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LITERATURE, LINGUISTICS & CRITICISM | RESEARCH ARTICLE

The influence of concept mapping and rehearsal on speaking accuracy and complexity

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Abstract: The present study sought to investigate the effect of concept mapping and rehearsal on speaking accuracy and complexity of Iranian intermediate EFL learners. In addition, an attempt was made to make a comparison between the two strategies in terms of their contribution to speaking accuracy and complexity. To this end, using an experimental research design, two language institutes were randomly selected in Yasouj, Iran. A Quick Placement Test was validated and administered. Based on the results, 60 EFL intermediate learners were selected and were randomly assigned to one control and two experimental groups, i.e., the concept mapping group and the rehearsal group. A speaking pre-test was initially administered. The results indicated that the groups were not significantly different in terms of the two variables in question. The experiment began, which involved instruction in concept mapping for the first experimental group, rehearsal for the second experimental group and placebo for the control group. Following the treatment, a post-test of speaking was administered to the groups. The findings were that concept mapping had a statistically significant effect on speaking accuracy and complexity of intermediate EFL learners. In addition, the analysis of the data showed rehearsal significantly improved accuracy. However, there was no indication that rehearsal can significantly improve speaking complexity. Finally, it was revealed that the concept mapping group and the rehearsal group do not show significant differences in terms of accuracy, but the concept map group

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PUBLIC INTEREST STATEMENT

Developing speaking skill in a language taught in a setting where that language is a foreign language is especially challenging. Having said that, language teachers need to make every effort to develop the much-needed oral ability in the language. Being aware of this necessity, the current study sought to determine whether the use of some techniques such as concept maps and rehearsal could contribute to the development of speaking. These simply involve language learners in the learning process. The first has more to do with mental involvement and the second is something more mechanical. The findings of the study indicate that under certain conditions these two techniques could make a difference. These findings can help improve teaching and learning practices of speaking classes.

outperformed the rehearsal group in terms of complexity. These findings have important implications for teaching speaking.

Subjects: Humanities; Language & Literature; Language & Linguistics; Language Teaching & Learning; General Language Reference; Languages of Asia; Languages of the Middle East

Keywords: accuracy; complexity; concept mapping; rehearsal; speaking skill

1. Introduction

Speaking is considered as the most prevalent means of communication among members of society. It is used to express thoughts and feelings and represent social behaviour (Novia, 2002). It involves the systematic production of auditory signals which are intended to bring about differential verbal responses on the part of interlocutors (Bygate, 1987). An alternative definition defines speaking as “the process of building and sharing meaning through the use of verbal and non-verbal symbols, in a variety of contexts” (Chaney & Burk, 1998). In addition, it is considered as an interactive process of constructing meaning, involving producing, receiving and processing information (Brown & Lee, 1994). In the current study, speaking has been defined operationally with particular reference to complexity and accuracy, as detailed in the section on the methodology of the study.

Given that communicative ability is high on the agenda of language teaching and learning these days, speaking ability in English as a second or foreign language has acquired ever more importance. Therefore, developing the skills through proper teaching and learning strategies is highly significant.

A learning strategy is defined as “an individual’s approach to a task. It includes how a person thinks and acts when planning, executing, and evaluating performance on a task and its outcomes” (Schumaker & Deshler, 2006). There are learning strategies, such as meaningful learning, organizing, note-taking, identifying important information, and summarizing which can contribute significantly to learners’ linguistic development, so in the long run, they can make a better job of language learning in classroom instructed setting (Pressley, 1982).

Concept mapping and rehearsal are among such learning strategies. In line with meaningful learning, Novak and his colleagues’ studies led to the development of concept mapping which can facilitate the process of conceptualizing and representing knowledge, can thus contribute to improved speaking (Novak, Bob Gowin, & Johansen, 1983). Concept mapping encourages questioning, discussion, and debate (Baroody & Bartels, 2000).

