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The Effect of Concept-Mapping on Speaking and Self-Regulation in Speaking of Iranian Intermediate EFL Learners

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Abstract

Concept-mapping is a meaningful strategy which helps learners to learn more effectively, to record and recall information easily, and to support creative problem solving (Novak, 1991). On the other hand self-regulation is a model of language learning through assumptions of which learners use strategies actively in order to control their own learning process (Oxford, 2011). This study was an attempt to investigate the effect of concept-mapping on speaking ability and on self-regulation in speaking of Iranian intermediate EFL learners. At the outset of the study, after piloting, 72 students participated in experimental and control groups, 36 in each. A Proficiency English Test (PET) (Quintana, 2003), was used to homogenize the proficiency level of the students, a questionnaire on motivated strategies for learning (Pintrich, Smith, Garcia, & McKeachie, 1991) was administered to measure the students' self-regulation including meta-cognitive, self-regulation, time and study environment, effort regulation, peer learning, and help seeking components. The experimental group received speaking treatment with concept mapping instruction. At the end, both groups filled out questionnaires again and took the speaking post test. The statistical analyses revealed that although concept-mapping had significant effect on speaking ability of the learners; it did not have any significant effect on learners' self-regulation in speaking.

Keywords

concept-mapping, self-regulation, speaking ability, strategy-based instruction

1. Introduction

1.1 Background and Purpose

One of the most significant discussions in meaningful learning is debating learners' interactions in the class atmosphere and one of the most challenging teaching situations is the discussion or speaking class. In most classes, the most confident learners like to talk more and control the discussion and the weaker ones stay silent. Speaking is a complex skill and its characteristics make it difficult to learn. Scholars (O'Malley & Chamot, 1990; Oxford, 2001; Rubin, 1981) believe that instruction in strategy use is an

effective means to promote language acquisition and to make learning easier, more effective, and appropriate to new situations. One of the most important instruction strategies introduced since the 1970s was concept-mapping. Weinstein and Mayer (1986) state that use of this learning strategy in the class, help learners attend to the exercises, pay attention to important points and have a productive atmosphere for learning.

Concept-mapping is a kind of learning strategies which writing and drawing have a crucial role in it. Folse (2010) notices that if you ask people to write about their ideas about a topic before speaking about it, not only the quantity but also the quality of discussion will improve. The original work done on concept mapping was based on Ausubel's (1968) theory of meaningful learning. This theory was developed after his work on how learners learn large amounts of useful information from textual and verbal inputs. Novak (2002) argues that concept maps are some graphical tools which are used to organize and represent learners' knowledge. One can express complex and powerful ideas with a minimum of graphic elements. Semantic units or units of meaning which are used in concept mapping are propositions. Propositions are statements about some objects or events which contain two or more concepts connected using linking words or phrases to form a meaningful statement.

One of the extremely important sections which instructors should notice is realizing that when learners are in the process of learning speaking there are a number of limitations working against them. This fact may work as an obstacle and slow down their speaking pace. These limitations consist of: their lack of confidence in their English skills, their lack of background information about the topic, their lack of participation in discussion group, and their lack of interest in the topic. In this paper, these possible limitations of the learners were also taken into account, and the strategy of concept-mapping was set up to help learners to develop and organize their ideas and thus foster confidence in their knowledge of the topic, which will facilitate speaking (Folse, 2010).

More recently, Oxford (2011) highlights that learners, in self-regulation model, try to use strategies actively and constructively in order to manage their own learning. She states that if learners want to achieve self-regulation in their learning phases, they should pass through some specific process, for example they should have special goals for their learning, they must concentrate on the received instruction, use effective strategies, rehearse information, monitor their performances, manage time effectively, hold positive beliefs about their capabilities and feel satisfied with their outcome.

Self-regulation for Zimmerman's (2002) has the same definition. This author believes that self-regulation can empower students to become self-aware of their learning skill and help them to manage their effort. He also states that "correct strategy use allows for personal change" (p. 68). Personal change may be in the form of success in learning lessons and it can be the retention of course materials.

