arrangement of words into a picture, which has a key concept at the center or at the top, and related concepts linked with the key concept by means of lines or arrows. Mapping is not just a good memory strategy but it is also useful as a pre-listening or pre-reading strategy for aiding comprehension (p.41).

Sopoehr (1994, cited in Dabbagh, 2001) defines concept mapping as follows:

It is a powerful and effective cognitive tool that encourages the students to organize their knowledge about a concept domain and to be explicit about the nature of relationship between ideas. Depending on how concept mapping strategy is utilized in an instructional context, it can alter the encoding process that in turn affects the learning outcome and performance of students (p.22).

Jonassen (1996) defines concept mapping as a tool that can enhance the interdependence of declarative and procedural knowledge to produce a third type of knowledge called structural knowledge. Novak (1990) defines concept mapping strategy as a tool for organizing and representing knowledge that includes concepts or propositions enclosed in circles or boxes of some type and connecting lines including the relationship between the concepts.

According to Cieognani (2000) concept mapping is a process through

Introduction

The use of concept maps as a teaching strategy was first developed by J.D. Novak in the early 1980's. It was derived from Ausubel's learning theory which places central emphasis on the influence of students' prior knowledge on subsequent meaningful learning. According to Ausubel (1968), the most important single factor influencing learning is what the learner already knows. When meaningful learning occurs, it produces a series of changes within our entire cognitive structure, modifying existing concepts and forming new linkages between concepts.

The power of concept maps has been best justified by the Model of Spatial/Verbal Processing proposed by Lambiotte et al. (1989). According to this model the presentation of a graphical display advocates both the spatial (i.e. perceptual and imaginative) and the verbal (i.e. syntactic and propositional) processing systems of the user. Concept mapping serves as a kind of template to help to organize knowledge and to structure it. Many learners and teachers are surprised to see how this simple tool facilitates meaningful learning and the creation of powerful knowledge frameworks that not only permit utilization of the knowledge in new contexts, but also retention of the knowledge for long period of time (Novak & Wandersee, 1991). There is still relatively little known about memory processes and how knowledge finally gets incorporated into our brain, but it seems evident from diverse sources of research that our brain works to organize knowledge in hierarchical frameworks and that learning approaches that facilitate this process significantly enhance the learning capacity of all learners (Novak, 1990).

The impact of concept map training as a post- listening strategy on efl learners' listening comprehension

Mansoor Fahim*

Farrokhlagha Heidari*

Abstract

This study aimed to investigate the impact of concept map training as well as the interaction between concept mapping and test type on EFL learners' listening comprehension. Sixty-four female second-term freshmen university students studying English Translation as their major were randomly divided into four groups. The first two groups, serving as the experimental group, received concept map training during a period consisting of six sessions but the other two groups, functioning as the control group, received no map training during this period. At the end of the term one of the groups in the experimental group and one of the groups in the control group were randomly given a concept map comprehension test type while the two remaining groups took a multiple choice test type. The obtained results revealed that concept mapping leads to an improvement in the students' comprehension; however, the effect of test type was not significant.

Key Words: concept map training – experimental group – control group – test type – comprehension.

* Allameh Tabatabaei University

• Ph.D.Candidate, Allameh Tabatabaei University