The findings of the study conducted by Chularut and DeBacker (2003) showed a significant interaction of time, method of instruction and level of English proficiency for self-monitoring, self-efficacy and achievement. For all of these variables, higher gains were achieved for students who used concept mapping, compared with students who made use of their own learning strategies. Related research findings have revealed that discussing the ways in which concept maps can be created and learning how to express oneself, using concept maps can enhance not only linguistic skills but also argumentative and persuasion skills (Marriott, 2010). Likewise, Lee’s (2013) study sought to investigate the use of concept mapping by American students in learning Korean. The results indicated that, as reflected in the five components of their composition score, collaborative concept mapping significantly improved L2 writing across the three class levels examined.

There are four major categories of concept mapping: spider, hierarchy, flow chart, and systems concept maps. To begin with, in the spider concept map, the central concept is placed in the centre of the map. In the second type, information is presented in a descending order of importance whereas in the flow chart concept map, information is represented in a linear format. In addition,

the systems concept map is the same as a flow chart. The only difference between them lies in the addition of inputs and outputs in the systems concept map.

Rehearsal strategies include activities and procedures for identifying and repeating important parts of materials provided for learners. Memorizing, reciting, loud-reading, listing concepts, highlighting, putting special marks, underlining, using mnemonics and taking personal notes are the subcategories. Rehearsal is a strategy that reduces learners' stress and anxiety so that they can take risk to speak in front of other learners (ThiTuyetAnh, 2015). In addition, rehearsal strategy is a cognitive strategy which is very effective in language teaching in general (Larsen-Freeman, 2012). It is thought that repetition and imitation-based practice could move a skill from controlled to automatic processing.

The brief literature review above suggests that these two strategies can bring about the improvement of language skills, in general. However, their impact on Iranian EFL learners' speaking accuracy and complexity has not been investigated. Therefore, the current study has sought to determine whether concept mapping and rehearsal, as two strategies in language learning and teaching, can influence speaking accuracy and complexity in Iranian EFL learners or not. In addition, these strategies are compared in terms of their impact to determine which one is more effective for intermediate learners and can enhance their speaking ability in terms of accuracy and complexity.

2. Concept mapping defined

Concepts, which are designated with labels are defined as regularities which are perceived in events or objects or records of events. Maps are defined as graphical representations (Novak, 1991). Therefore, concept maps can be defined as graphical representation of knowledge that is comprised of different concepts and the relationships and inter-relationship between them (Novak & Gowin, 1984). Concepts are organized hierarchically so that more general concepts are located at the top and more specific ones at the bottom (Novak, 1991). Two or more concepts are connected to form a meaningful statement or proposition. In other words, propositions are statements about some object or event in the universe, either naturally occurring or constructed. Cross links are used to show interrelationships among the concepts in a given domain of knowledge. Figure 1 provides an example of concept mapping technique for structuring information.

3. Objectives of the present study

The main objective of this study is to investigate the impact of two variables (i. e. concept mapping and rehearsal) on speaking accuracy and complexity of English language learners in Iran. Specifically, this study aims to address the following questions:

- (1) Does concept mapping have any effect on speaking in terms of accuracy and complexity?
- (2) Does rehearsal have any effect on speaking in terms of accuracy and complexity?
- (3) Is concept mapping or rehearsal more effective in terms of possible effect on accuracy and complexity?

4. Method

4.1. Participants & sampling procedure

In the current study, the population was intermediate English language learners of language institutes in Yasouj, Iran. Language learners of intermediate level were of interest because advanced learners had already been through these stages and it is not expected to see pronounced improvement in their performance, especially in terms of accuracy. Out of the language institutes, two institutes, namely, Bozorgmehr and Andishmand were randomly selected. A Quick Placement, comprising 60 items was administered. This test was given to 110 English language learners. The results are given in Table 1.

Figure 1. Concept mapping (Novak, 1991).