Concept-mapping is a useful strategy which helps you to learn more effectively, improves the way that you record your information as they hold it in a format, that your mind find it easy to recall and quick to review and also supports creative problem solving (Novak, 1991). On the other hand, self-regulated

learners seem to take control of their learning such as self-monitoring. Winne (2004), for instance, argues that self-regulated learners take control of their learning and have different types of strategies that encourage regulating such as planning and self-monitoring. Self-regulated learners are agents and agents are purposeful in their process of learning. Therefore, this study was an attempt to investigate the effect of concept-mapping on speaking and self-regulation in speaking abilities of Iranian intermediate EFL learners. The study was sought to see how concept-mapping help learners to develop and organize their ideas and foster confidence in their knowledge of the topic to enhance their speaking. Also, it saw how concept-mapping led the learners to become self-regulated in speaking.

2. Research Questions

In order to investigate the effect of concept-mapping on learners' speaking and the learners' level of self-regulation in speaking, following research questions were formulated:

(1) Does concept-mapping have any significant effect on Iranian intermediate EFL learners' speaking ability?

(2) Does concept-mapping have any significant effect on Iranian intermediate EFL learners' self-regulation in speaking ability?

3. Method

3.1 Participants

The participants of the main study comprised of 72 students. They were studying English at Tehran University Language Center in Iran. All of the students were at the intermediate level of language proficiency. They were all Iranian, males and females between the age of 20 to 30 and most of them were studying different majors at Tehran University.

3.2 Materials and Procedures

A) Proficiency English Test (Quintana, 2003) was used to determine the homogeneity of the participants. It consisted of reading, writing, listening and speaking part. All of the students took PET test at the beginning of the term.

B) Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991) was applied to measure the students' self-regulation. It consisted of thirty one item related to self-regulated learning strategies, like metacognitive self-regulation or meta-cognition, time and study environment, effort regulation, peer learning, and help seeking.

C) A speaking post test was adapted from standardized speaking tests. It had 25 questions was reviewed by some EFL experienced instructors and double checked by the language faculty of Tehran University Language Center.

D) The rating scale to rate speaking test was the same as the one used to rate PET.

3.3 Design

This quantitative study had a quasi-experimental with a pre-test-treatment-post test design. While

concept-mapping was considered as independent variable, self-regulation and speaking ability were dependent variables of the study. The study also enjoyed a survey questionnaire.

3.4 Procedures

The study started with piloting which took four sessions. There were 15 students with the same characteristics of the population. Concept-mapping strategy instruction and the questionnaire were piloted. Reliability of the questionnaire was 0.79. The main study took 13 sessions in seven weeks. At the outset of the study all participants took homogeneity test of PET and filled out the questionnaire. Then, students in experimental group had an introduction session about concept-mapping as a learning strategy. They were provided with a handout on concept mapping with examples and maps which was taught in details. During treatment sessions, whenever a question for discussion was introduced, there was a prerequisite exercise which made learners to write out their own ideas. They had to write their thoughts on paper through a map which made them to rethink, and recycle their ideas. When instructors asked learners' opinions about the topic, before learners had a chance to speak out, instructors gave them time to write their opinions on a map. This task seemed to be influential. After a while instructor asked them to begin the discussion by using their maps.

One of the essential principals of meaningful learning is the existence of cooperation among second language learners and the collaboration can be among learners and instructor too. Therefore, in experimental group, exchanging ideas among learners created a challenging atmosphere among learners and caused moderate and weak learners participated in activities. As interactive activities went on, increasing learners' self-confidence seemed evident.

The students were assigned into groups and asked to think about the topic that the instructor had just introduced. Then, the important information was elicited from the students though asking questions on the topic.

The students were encouraged to use concept mapping and to plan what they say. It was aimed to improve their not only speaking ability but also self-regulation in speaking through planning and taking control of their learning process.

