The Effectiveness of Using Concept Mapping Strategy on Learning English Grammar Rules for English Foreign Language Learners

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Abstract: The purpose of this quasi-experimental study is to investigate the effectiveness of applying concept mapping strategy to improve the performance skills and retention of grammar rules for English foreign language learners. The research was conducted on seventy-two undergraduate students at King Khalid University in the Aseer region in Saudi Arabia. Students were enrolled in two classes and each class was randomly assigned to either experimental or control group. Each group consisted of 36 students. The experimental group was taught with the concept mapping strategy, while the control group was taught with the traditional method. Both groups were provided with pre-test, taught with assigned treatment, and were given post-test. Then, the experimental group was provided with the retention test to examine the strategy impact on the long-term learning. The results showed that there were statistically significant differences between both groups in the post-test where the concept mapping group scored higher. Further, there were statistically significant differences between experimental group scores in the post-test and the retention test, where their scores increased in the retention test. Based on the findings of this study, teachers are encouraged to apply concept mapping strategy in their teaching and train students to create their own maps.

Keywords: Concept mapping. English grammar. EFL

فعالية استخدام استراتيجية خريطة المفاهيم في تعليم قواعد اللغة الإنجليزية

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الملخص: هدفت هذه الدراسة شبه التجريبية إلى استكشاف فعالية استخدام استراتيجية خرائط المفاهيم في تنمية مهارات قواعد اللغة الإنجليزية لمتعلمين اللغة الإنجليزية كلغة أجنبية. أجري البحث على اثنين وسبعين طالبًة في شعبتين في جامعة الملك خالد بمنطقة عسير في المملكة العربية السعودية. تم تعيين كل شعبة بشكل عشوائي إما لتمثل المجموعة التجريبية أو الضابطة؛ حيث تكونت كل مجموعة من 36 طالبة. تم تدريس المجموعة التجريبية بعض دروس قواعد اللغة الإنجليزية باستخدام استراتيجية خرائط المفاهيم، بينما تم تدريس المجموعة الضابطة بالطريقة التقليدية. أعطيت كلتا المجموعتين اختباراً قبلياً للتأكد من تكافؤ المجموعتين، ثم تم تدريسهما بالاستراتيجية المخصصة لكل مجموعة، ومن ثم تم إعطاؤهما الاختبار البعدي لقياس تأثير الاستراتيجية على تعلم قواعد اللغة الإنجليزية، وبعد مرور شهر تم إعطاء المجموعة التجريبية اختبار تتبع الأثر لقياس تأثير الاستراتيجية على الاحتفاظ بالمعلومات لفترة طويلة. أظهرت النتائج وجود فروق ذات دلالة إحصائية بين المجموعتين في الاختبار البعدي لصالح المجموعة التجريبية. بالنسبة لاختبار تتبع الأثر، فكانت هناك فروق ذات دلالة إحصائية بين تحصيل طالبات المجموعة التجريبية في الاختبار البعدي واختبار تتبع الأثر لصالح الاختبار الأخير. بناءً على نتائج هذه الدراسة، أوصت الباحثة بتشجيع المعلمين على تطبيق استراتيجية خرائط المفاهيم في التدريس، بالإضافة إلى تدريب الطالبات على إنشاء خرائط مفاهيم خاصة بهم وذلك للاستفادة من الاستراتيجية.

1- Introduction

English has spread widely, and it has become the official or sub-official language in most of the countries around the world (Abu Nada, 2008). In countries where English is not the official spoken language, it has become the primary language regarding international affairs. English plays an important role in many sectors such as engineering, medicine, and education. Mastering English is one of the requirements for getting a better job, and it is very important in education, so children are encouraged to learn English as a foreign language. Most classes are taught in English at the university levels in many countries. It is also the language of most of the websites and for internet press such as books, newspapers, and journals. Being able to read in English opens the door for billions of pages of information to be read in English. Learning a language is the foundation for learning all the other subjects in all the levels, such as Math, Science, History, etc. (Nishanthi, 2018). Further, mastering learning language skills depends on the foundation of grammar rules. Grammar is described as the science of language (Sweet, 2005). Students will struggle to read, write, speak and listen in English if they do not understand grammar well (Kumar, 2013). Therefore, teachers should use effective and engaging strategies to make learning grammar unforgettable and enjoyable, which as a result would lead to students' being able to speak and write properly (Perween, 2018). Concept mapping is one of the strategies that makes learning memorable and shows its effectiveness in achieving grammar (Abu Nada, 2008). The Concept mapping strategy is an educational strategy which can be described as a graphic tool that organizes information in ways to make it visual and easy to learn (Novak, 2004; Shakoori, Kadivar, & Sarami, 2017).