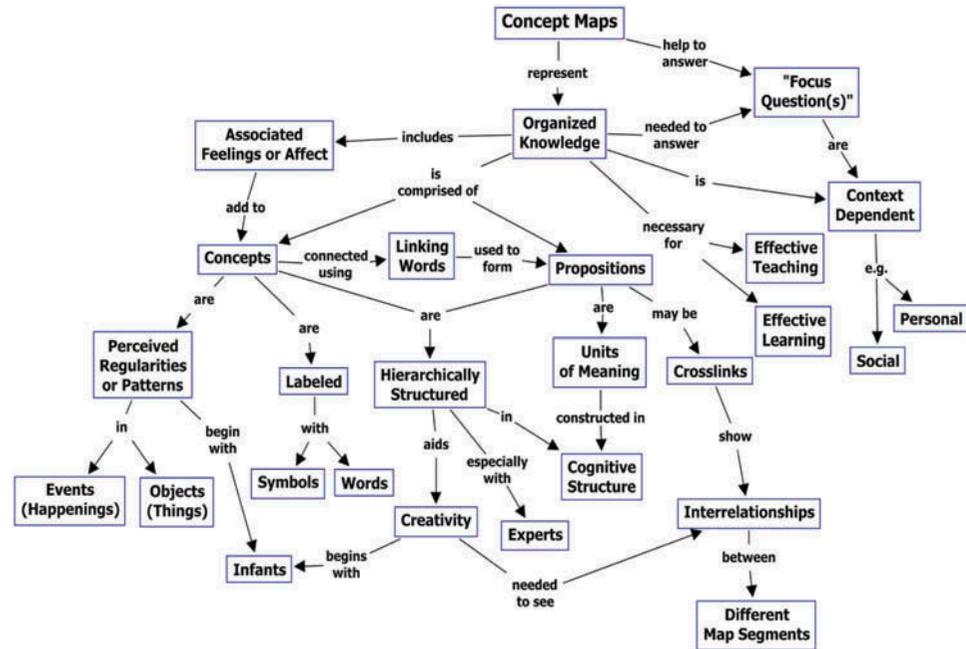


Table 1. Quick placement test statistics

N	Mean	Standard deviation	Variance	Range	Minimum	Maximum
110	42.5	7.99	63.94	31	25	56

As shown above, the mean is 42.05 and standard deviation is 8. Therefore, the learners who scored one standard deviation above and one standard deviation below the mean were selected as participants of the study. The ultimate purpose was to make sure they are homogenous in terms of their proficiency level. In sum, there were 76 learners who scored between 34 and 50. Ten participants were set aside for piloting purposes. Six more participants were not willing to cooperate. Therefore, 66 language learners were selected as the participants of the study. Demographic information of the participants of the main study indicates the participants comprised 20 (33.33%) female and 40 (66.67%) male learners with 1 to 10 years of experience in learning English. The age of the participants ranged from 14 to 23 years old. Before the treatment, they were briefed on the objectives and the procedure of the study. Informed written consent was obtained from those who were willing to cooperate. At this stage, six more participants withdrew from the experiment for personal reasons. Therefore, the study was conducted on 60 remaining participants.

4.2. Design

This study employed a quantitative research design to investigate the influence of concept mapping and rehearsal on speaking accuracy and complexity. Quantitative research methods use objective measurements such as tests and questionnaires to obtain numerical values to answer research questions or test hypotheses which have been formulated (Dörnyei, 2007). Given the objectives of the study, which were quantitative in nature, out of quantitative designs, the experimental method of research was adopted. In the current study, control and experimental groups, treatments and pre-test and post-test were utilized. The concept mapping strategy was taught to one experimental group, using either teacher- or student-made concept maps. Different types of concept map were introduced in the classroom to help students learn how to make concept maps.