Finally, students had to discuss and exchange their ideas through concept mapping, thus cooperating with each other. They had to do tasks in the group and made their information complete, so everyone in the group participated in completing concept mapping tasks. Then, they had to perform the task in the class using the ideas based on concept mapping through discussions in the groups and speak to the class. At this time, the students needed the input of the other learners to complete the discussion which caused a productive atmosphere.

During the instructional period students in the control group did many speaking activities based on their teaching materials in the absence of concept-mapping strategy. At the end of the instructional courses, the students in both groups completed the self-regulation questionnaire with rearranged items to prevent practice effect. Then they took the speaking post-test. All of the students' speaking exams were recorded on a recorder which made the rating by the second rater possible.

4. Results

Since the gathered data analyzed through the parametric tests, four assumptions of interval data, independency of subjects, normality and homogeneity of the variances should be met (Field, 2009). When the assumption of normality was met the data were measured according to an interval scale and the subjects' performed independently on the tests.

4.1 Analyses of Proficiency English Test

An independent t-test was run to compare the experimental and control groups' mean scores on the PET test in order to prove that both groups enjoyed the same level of general language proficiency prior to the administration of the treatment. As displayed in Table 1, the experimental (M = 53.81, SD = 6.40) and control (M = 54.11, SD = 6.31) groups showed almost the same means on the PET and the homogeneity of both experimental and control group before treatment is also revealed.

Table 1. Descriptive Statistics Based on the Results of PET

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	36	53.81	6.400	1.067
Control	36	54.11	6.315	1.052

The results of the independent t-test (t (70) = .204, P > .05, R = .024) represented a weak effect size. Table 2 indicated that there was not any significant difference between the experimental and control groups' mean scores on the PET. Thus it can be concluded that they were homogeneous at the outset of the study.

Table 2. Independent T-Test Based on the Results of PET

	Levene's Test for Equality of Variances		T-Test for Equality of Means						
			t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
	F	Sig.						Lower	Upper
Equal variances assumed	.020	.889	.204	70	.839	.306	1.498	-2.683	3.294
Equal variances not assumed			.204	69.987	.839	.306	1.498	-2.683	3.294

It should be noted that the assumption of homogeneity of variances was met (Levene's F = .020, P > .05). That is why the first row of Table 2, i.e. "Equal variances were not assumed" was reported.

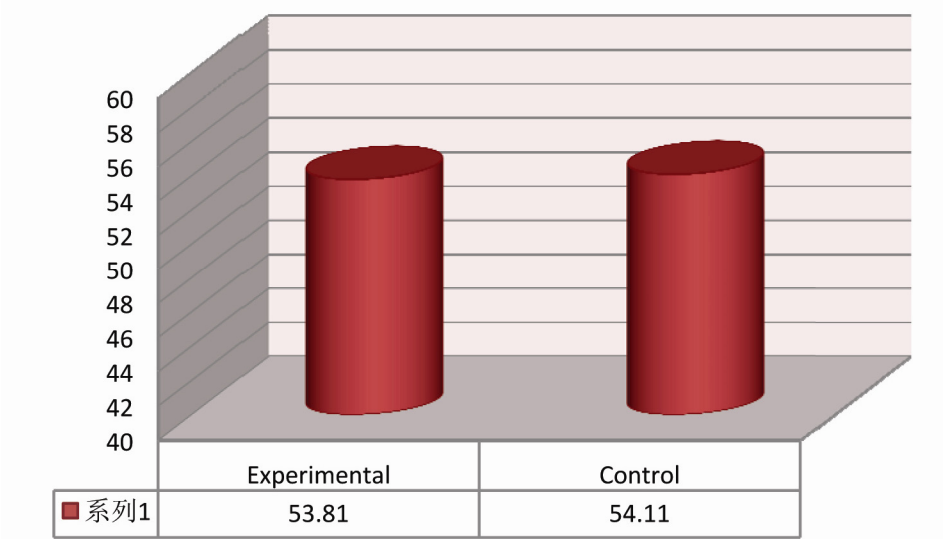


Figure1. PET by Groups

Hypothesis One

Inter-rater reliability of the speaking test was obtained as reported in Table 3.

