The Effectiveness of Concept Mapping on Learning: A Study in a Saudi College-Level Context

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Abstract Concepts play a key role at the teaching and learning processes of different disciplines, and due to the importance of concepts many researches such as Ausubel [3], Gowin [12], Skinner [25], Piaget [21] and Gagne, [11] believe that concepts and the clarity of them are considered to be the essence of any discipline This study aims to investigate the effect of using concepts mapping on developing the learning outcome of college-level students studying at the College of Technology at Arrass. In order to achieve this objective two groups (experimental and control) were randomly assigned by the researcher; the experimental group has been asked to employ concepts mapping in their learning, while the control group members were not given instructions to do so. Both groups were tested before and after the study. The posttests results showed that the experimental group members scored higher grades compared to counterparts in the control group.

Keywords: *concept mapping, speaking, english, college of technology, TVTC, Saudi Arabia*

1. Introduction

Of the four language skills, speaking seems intuitively the most important. A person who knows a language is referred to as 'a speaker of that language, as if speaking included all other types of skills and many second/ foreign language learners are primarily interested in learning to speak [26].

Speaking requires that learners not only know how to produce specific skills of language such as grammar, pronunciation, or vocabulary, but also they understand when, why and in what ways to produce language [7]. Levelt identified three autonomous processing stages in speech production: (1) conceptualizing the message, (2) formulating the language representation, and (3) articulating the message.

When it comes to second language teaching speaking has occupied a peculiar position throughout much of the history of language teaching, and only in the last two decades has it begun to emerge as a branch of teaching, learning and testing in its own right, rarely focusing on the production of spoken discourse [3]. Many researchers have tried many teaching techniques to improve this important skill; and they have tried to create environments that help students to improve and develop their speaking abilities especially when the opportunity to speak in English is not always possible outside the classroom.

Furthermore, to find out how speaking is developed, researchers have paid a great deal of attention to the nature and conditions of speech. Most current approaches draw on psycholinguistic skills or information processing models [15,23]. In a nutshell, various sources of information and processes are used when speaking takes place. These sources include planning, using background knowledge, finding words and phrases, using appropriate grammatical markers, and using the proper sound patterns.

Over the last 15 years of working as an English teacher at the college I have noticed that many of my students make lots of mistakes when they speak, and I have noticed that they have difficulty developing this skill. In a previous study [1] I have found out that part of this un wanted result is an outcome of lack of planning from the students part in speaking activities; thus, I set out to run the current study to investigate the effect of concept mapping on EFL students speaking abilities. The rationale behind the use of concept mapping in speaking abilities can be tentatively expressed in its effect on the planning process planning used in speaking, finding suitable words and phrases and organizing knowledge. I therefore speculate that learners who are not very good in speaking English might benefit from concept mapping.

2. Literature Review

Concept maps could be described as a "visual way of representing knowledge in which concepts, relationships and propositions exist" [26]. They are graphical tools used for organizing and representing knowledge [20]. Concept mapping was first explored by Joseph Novak and his colleagues in the 1970s, as a graphic means of expressing scientific concepts to children. Since then, concept maps