For example, to construct a hierarchy concept map, several steps are in order. First, a list of important topics is brainstormed. Second, the most important concept is chosen and is indicated in a box at the top of the map. Then, the keyword is linked to the second most important words from the list. Now that the keyword and the next most important words are found, it is possible to write the words that relate to the second keywords below these. Finally, lines are added to connect the terms, and explain the relationship between the terms in a word or two. The teacher sometimes asked students to create the concept maps in the classroom or out of the class. For the rehearsal group, as the second control group, the students practised taught materials through highlighting, overt group repetition, covert repetition, pattern practice by imitation and providing additional homework.

4.3. Instrumentation

A speaking test was developed by the current researchers in order to gather the data required in the study, consistent with guidelines provided by Haynes, Richard, and Kubany (1995). However, it was necessary to determine whether it was valid and reliable. The test was validated by two Ph. D. holders with expertise in language testing. They were requested to make judgements about the content validity and face validity of the test. Content validity refers to the degree the test content is a representative sample of the course content or the relevant domain. Moreover, face validity is defined as the relevance of the test to its function, based on judgments about the appearance of the test (Bachman, 1990). After providing feedback about the content of the test, especially given the proficiency level intended in the study, which, once addressed, led to major revision in the test, they confirmed both content and face of the test. After scrutinizing the test, they both confirmed its face and content validity.

A reliable test gives consistent scores on different administrations so that one's score does not differ significantly from one administration to the other (Farhady, Jafarpur, & Birjandi, 1994). To do so, the researchers administered the test to 10 English learners who were at the intermediate level as the participants of the study. After two weeks, the same test was administered to the same 10 learners and was scored again. To compute test-retest reliability, Pearson's correlation coefficient was calculated, which indicated that the test was reliable enough for the study.

4.4. Data collection

To collect the required data for this study, a Quick Placement Test was administered to 110 EFL learners. Out of these, 66 learners who scored one standard deviation above and one standard deviation below the mean were selected as intermediate learners to serve as participants. Given that six participants withdrew from the study, the remaining 60 participants were randomly and evenly assigned to three groups: the concept map, rehearsal and control groups. Each group comprised of 20 participants. Instruction in concept mapping strategy was provided for the first experimental group and a few examples were given in the classroom. In addition, instruction in rehearsal strategy and the associated activities such as simple repetition, note-taking, highlighting was provided for the second experimental group. For the control group, no specific strategy was used and the class was run as it is normally the case. The American English file 3 was selected as the course to be taught to the participants. Then, the treatment began. The classes were taught for twenty-two sessions. Every session there was a speaking part that lasted about 25 to 30 min. Following that, a post-test was administered to evaluate the participants' speaking ability in terms of accuracy and complexity. The procedure was the same as the pre-test. The participants were tested again and their speech was recorded and later transcribed for further analysis.

Regarding data transcription and coding, it is argued that as oral data are challenging for analysis, reliability of such measures could be called into question (Ellis & Barkhuizen, 2005). In the current study, the data were transcribed and coded into AS units and clauses which are sentence-length utterances defined for oral data. For the purpose of reliability, two raters rated the oral test. The correlation coefficient between the two raters was calculated both for the pre-test and the post-test for the concept mapping group, the rehearsal group and the control group in

terms of accuracy and complexity. The correlation coefficient for accuracy and complexity of the speaking pre-test for the concept mapping group, the rehearsal group and the control group was significant. That is, two sets of scores obtained from the two raters of the same test highly correlated, suggesting the test scoring is reliable enough. In addition, it was necessary to determine the inter-coder reliability for scoring the post-test. Like the pre-test results, post-test results showed high correlation between the scores of the two raters. That is, scoring the post-test was reliable enough.

5. Measures

Accuracy and complexity have been identified as two important components of language speaking by applied linguists. In general, accuracy refers to being error-free and complexity shows the extent to which language is advanced. In spite of these general definitions, these components have been defined and operationalized differently by different researchers (Housen & Kuiken, 2009). Therefore, there are specific measurements for evaluating each of these general components. High scores in speaking fluency, accuracy, complexity are not always better (Pallotti, 2009). For example, extremely long speech without any hesitation is difficult to be understood. Generally speaking, the more fluent, accurate and complex, the better language performance (Foster, Tonkyn, & Wigglesworth, 2000).