1.1-Statement of the problem

It has been stated that learning second language grammar is difficult. DeKeyser stated that grammatical difficulty was determined through three factors: the complexity of meaning, form and form-meaning relationship. In addition, the characteristics of the second language and its differences from the first language make acquiring the second language grammar so difficult (2005). Further, learning grammar for EFL learners is challenging because of the exceptions of the rules and the lack of motivation for learning (Lin, Hwang, & Cao, 2020). Therefore, many attempts have been applied to make learning grammar easy. Perween stated that achieving English grammar can be done when students are engaged (2018). One of the ways to make students engaged in the learning and helps make learning grammar less stressful is using strategies that make learning meaningful. For example, concept mapping is one of the strategies that is found to be effective in learning the four language skills: listening, speaking, reading, and writing. It is found to be beneficial for learning vocabulary and grammar rules. However, limited studies have been conducted on measuring its effectiveness on Arabic speakers learning English as a foreign language (EFL). In addition, none of the studies measured its influence on achieving grammar rules for

long-term memory. Therefore, this study was implemented to examine the impact of using concept mapping strategy on learning grammar rules and investigate whether it has an effect on learning grammar rules for long-term memory or not.

1.2-Research questions:

The main research question:

What is the effect of applying concept mapping strategy on achieving grammar rules?

From the main question, there are two sub-questions to answer:

Does the use of concept mapping strategy help EFL learners improve their grammar skills?

Does the use of concept mapping strategy help EFL learners retain their grammar skills?

1.3-Research hypotheses:

We can answer these questions through examining the following research hypotheses:

Research hypotheses 1:

There are no statistically significant differences at ($\alpha \leq 0.05$) between students' grammar performance of the experimental group and the traditional group in the post-test.

Research hypotheses 2:

There are no statistically significant differences at ($\alpha \leq 0.05$) between post and retention tests of students' grammar performance of the experimental group.

1.4-Purpose and significance of the study

The purpose of this study was to investigate the effects of using concept mapping on learning grammar rules. Data were collected to answer the research question; What is the effect of applying concept mapping strategy on achieving grammar rules? The significance of this study was that answering the research question will help in having a clear understanding of the strategy and its effectiveness on learning grammar rules. This will enrich teachers' knowledge about the new method for teaching grammar, which they can apply in their teaching. The findings of this study will assist EFL learners with their awareness of the concept mapping strategy, the ability to use it in studying grammar rules, and the ability to apply it into other subjects as well. It will contribute to the development of EFL instruction through applying the concept mapping strategy in teaching grammar. Further, it will help curriculum developers to supplement English curricula with concept maps-based activities.

1.5-Definition of Terms:

1.5.1-Concept mapping strategy:

This term is defined as a teaching strategy that is based on creating a graphic organizer to be utilized to show relationships between information in a way to make it memorable (Novak, 2004; Shakoori, Kadivar, & Sarami, 2017).

1.5.2-Traditional method:

A traditional method is a teacher-centered strategy, where the teacher explains the rules and the students are not active (Abu Nada, 2008). It is defined as providing the meaning of the part of speech and the systematic rules, where the learner can be able to choose the right words and organize them in a sentence (Woods, 1995). Teachers teach grammar rules through explaining the forms and making students practice them (Abu Nada, 2008).

3-Literature Review

Grammar skills are very important for learning any language. Brinton defined grammar as the language structure's knowledge, (2000). It is also referred to how words are fit together to make meaningful sentences (Williams, 2005, p.26). Knowledge of grammar makes communicating easy and clear, and helps people express their thoughts correctly (Brinton, 2000; Woods, 1995). However, learning grammar is difficult and there are many exceptions to many rules (DeKeyser, 2005). Therefore, grammar needs to be taught in a way that makes learning easy and memorable. That can be done through the use of concept mapping strategy to teach grammar rules.