have been used in a wide variety of settings and contexts. Through concept mapping learners are able to externalize their existing knowledge and combine it with new knowledge rearranging and internalizing both the old and new knowledge in a graphic form [28]. The primary features of a concept map are its hierarchical structure which identifies specific concepts, usually enclosed in circles or boxes, and the connecting lines between these concepts which indicate how knowledge of a specific concept or domain is linked to the other concepts or domains. The most general and inclusive concepts are placed at the top of map, while the secondary concepts are placed below with the cross linkages and relationships between concepts indicated by lines [27]. Originally produced using pen and paper, concept maps are now a visualised cognitive tool supported by computer systems [14] and [29]. Novak"s concept map about concept mapping (Figure 1) shows how a concept map can be used to show the multiple relationships between concepts.
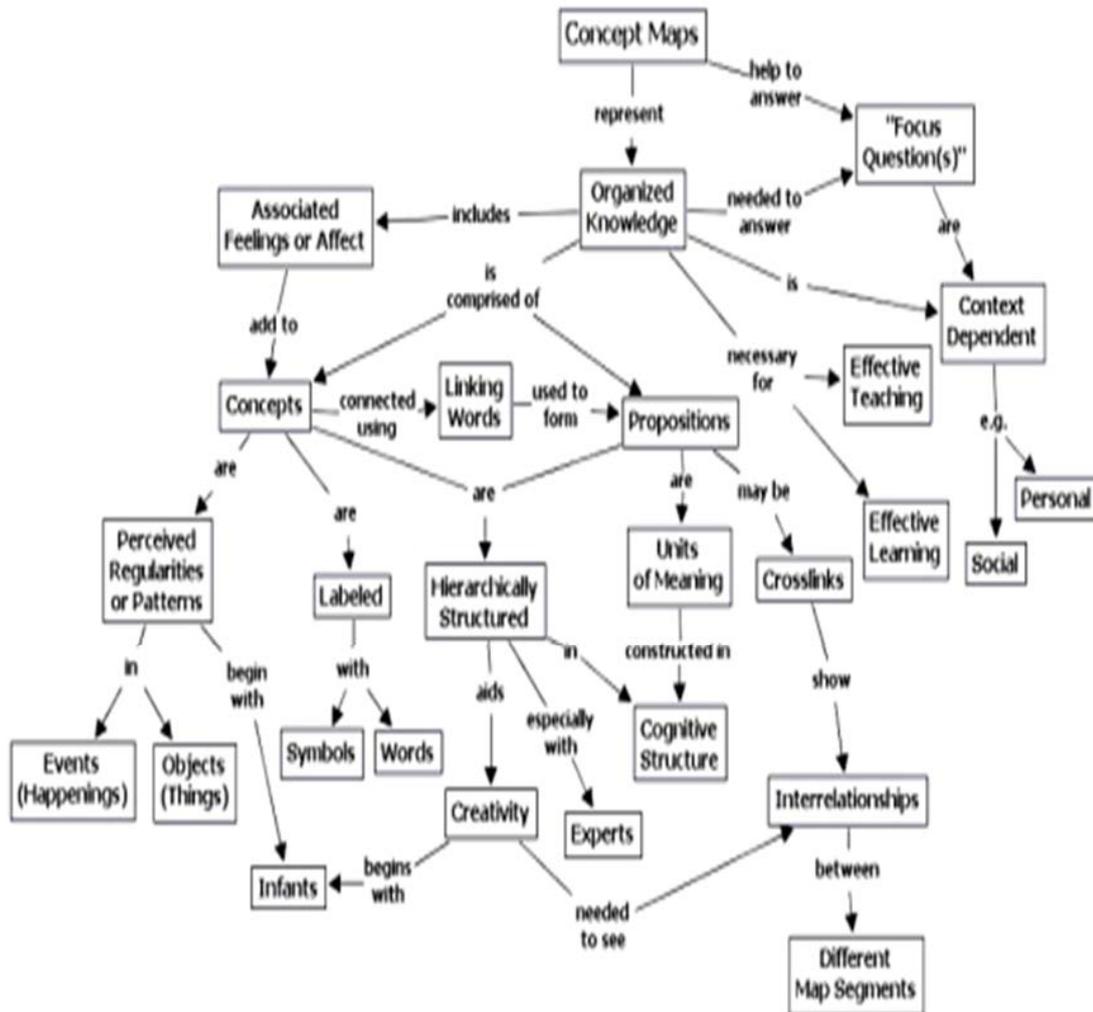

Figure 1.