5.1. Accuracy measures

In the current study, speaking accuracy was measured by calculating proportion of error-free clauses and percentage of error-free AS units (Skehan, 1996; Skehan & Foster, 1997).

Based on standard American English, syntactic, morphological, and lexical errors are calculated to measure error-free clauses and AS units. However, pronunciation errors are not taken into account (Ellis & Barkhuizen, 2005). If speech is repeated, the final version is considered as the basis for performance. Likewise, when self-correction occurs, the final utterance is taken into account.

5.2. Complexity measures

Corpus analyses have shown that writing and speaking differ in terms of syntactic complexity features (Johnson, 2017). In line with Norris and Ortega (2009), three different levels were measured for syntactic complexity of speaking in this study. First, length of AS unit was calculated by mean number of words divided by AS unit. Second, clause length was measured by dividing mean number of words by clauses. Subordination was another measurement which was calculated as the ratio of clauses both finite and infinite divided by AS units.

5.3. Data analysis

Prior to the experiment, it was necessary to determine whether the groups are homogenous in terms of the variables in question or not. To accomplish this, ANOVA and T-tests were run. In order to analyse the data, both descriptive and inferential statistics were used. To see the possible influence of concept mapping and rehearsal on speaking accuracy, t-test and analysis of variance (ANOVA) were run. To compare the impact of concept mapping strategy and rehearsal strategy, use was made of descriptive statistics such as mean, standard deviation and inferential statistics, such as t-test.

5.4. Results of pre-tests

5.4.1. Accuracy component in general for the concept mapping group and the control group

It was necessary to consider accuracy in general for the concept mapping group and the control group. The results appear in the following Table

The accuracy mean scores of the concept mapping group, as the experimental group, and the control group were compared. The results presented in Table 2 show that the differences between the concept mapping group and the control group were not statistically significant before receiving treatments.

Table 2. Independent sample T-Test for accuracy variable of the concept mapping group and the control group in pretest.

		t-Test for equality of means									
Leven's test for equality of variance		T	Df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference			
f	Sig							Lower	Upper		
.068	.796	-.391	38	.698	-.00197	.00506	.004	-.01221	.00826		
Equal variances assumed											
		-.391	37.871	.698	-.00197	.00506		-.01221	.00826		
Equal variances not assumed											

5.4.2. Accuracy in general for the rehearsal group and the control group

Combination of the subcomponents of accuracy provides us with a clear picture of accuracy in general. Given that, it is necessary to find out whether accuracy in general for the rehearsal group and the control group is different or not before the commencement of the study.

The pretest mean scores of the rehearsal group, as the experimental group, and the control group in terms of accuracy were compared. The results presented in Table 3 confirm that the rehearsal group and the control group are not significantly different before receiving treatments.

5.4.3. Complexity in general for the concept mapping group and the control group

It was necessary to make a comparison in terms of general complexity. The following table provides the results.

The table shows that the two groups were not statistically different in terms of their overall complexity.

5.4.4. Complexity in general for the rehearsal group and the control group

Pretest scores of complexity were compared. The following table provides the results. Table 4 provides the results of the comparison between the concept mapping group and the control group in the pretest, which indicates that the two groups began the experiment on an equal footing.

As shown in Table 5, the results of the t-test confirm that the rehearsal group and the control group do not differ significantly in terms of complexity at the outset of study.

5.5. Post-test results (finding of the study)

Post-test Results of Accuracy and Its Components for the Concept Mapping Group and the Control Group

To determine whether there is any significant difference between the experimental group, the concept mapping group, and the control group in terms of accuracy as the function of concept mapping strategy, the data gathered through the post-test for accuracy were analysed. The results are given below.

5.5.1. The influence of concept map on accuracy in general

Post-test scores of accuracy components were compared. Again, t-tests were run to accomplish this.