3.1-Concept mapping strategy

It is a graphic organizer that represents relationships among ideas and concepts that are linked to a central subject. It represents knowledge in boxes, circles, or triangles and is connected with arrows or lines to show relationships and interrelationships between concepts. Major categories are represented in the top or the center of the diagram and the subcategories as the branches (Calvo, Arruate, Elorriaga, Larrañaga, & Conde, 2011). It is a strategy that helps in taking notes, generating ideas, and organizing thinking (Novak, 2004). Concept mapping strategy emerged from the constructivist theory of learning, which was derived from Ausubel's assimilation theory (Novak and Cañas, 2006). Ausubel suggested an advance organizer, which is based on activating the prior knowledge in the mind and linking it to the new one through a structure. Ausubel stated that learning becomes meaningful when it assists students to build on their prior information (Novak & Canas, 2008). In other words, when using the known information to learn the new content, it makes learning connected. Just as Ausubel's advance organizer helps learners make relationships between known information and new knowledge, concept mapping

strategy does the same. Using concept mapping strategy to learn new information requires learners to recall known information (Basso & Margarita, 2004). In addition, the concept mapping can be done either through paper and pen or by computer. Both types help promote students' learning, memorize information, and assist them in increasing learning achievement (Khajavi & Ketabi, 2012; Marangos & Alley, 2007; Hwang, Kuo, Chen, & Ho, 2014).

Concept mapping has been identified as a great teaching strategy and characterized by the following. It is a useful strategy for brainstorming, and it helps students organize information in groups. Concept mapping encourages students' creativity because it requires them to help create the map through using words and pictures or drawing (Novak, 2004). It also allows them to choose different shapes and colors for creating them. Further, it makes learners active, which attracts their attention and helps them learn better (Laight, 2004; Marangos & Alley, 2007). Furthermore, it shows students related information in a form of visuals, colors, symbols, which provides learners with an enjoyable and attractive format for both the eyes and the brain, and then be easier to remember. Using visuals helps learners learn faster and remember easily for a longer time (Novak, 2004). Teaching grammar with concept mapping makes learning more visual because it converts knowledge into a structure. It helps eliminate the overload of information in the mind. It involves both the use of verbal and visual to learn any information, which attracts both sides of the brain (Paivio, 1991). Concept mapping strategy is grounded on the dual coding theory by Paivio. Information that is coded visually and verbally increases the chance of recalling compared to the one coded using only one (Kalhor & Shakibaei, 2012). Concept mapping strategy requires involving both visual and verbal code. Thus, students will learn grammar better and more successfully when applying this strategy (Perween, 2018).

3.2-Studies on concept map:

The literature review contains a considerable body of research that focused on investigating the effects of using concept mapping strategy in teaching and learning. Almost all the studies that the researcher reviewed prove the benefits of the strategy on different essential language skills such as, reading (Kalhor & Shakibaei, 2012; Chularut & DeBacker, 2004), writing (Kassem, 2017; Yen & Yang, 2013), and listening (Ahour & Sakhaei, 2015). In addition, many studies' results have shown the strategy effectiveness on other important skills such as grammar (Abu Nada, 2008), vocabulary (Acat, 2008; Liu, 2016), and self-regulation (Khajavi & Ketabi, 2012).

Some studies were conducted on the usefulness of concept mapping strategy on learning English reading for ELL and for self-efficacy, (Khajavi & Ketabi, 2012; Chularut & DeBacker, 2004). Khajavi and Ketabi (2012) study examined the impacts of using concept mapping strategy on English reading comprehension and self-efficacy. It was conducted on 60 intermediate EFL who were divided into two groups; the concept mapping and the traditional method group. The concept mapping group showed

more improvement than the traditional group in terms of reading comprehension as well as self-efficacy. Another study by Kalhor and Shakibaei, (2012) investigated the effects of concept mapping on reading comprehension. Thirty-eight students of the last year of a high school in Karaj city in Iran were divided randomly into experimental and control groups. The experimental group was taught with concept mapping and the other group was taught with the traditional teaching method, reading passages and explaining them. Students were given tests that examined high levels of knowledge. The tests' results showed that the group who was taught with concept mapping scored higher than the other group in reading comprehension. Kalhor and Shakibaei stated that the concept mapping strategy is an effective method because it helped students use both pictorial and verbal ways to decode information. Therefore, the learning process is improved. In addition, using pictures help learners manage the overload of information in the mind and made remembering the information easier.

In an older study, Chularut and DeBacker (2004) scrutinized the impact of using concept mapping strategy on EFL self-monitoring, self-efficacy, and knowledge acquisition. Seventy-nine English Language Learners (ELL) enrolled in the study and were randomly divided into two groups. One was learning English reading with the concept mapping, and the other with individual study groups plus discussion. The results showed that students who were learning with concept mapping outperformed the other group in all the variables: achievement, self-monitoring, self-efficacy, and knowledge acquisition.