There was a significant agreement between the two raters who rated the students in speaking post-tests ($R(70) = .75$, $P < .05$, it represents a large effect size).

Table 3. Inter-Rater Reliability of Speaking Post-Tests

		SPR2
SPR1	Pearson Correlation	.758**
	Sig. (2-tailed)	.000
	N	72

**. Correlation is significant at the 0.01 level (2-tailed).

An independent t-test was run to compare the experimental and control groups' mean scores on speaking post- tests in order to probe the effect of concept-mapping on the learners' speaking ability. As displayed in Table 4, the experimental ($M = 29.83$, $SD = 3.14$) showed a higher mean than the control ($M = 28.18$, $SD = 2.79$) group on the speaking test.

Table 4. Descriptive Statistics of Speaking Post-Tests by Groups

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental	36	29.83	3.140	.523
Control	36	28.18	2.791	.465

The results of the independent t-test (t (70) = 2.361, P < .05, R = .27) represented an almost moderate effect size (Table 5) and indicated that there was a significant difference between the experimental and the control groups' mean scores on the speaking test. Therefore, concept mapping had significant effect on speaking of the learners.

Table 5. Independent T-Test of Speaking Post-Tests by Groups

	Levene's Test for Equality of Variances		T-Test for Equality of Means						
			T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
	F	Sig.						Lower	Upper
Equal variances assumed	.133	.716	2.361	70	.021	1.653	.700	.256	3.049
Equal variances not assumed			2.361	69.050	.021	1.653	.700	.256	3.049

It should be noted that the assumption of homogeneity of variances was met (Levene's F = .133, P > .05). That is why the first row of Table 5, i.e. "Equal variances not assumed" was reported.

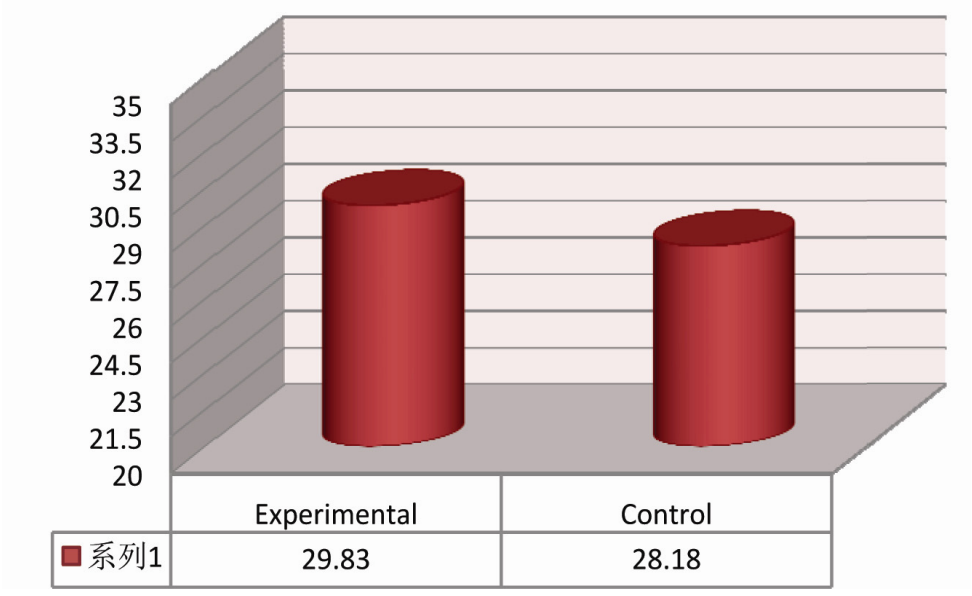


Figure2. Post-Tests of Speaking by Groups

4.2 Data Analysis of Self-Regulation Questionnaire

The Cronbach Alpha Reliability shows in table 6 for the pre-test and post-test of self-regulation questionnaire.