Concept mapping has shown to be a valuable tool in different educational areas [13]. They can be used to communicate complex ideas and summarize information, for collaborative learning and for assessment and evaluation. Concept maps have been shown to help learners learn [20], and to facilitate the learning process [6]. They have also been used as advance organizers and as a curriculum development tool [24]. Furthermore, Educational research in the field of Second and Foreign Language Learning suggests that learning outcomes are positively affected when teaching strategies are matched to individual learning preferences [16]. They have proved useful in the context of cross cultural teaching and learning; concept maps have been used across a range of levels of English proficiency in ESL and EFL teaching [4]. For example, in reading comprehension tasks where students need to refine their language, concept maps can be used to identify and organize the main issues of a reading text. This technique was shown to make students more confident to retell the content of a reading text. An experimental study investigating the effects of using CACM (Computer Assisted Concept Maps) of 192 first year EFL learners at university level, found that concept mapping was more valuable than traditional reading teaching strategies [5,18]. Concept maps have also been used as a prewriting strategy for EFL learners. In a study of 23 EFL students, [19] found that students using concept maps out performed and controlled their learning better than the students who did not use concept maps. Moreover, Fahim & Hiedari [9] reported a positive influence of concept mapping on the learners' listening comprehension. Additionally, in a study by Pishghadam & Ghanizadeh [22] on the effect of concept mapping on EFL writing ability, it was found that the use of concept mapping resulted in improvement of students' writing ability. Furthermore, Marriott, and Torres [17] examined the use of concept

mapping in developing a student's reading, writing and oral skills. This methodology resulted in the betterment of the aforementioned skills.

These studies suggest that concept map use is a valuable learning strategy for ESL/EFL. However, the extent to which concept mapping might exert any influence on speaking of students learning English for specific purposes in an EFL setting has not been addressed in the literature to the best knowledge of the researcher.

3. Research Questions

1. Is there a statistically significant difference between the subjects' mean scores due to the use of concept mapping?

2. Is there a statistically significant difference between the groups' mean scores due to the use of concept mapping?

4. Methodology

4.1. Participants

60 full-time students participated in the present study during the university year 2013. The participants were enrolled in their first year of a two-year program offered by Arrass college of technology, Saudi Arabia (a yearly intake of approximately 250 students). Their age ranged from 19 to 22 years. The mean length of time they studied English was 7 years. This sample represented a fairly homogeneous groups (control and experimental) in terms of their schooling history (they all graduated from public Saudi schools) and their English proficiency level (according to the replacement tests results).

4.2. Arrass College of Technology

Arrass College of Technology is a technical college in Saudi Arabia. It was established in 2002 as the second college of technology in Alqassim region. Its first objectives and priorities to graduate the qualified technical cadres scientifically and practically to work in technical areas those contribute directly in building the national economy. Additionally, due to the importance of English language in the technical sciences programs, and because of the increased English language courses in diploma programs, the college has established a general studies department to supervise the English language-training curricula and other curricula. It also aims to contribute in raising the competency of college's trainers in this field through training courses and computer programs and other educational services. The department has adopted a readymade English language programs prepared by the Technical and Vocational Training Corporation (TVTC).

5. Instruments and Procedures

5.1. The Concept Maps

In each listening class, a conversation was introduced to the students in the experimental group using concept mapping. Students in the control group listen to the conversations without concept maps). Experimental group students are required to look at the given concept maps to understand conversations. Then they were asked to participate in different speaking tasks.

5.2. The Speaking Test

The speaking test was designed and developed by the researcher, and includes oral questions and evaluation rubrics. The oral questions consisted of three types of questions:

1. Biographical such as "What do you like about your hometown?" and "How large is your family"?

2. Opinion questions such as: "From your point of view; what is the best way to learn English? "What are the problems that face students in your college?

3. Guided questions such as "What is your dream job? Why? "Have you always wanted to join this college?

The purpose of the speaking test was to assess the participants' speaking skills before and after the using concept maps in order to detect the effect of the implementing them on the participants' speaking skills. The participants were pre and post-tested orally, and were then tape- recorded by two EFL teachers who evaluated them after each session according to an evaluation scheme presented by the researcher. The evaluation rubrics for the speaking test were adopted from The IELTS exam (Appendix 1) Before discussing the remaining parts of this paper I have to mention that the speaking test, the rubric and the pedagogical tasks have been validated by a panel of experts in this field. Those experts are professors who teach in different universities in Saudi Arabia, all of them got their PHDs from either UK or US universities and each one of them has been teaching English for more than 20 years.