Using an alpha level of .05, the results of an independent-sample t-test in Table 6 show that the test was significant. The 95% confidence interval for accuracy ranges from .004 to .02. An examination of the group means indicates that language learners in the concept mapping group are significantly more accurate than those in the control group. In addition, the mean scores of the control group in the pre-test and post-test show that the control group has not improved in terms of accuracy.

5.5.2. Post-test results of accuracy and its components for the rehearsal group and the control group

To determine whether there is any significant difference between the rehearsal group and the control group in terms of accuracy as the function of rehearsal strategy, the data gathered through the post-test for accuracy were analysed. The results appear below.

5.5.3. The influence of rehearsal on accuracy

Post-test scores of accuracy components were compared. A t-test was run to accomplish this.

Using an alpha level of .05, the results of the t-test in Table 7 show that the rehearsal group and the control group are significantly different. The 95% confidence interval for the

Table 3. Independent sample T-Test for accuracy variable of the rehearsal group and the control group in pretest.

		t-Test for equality of means									
		Leven's test for equality of variance					t-Test for equality of means				
		f	Sig	T	Df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
										Lower	upper
Equal variances assumed		.035	.852	.220	38	.827	.00113	.00510	.001	.00920	.01145
Equal variances not assumed				.220	37.940	.827	.00113	.00510		-.00920	.01145

Table 4. Independent sample T-Test for complexity variable of the concept mapping group and the control group in pretest

	Leven's test for equality of variance		t-Test for equality of means							
	F	Sig	T	Df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
									Lower	Upper
Equal variances assumed	.069	.794	.226	38	.822	.02450	.10825	.001	-.19463	.24363
Equal variances not assumed			.266	37.936	.822	.02450	.10825		-.19465	.24365

Table 5. Independent sample T-Test complexity variable of the rehearsal group and the control group in pretest

	Leven's test for equality of variance		t-Test for equality of means							
	F	Sig	T	df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
									Lower	upper
Equal variances assumed	.164	.688	.406	38	.687	.041	.10087	.004	-.16320	.24520
Equal variances not assumed			.406	37.932	.687	.041	.10087		-.16321	.24521

Table 6. Independent sample T-Test for accuracy variable of concept map group and the control group in post-test

	Leven's test for equality of variance		t	df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
	F	Sig							lower	upper
Equal variances assumed	.209	.650	2.868	38	.007	.01303	.00454	.175	.00383	.02222
Equal variances not assumed			2.868	36.444	.007	.01303	.00454		.00382	.02223

Table 7. Independent sample t-Test for accuracy variable of the rehearsal group and the control group in post-test

	Leven's test for equality of variance		t-Test for equality of means							
	F	Sig	T	Df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
									lower	upper
Equal variances assumed	4.707	.036	5.239	38	.000	.02145	.00409	.419	.01316	.02974
Equal variances not assumed			5.239	30.786	.000	.02145	.00409		.01310	.02980

average percentage of accuracy ranged from .013 to .029. An examination of the group means indicates that the participants in the rehearsal group outperformed the control group in terms of accuracy.

5.6. Comparison between concept mapping strategy and rehearsal strategy in terms of speaking accuracy

The post-test data were analysed to determine which strategy is more effective in improving speaking accuracy. The following results were obtained.

The post-test mean score of the concept mapping group and the rehearsal group in terms of accuracy were compared. The results presented in Table 8 show that the concept mapping group and the rehearsal group are not significantly different after receiving treatments.

5.7. Post-test results of complexity and its components for the concept mapping group and the control group

It was also necessary to compare the groups in terms of complexity after receiving treatments. The comparison was carried out in terms of the components of complexity.

5.7.1. The influence of concept mapping on complexity in general

Post-test scores of the components of complexity were compared. The following tables provide the results.

Using an alpha level of .05, an independent sample t-test was run to evaluate whether the speaking complexity variable differs significantly as a function of concept mapping. The test was significant. The 95% confidence interval for the average percentage of complexity ranged from .11 to .80, as reported in Table 9. The examination of the group means indicates that the participants in the concept mapping group used significantly more complex language than the participants in the control group.