Table 6. Cronbach Alpha Reliability

	Cronbach's Alpha	N of Items
Pretest	.790	31
Posttest	.781	31

The sampling adequacy (KMO = .71 > .60) and sphericity ($\chi 2$ (45) = 177.51, P < .05) were met. That is, the present sample size was adequate enough for carrying out the factor analysis. The correlation matrix was also appropriate for the analysis which made inferences of the result possible. The results of factor analysis indicated that prior to the administration of the treatment all components of self-regulation tapped on a single construct.

Table 7. Sampling Adequacy and Sphericity Assumptions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.714
Bartlett's Test of Sphericity	Approx. Chi-Square	177.518
	df	45
	Sig.	.000

4.3 Pretests of Self-Regulation Questionnaire

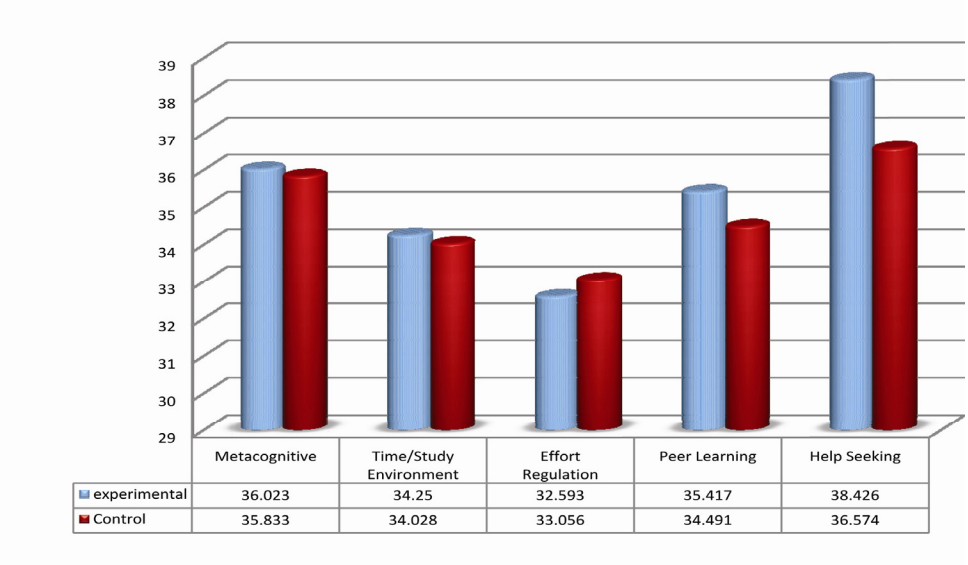
A multivariate ANOVA (MANOVA) was run to probe any significant difference between the experimental and control groups' use of five components of self-regulation strategies speaking ability before the treatment in pre- tests. Before reporting the results, it should be noted that the assumption of homogeneity of variances-as tested through the Levene's F-values and the assumption of homogeneity of covariance—as tested through the Box's test were met. The probabilities associated with the Levene's F-values were all higher than 0.05. Thus the assumption of homogeneity of variances was met.

Besides enjoying homogenous variances, the groups also had to enjoy homogenous covariance matrices. The Box's M-value of 15.45 was not significant (P = .506 > .05). Thus the assumption of homogeneity of covariance matrices was also met.

Table 8. Box's Test of Equality of Covariance Matrices: Pre-Tests of Self-Regulation Speaking Questionnaire

Box's M	15.453
F	.951
df1	15
df2	19728.947
Sig.	.506

Figure 3 represents the experimental and control groups' use of five components of self-regulation strategies.



	Metacognitive	Time/Study Environment	Effort Regulation	Peer Learning	Help Seeking
experimental	36.023	34.25	32.593	35.417	38.426
Control	35.833	34.028	33.056	34.491	36.574

Figure3. Pre-Tests of Self-Regulation Questionnaire

Hypothesis Two

A multivariate ANOVA (MANOVA) was run to probe any significant difference between the experimental and control groups' use of five components of self-regulation strategies in order to investigate the effect of concept-mapping on the learners' self-regulation in speaking after treatment in post-tests. Before reporting the main results, it should be noted that the assumption of homogeneity of variances—as tested through the Levene's F-values and the assumption of homogeneity of covariance—as tested through the Box's test-were met. As is displayed in Table 9, the probabilities associated with the Levene's F-values were all higher than 0.05. Thus the assumption of homogeneity of variances was met.