6. Results and Discussions

The purpose of the current study is to examine the effect of concept maps on the students' speaking skill. The results of the study are presented in this section according to the research questions.

The first question aims to find if there is a statistically significant difference between the subjects' mean scores on the English speaking skills test due to the use of concept mapping. To answer this question the researcher firstly has calculated the means, and the standard deviation for the pretest and the first posttest, then t-test was performed to determine the differences of these means (Table 1).

Table 1.

Test	N	Mean	Std.Dev.	T	Degree Freedom	Sig
Pretest	30	2.43	.626	-12.836	29	.000
Posttest	30	4.10	.662			

As can be seen from previous table there was a statistically significant difference ($\alpha = 0.05$) between the two means in favor of the posttest(1) mean. This result suggests that concept maps has improved the speaking skill of the experimental group participants.

These results support the previous findings mentioned in literature which suggest that concept maps have a positive impact and using them could improve second language abilities.

The second part of this section will concentrate on the second research question which aims to find if there is a statistically significant difference between the groups' mean scores on the English speaking skills test due to the use of concept mapping. The results showed that there was a huge difference between the two groups; as can be seen from (Table 2) the groups (especially the experimental) levels have changed at the end of the semester.

Table 2.

Test	Levels							
	Level 2		Level 3		Level 4		Level 5	
	Exp.	Cont.	Exp.	Cont.	Exp.	Cont.	Exp.	Cont.
Pretest	21	21	8	8	1	1	-	-
Posttest	-	14	5	14	17	2	8	-

As can be seen from the same table the pre-test scores revealed that most students had weak proficiency in English and that they were particularly weak in speaking. The Posttest which was administered on both the experimental and the control groups on the same day, at the same time under similar conditions. The levels of all participants in the experimental group, have improved which proves that concept maps have a positive effect on their speaking skill, and by comparing their results with their colleagues in the control group, it appeared that the level of (73.7%) them has not improved at all, the level of (26.3%) them has reached level three, and the level of (3.3%) them has been improved from level three to level four. In contrast, the level of (16.7%) of experimental group members has improved from level two to three, the level of (16.7%) of them has improved from level three to level four, and the level of (3.3%) has improved from level four to level five.

Additionally, (ANCOVA) has been used to determine whether there were any significant differences between the two groups. As (Table 3) there are observed differences between the adjusted means of both groups.

Table 3

Group	Pretest		Posttest		Adjusted Means.	N
	Mean	Std. Dev.	Mean	Std. Dev.		
Experimental	2.43	.626	4.10	.662	4.07	30
Control	2.33	.547	2.60	.621	2.63	30
Total	2.38	.585	3.35	.988	3.35	60

The researcher used ANCOVA to find the significance of these differences. The results are presented in (Table 4).

Table 4.

Source	Sum of Squares	df	Mean Square	F	Sig
Pretest	6.833	1	6.833		
Method	30.941	1	30.941	22.821	.000
Error	17.067	57	.299	103.338	.000
Total	57.650	59			

The last table shows that there is a statistically significant difference ($\alpha = 0.05$) between the two adjusted means of the participants' scores on the posttest in favor of the members of the experimental group.

These results also prove that concept maps have positive effect on the students' speaking abilities. These results go along what has been mentioned in the literature such as Hsu, and Chang [13], Novak, and Cañas [20], Cicognani [6]. They also agrees with results mentioned by Mahnam and Nejadansari [19], Fahim & Hiedari [9], Pishghadam & Ghanizadeh [22] which suggest that concept maps improve the students' abilities when learning a second language.

7. Conclusion

Based on the results that have been reached in this study; it is safe to say that concept maps have a positive effect on the college level student's speaking skill. This suggestion goes along the positive point of view suggesting that concept maps are very useful and they could help students improve their speaking abilities.

To conclude, based on the findings of this study it is recommended that EFL teachers use concept maps in their teaching, since they enhance students' abilities in the speaking skill.