5.7.2. Post-test results of complexity for the rehearsal group and the control group

It was also necessary to compare the rehearsal group and the control group in terms of complexity after receiving treatments.

5.7.3. Complexity in general for the rehearsal group and the control group

Post-test scores of the components of complexity were compared. The following table provides the results.

Analysis of variance shows that the two groups were not significantly different after receiving respective treatments. Therefore, the effect of rehearsal strategy on speaking complexity was not significant.

5.8. Comparison between concept mapping strategy and rehearsal strategy in terms of speaking complexity

Finally, the post-test data were analysed to determine which strategy is more effective in improving speaking complexity.

The post-test mean scores of the concept mapping group and the rehearsal group in terms of complexity were compared. The results presented in Tables 10 and 11 indicate that the concept mapping group and the rehearsal group are significantly different after receiving treatments. In fact, the concept map group outperformed the rehearsal group. The summary of the findings is provided in the following Table 12.

Table 8. Independent sample T-Test for accuracy of concept mapping group and the rehearsal group in post-test

		t-Test for equality of means								
		Leven's test for equality of variance								
		F	Sig	T	df	Sig(2-tailed)	Mean difference	Std. Error difference	95% Confidence interval of the difference	
									lower	upper
Equal variances assumed		5.738	.022	-2.382	38	.820	-.00843	.00354	-.01559	.00126
Equal variances not assumed				-2.382	34.697	.820	-.00843	.00354	-.01561	.00124

Table 9. Independent sample T-Test for complexity variable of the concept map group and the control group in post-test

	Leven's test for equality of variance		T	Df	Sig (2-tailed)	Mean difference	Std. Error difference	Effect size	95% Confidence interval of the difference	
	F	Sig							lower	upper
Equal variances assumed	.005	.943	2.679	38	.011	.45769	.17083	.159	.11185	.80352
Equal variances not assumed			2.679	29.021	.012	.45769	.17.83		.10830	.80707

Table 10. ANOVA for complexity of the rehearsal group and the control group in post-test

	Some of squares	Df	Mean square	F	Sig.	Effect size
Between group	.216	1	.216	2.734	.106	.067
Within group			2.679	29.021	.012	
Total						

6. Discussion

The purpose of this study was to investigate how learners' speaking accuracy and complexity are affected by concept mapping and rehearsal strategies. The results for the posed research questions are presented and discussed in the following section.

The first research question addressed the impact of concept mapping on speaking in terms of accuracy and complexity. The result indicated that the participants in the concept mapping group were significantly more accurate than those in the control group. This could be due to the fact that language learning is more effective when language learners' attention is drawn to what is language used for, rather than what language is. Therefore, this task does not necessarily improve accuracy. Moreover, the speaking complexity variable differed significantly as a function of concept mapping in comparison with that of control group. These findings were in line with the results of a study that showed that the group which was taught grammar through concept mapping had a higher achievement in grammar in comparison with the control group that received instruction in the traditional method (Salehi, Jahandar, & Khodabandehlou, 2013). The same results were obtained in the study conducted by Abu Nada (2008). In this study, it was found that concept mapping improved English grammar achievement among ninth graders in Gaza. Shaul's (2011) study showed that self-generated concept mapping by low-knowledge students had a significant influence on students' text comprehension. Through a qualitative and descriptive study, Vázquez-Cano, Meneses, and Márquez (2013) concluded that concept mapping promotes the knowledge construction and management by the students, allows assessment of the understanding of teaching graduate students in relation to the implications of information and communication technologies in education and facilitates multimodal learning.