Table 9. Homogeneity of Variances: Post-Tests of Self-Regulation Questionnaire

	F	df1	df2	Sig.
Post Metacognitive	0.307	1	70	0.581
Post Time Study Env	1.171	1	70	0.283
Post Effort Regulation	0.377	1	70	0.541
Post Peer Learning	1.513	1	70	0.223
Post Help Seeking	0.894	1	70	0.348

Besides enjoying homogenous variances the groups enjoyed homogenous covariance matrices. The Box's M-value of 15.75 was not significant (P = .484 > .05). Thus the assumption of homogeneity of covariance matrices was also met.

Table10. Box's Test of Equality of Covariance Matrices: Post-Tests of Self-Regulation Questionnaire

Box's M	15.764
F	0.970
df1	15
df2	19728.947
Sig.	0.484

The results indicated that there was not any significant difference between the overall mean scores of the experimental and control groups on the post-tests of the components of self-regulation strategies therefore, concept-mapping did not have any significant effect on learners' self-regulation in speaking.

Table 11. Descriptive Statistics: Post-Tests of Self-Regulation Speaking Questionnaire

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Post Metacognitive	Experimental	32.523	.672	31.183	33.863
	Control	32.819	.672	31.479	34.160
Post Time Study Env	Experimental	31.736	.775	30.191	33.281
	Control	31.944	.775	30.400	33.489
Post Effort Regulation	Experimental	35.306	.787	33.737	36.875
	Control	33.935	.787	32.366	35.504
Post Peer Learning	Experimental	39.741	.868	38.009	41.472
	Control	37.176	.868	35.444	38.907
Post Help Seeking	Experimental	32.130	.968	30.199	34.060
	Control	34.074	.968	32.143	36.005