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Appendix 1

Band	Fluency and coherence	Lexical resource	Grammatical range and accuracy	Pronunciation
9	• speaks fluently with only rare repetition or self-correction; any hesitation is content-related rather than to find words or grammar • speaks coherently with fully appropriate cohesive features • develops topics fully and appropriately	• uses vocabulary with full flexibility and precision in all topics • uses idiomatic language naturally and accurately	• uses a full range of structures naturally and appropriately • produces consistently accurate structures apart from 'slips' characteristic of native speaker speech	• uses a full range of pronunciation features with precision and subtlety • sustains flexible use of features throughout • is effortless to understand
8	• speaks fluently with only occasional repetition or self-correction; hesitation is usually content-related and only rarely to search for language • develops topics coherently and appropriately	• uses a wide vocabulary resource readily and flexibly to convey precise meaning • uses less common and idiomatic vocabulary skilfully, with occasional inaccuracies • uses paraphrase effectively as required	• uses a wide range of structures flexibly • produces a majority of error-free sentences with only very occasional inappropriacies or basic/non-systematic errors	• uses a wide range of pronunciation features • sustains flexible use of features, with only occasional lapses • is easy to understand throughout; L1 accent has minimal effect on intelligibility
7	• speaks at length without noticeable effort or loss of coherence • may demonstrate language-related hesitation at times, or some repetition and/or self-correction • uses a range of connectives and discourse markers with some flexibility	• uses vocabulary resource flexibly to discuss a variety of topics • uses some less common and idiomatic vocabulary and shows some awareness of style and collocation, with some inappropriate choices • uses paraphrase effectively	• uses a range of complex structures with some flexibility • frequently produces error-free sentences, though some grammatical mistakes persist	• shows all the positive features of Band 6 and some, but not all, of the positive features of Band 8
6	• is willing to speak at length, though may lose coherence at times due to occasional repetition, self-correction or hesitation • uses a range of connectives and discourse markers but not always appropriately	• has a wide enough vocabulary to discuss topics at length and make meaning clear in spite of inappropriacies • generally paraphrases successfully	• uses a mix of simple and complex structures, but with limited flexibility • may make frequent mistakes with complex structures, though these rarely cause comprehension problems	• uses a range of pronunciation features with mixed control • shows some effective use of features but this is not sustained • can generally be understood throughout, though mispronunciation of individual words or sounds reduces clarity at times
5	• usually maintains flow of speech but uses repetition, self-correction and/or slow speech to keep going • may over-use certain connectives and discourse markers • produces simple speech fluently, but more complex communication causes fluency problems	• manages to talk about familiar and unfamiliar topics but uses vocabulary with limited flexibility • attempts to use paraphrase but with mixed success	• produces basic sentence forms with reasonable accuracy • uses a limited range of more complex structures, but these usually contain errors and may cause some comprehension problems	• shows all the positive features of Band 4 and some, but not all, of the positive features of Band 6
4	• cannot respond without noticeable pauses and may speak slowly, with frequent repetition and self-correction • links basic sentences but with repetitious use of simple connectives and some breakdowns in coherence	• is able to talk about familiar topics but can only convey basic meaning on unfamiliar topics and makes frequent errors in word choice • rarely attempts paraphrase	• produces basic sentence forms and some correct simple sentences but subordinate structures are rare • errors are frequent and may lead to misunderstanding	• uses a limited range of pronunciation features • attempts to control features but lapses are frequent • mispronunciations are frequent and cause some difficulty for the listener
3	• speaks with long pauses • has limited ability to link simple sentences • gives only simple responses and is frequently unable to convey basic message	• uses simple vocabulary to convey personal information • has insufficient vocabulary for less familiar topics	• attempts basic sentence forms but with limited success, or relies on apparently memorised utterances • makes numerous errors except in memorised expressions	• shows some of the features of Band 2 and some, but not all, of the positive features of Band 4
2	• pauses lengthily before most words • little communication possible	• only produces isolated words or memorised utterances	• cannot produce basic sentence forms	• speech is often unintelligible
1	• no communication possible • no rateable language			
0	• does not attend			