The second question addressed the effect of rehearsal on speaking in terms of accuracy and complexity. The examination of the group means indicates that students in the rehearsal group outperformed the control group in terms of accuracy while analysis of variance showed that the two groups were not significantly different after receiving the respective treatments. Therefore, the effect of rehearsal strategy on speaking complexity was not significant. There are studies that confirm the effectiveness of rehearsal strategy in language-related performance. In the study into the effects of task repetition, Bygate (1996) demonstrated that fluency and complexity improved in an oral narrative task repetition; however, accuracy improvement was not significant, which is not consistent with the findings of the present study. This could be attributed to the fact that proficiency levels were different in these two studies. In addition, unlike the current study in which the participants were EFL learners, in the study carried out by Bygate, the participants were native speakers of the language. In addition, Bamanger (2014) examined the effect of task repetition on fluency and accuracy of Saudi EFL female learners' oral task performance. The findings revealed that task repetition increased learners' oral fluency and accuracy.

Finally, in the present study, it was found that the concept mapping group and the rehearsal group are not significantly different before receiving treatments in terms of accuracy. However, the results showed that the two groups are significantly different after receiving treatments. In fact, the concept map group outperformed the rehearsal group.

Table 11. Independent sample T-Test for complexity of concept mapping group and the rehearsal group in post-test

		t-Test for equality of means								
Leven's test for equality of variance		f	Sig	T	Df	Sig(2-tailed)	Mean difference	Std. Error difference	95% Confidence interval of the difference	
									lower	upper
Equal variances assumed		1.680	.203	1.899	38	.045	.299813	.15696	-.01961	.61586
Equal variances not assumed				1.899	22.220	.044	.29813	.15696	-.02721	.62346

Table 12. Findings summary

Strategy	Concept mapping	Rehearsal
speaking aspects		
Accuracy	Significant	Significant
Complexity	Significant	Not significant

7. Conclusion

The findings of the study could have several implications for curriculum design, language teachers and language learners. Language teachers can, in particular, gain considerable insights into proper ways in which concept mapping and rehearsal could improve speaking skill. Even if for pedagogical purposes, both teaching and learning strategies are encouraged, it does not necessarily mean that the haphazard adoption of strategies could bring about the desired results. Rather, they can ensure access if utilized in an informed manner. In addition, given the clear advantage of concept-mapping over-rehearsal, language teachers need to ensure that arrangements are in place to incorporate relevant content and practices in their teaching agenda and language teaching methodology.

Moreover, language learners can benefit from the two strategies. Given that the participants of the study were instructed to create their own concept maps and the procedure to be adopted to develop them is not complicated and given the considerable effect which it has on accuracy and complexity, for pedagogical purposes, it is advisable to incorporate concept-mapping into assignments given to students to be done in the classroom situation as a guided practice and later on independently at home. This is expected to bring about considerable improvement as learning is more about how to learn than what to learn (Wells, 2009). Since concept maps are graphical representations of concepts and meaningful learning theory supports the use of concept maps, this strategy can organize learners' minds to prepare for speaking as learners are taught to focus on key ideas. Due to its nature, it can also harness language learners' anxiety and tension by planning the concepts they want to convey. In that case, concept mapping can bring about significant improvement in speaking accuracy and complexity. In addition, concept mapping strategy involves language learners in class activity and motivates them to develop their speaking ability.

On a broader level, the findings revealed that concept-mapping was more effective than the rehearsal strategy. However, rehearsal could be beneficial in terms of accuracy. The repetitive nature of rehearsal strategy can help learners with storing, maintaining, and retrieving language knowledge.

The current study was an attempt to determine the influence of concept mapping and rehearsal strategies on speaking accuracy and complexity and to determine which one is more effective in terms of its impact on speaking. Given the limitations in sampling and the way in which the participants were chosen, the findings of the study should be interpreted with caution as they may not be generalizable to other situations. There were other limitations inherent to the nature of the study at hand which had to do with the subjectivity involved in establishing the reliability and the validity of the instruments used and with assessing oral performance. Given these limitations, the findings of the current study are descriptive rather than complete. Therefore, further research is needed to determine whether the same findings will be replicated, which will consolidate the findings.

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