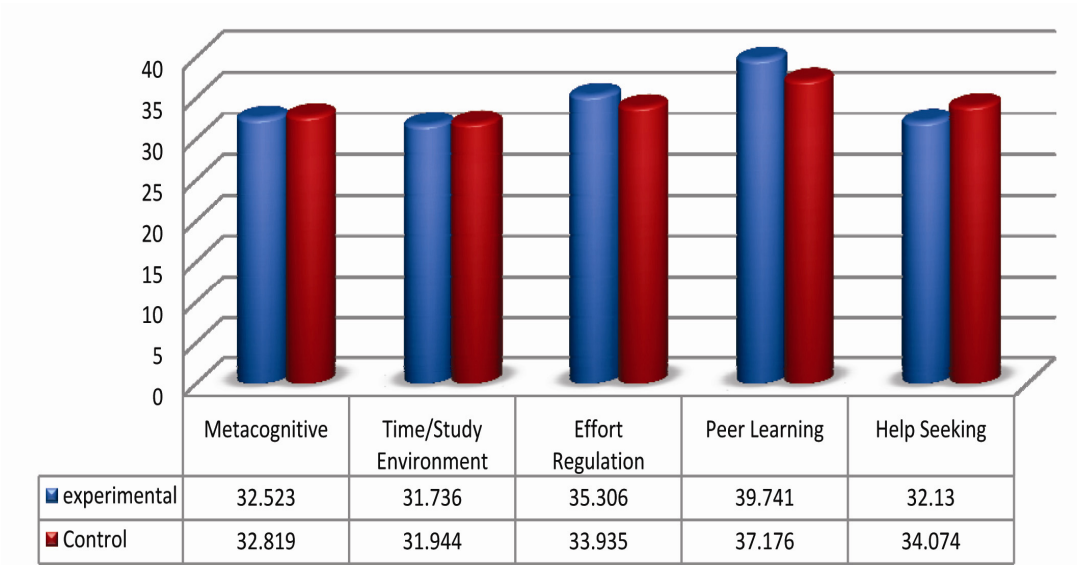


Figure 4. Post-Tests of Self-Regulation Speaking Questionnaire

5. Discussion

Several studies have noted the importance of meaningful learning which founded the concept-mapping strategy. Positive effect of concept-mapping strategy on learners' self-regulation is confirmed by Talebinezhad and Mousapour Negari (2007) who concluded that use of concept-mapping strategy in their writing courses, promoted learners' self-regulation and learners claimed that their learning was maximized while using concept mapping in essay writing. The findings of this study were both compatible and in contrast with their findings in a sense that, while concept-mapping was an effective strategy to promote and foster learners' speaking ability it was not effective on the learners' self-regulation in speaking.

Like Leahy (1989) who used concept maps to help his students understand literature and found that concept maps were valuable for students not only for giving descriptions, but also for taking notes and using notes in their speech, during the treatment sessions of this study it was revealed that concept maps were valuable for students giving descriptions and note taking in their discussion which led to an improvement in learners' speaking ability.

The findings of the study is also in line with the study done on the effects of strategy instruction on second-language complexity, accuracy, and fluency of oral production by Tavakoli, Vahid Dastjerdi and Esteki (2011). They both showed strategy instruction had an important role in foreign language classrooms.

The finding of this study accompanied with the finding of Beissner and Yacci's (1993) study where concept-mapping strategy was also focused upon, could be an influential factor in problem solving processes. The procedure of treatment sessions of this study revealed that concept-mapping could be used as an influential strategy in problem solving tasks.

The efficacy of concept-mapping in aural skills training is confirmed by Scandrett (2005), who found that it is possible to apply the process of concept mapping to aural skills, and concept-mapping should be seriously considered as the basis for a new, more efficient and more effective method for practicing aural skills. This, undoubtedly, is in agreement with the result of this study.

However, these findings are in contrast with the study of Jegede, Alaiyemola and Okebukola (1990), who concluded that concept-mapping, led to a significantly greater reduction in anxiety level of students as a part of self-regulation strategy. However, based on the findings of this study, concept-mapping did not have any effect on learners' anxiety as a part of self-regulation.

Self-regulation efficacy also investigated by Shen and Liu (2011) in English blended context. The study resulted that students did not possess strong self-regulatory ability while the outcome also implied that postgraduates' self-regulatory ability was stronger than that of undergraduates. Although this study found that concept-mapping was not effective on increasing learners' self-regulation it seems that it may support the argument that students' self-regulatory ability could be enhanced through teaching, learning and more practice.

6. Conclusion

In sum, given the idea that learners learn a language meaningfully and may have better language retention and learning, concept mapping strategy can be used to achieve a higher speaking ability, although this strategy did not seem to improve self-regulation of students in their speaking. Learners were actively involved in their learning process and achieved higher speaking ability as the result of concept-mapping instruction. This indicated that through the increase of the learners' conceptual understanding they had a better output which supports the second school of Novakian concept-mapping.

The improvement of learners' speaking abilities using thinking and brainstorming based on related concepts prior to speaking activities is compatible with Gowin's (1981) conclusion in his study. It can thus be concluded that meaningful learning as Ausubel (1968) argues, may cause better language retention and production of the learners. Novak and Cañas (2008) also state that one of the reasons why concept-mapping is so powerful for meaningful learning is that it works as a kind of scaffold to help organizing knowledge and structuring knowledge, even though the structure must be built up piece by piece with small units of interacting concept and propositional frameworks. The conclusion of this study supports the second school of Novakian concept-mapping in a sense that the process of concept mapping gave the students the ability to reflect upon a specific topic. In doing so, the students became able to clarify their ideas about that topic. Thus through the increase of the learners' conceptual understanding they had a better output. Learners had crucial and active roles in this study through constructing concept maps since this study was based on the idea of Stoica, Moraru and Miron (2010) who believe that concept maps are necessary for the modern teaching-learning process because learners are actively involved in their learning process and collaboration with the instructor in the developing of concept maps.

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