Other studies were conducted on the impacts of applying concept mapping strategy on English writing (Talebinezhad & Negari, 2007; Yen & Yang, 2013; Kassem, 2017; Kurniati & Kusumastuti, 2019). The Talebinezhad and Negari (2007) aimed to investigate the effect of using concept mapping on EFL self-regulation in writing. Sixty university students who were enrolled in either translation or literature classes were split into half; thirty students formed the concept mapping group and thirty students represented the traditional group. The results of the study stated that students who were in the concept mapping strategy showed more self-regulation in writing than the control group. Another study conducted by Yen and Yang (2013) examined the impacts of using digital concept mapping on EFL writing skills in forms of PPT. The study focused on improving some important skills of writing such as, accuracy, techniques, coherence and construction through the use of network tree, spider mapping, and idea webbing. Using these forms of concept mapping to analyze texts and write the analysis in ppt slides. The results of this study stated that the use of concept mapping helped EFL learners improve their writing in PPT.

Another study by Kassem (2017) examined the impact of blended strategy of concept mapping and text structure on Saudi EFL college level students' writing performance. Forty-two participants were divided into the blended strategy group and the control group. They were given a pre-test and were taught with either strategy and then were given the post-test. The blended strategy group showed greater achievement in writing scores than the control group. A current study by Kurniati and Kusumastuti (2019) aimed at examining the impacts of applying concept mapping strategy on organizing ideas in writing

exposition text for high school students. The result showed that the strategy was effective for enhancing students writing ability and helping them organize their ideas clearly in writing.

Other studies examined the effects of concept mapping strategy on teaching listening. Ahour and Sakhaei (2015) examined the role of using concept mapping on listening comprehension. Two classes were chosen based on a CELT test and then randomly assigned into the experimental group and the control group. After being taught listening with the assigned method they were tested. The results of the study showed that the concept mapping group scored higher than the control group.

The literature review does not just contain studies on the essential language skills but also covers other important skills that cannot the language be learned without such as vocabulary (Acat, 2008; Liu, 2016) and grammar (Abu Nada, 2008). Regarding vocabulary, the study conducted by Acat (2008) aimed to investigate the impact of concept mapping strategy on vocabulary enrichment. Two fourth grade classes at an elementary school in Turkey were involved in the study. Pre-test and post-test design were employed. The classes formed two groups and each group was taught with either the concept mapping strategy or conventional method. The study investigated the impact of concept mapping strategy on the students' knowledge of determining word meaning. In addition, it examines the effects of using the strategy on the degree of using vocabulary in sentences and identifying connections between words. The results of the study assured that concept mapping strategy is an effective strategy in helping enrich student's vocabulary. It helped students identify word meaning and connections among vocabulary and be able to correctly use them in sentences.

Another quasi experimental study investigated the impacts of "mobile English vocabulary learning based on concept mapping strategy" (Liu, 2016, p.128). One hundred students were divided into two groups (n=50), and each group was assigned to one of the treatments. One group was taught some vocabularies with concept mapping from the students' creation, while the other group was taught with text-only strategy. The results assured that the concept mapping group outperformed the text-only group in terms of vocabulary learning and retention.

Regarding grammar, only Abu Nada (2008) study was found in the literature that examined the use of concept mapping on grammar rules. He investigated the effect of implementing concept mapping strategy on grammar. The sample consisted of 113 female EFL who were 9th graders and were divided into the concept mapping strategy and the traditional group. Each group was taught with one method after having pre-test and then was given a post-test. The concept mapping strategy group showed greater improvement in the grammar achievement test compared to the traditional group.

From reviewing the previous studies, it seems that a lot of studies have been conducted on the usefulness of the concept mapping strategy on a variety of English language skills such as writing, listening, reading, and vocabulary, and other skills such as self-regulation. However, only Abu Nada (2008) study was conducted on the impact of the strategy on grammar. In addition, none of the studies

have been conducted on its effects on learning for long-term memory. Therefore, this study aimed to test the rule of using concept mapping strategy on grammar rules achievement and whether it helps students retain grammar rules for long-term memory.

4-Methodology

This quasi experimental study aimed to examine the impacts of using concept mapping strategy on EFL Arabian students' grammar performance skills and its effectiveness on retaining information in the long-term memory. The study used pretest-posttest nonequivalent design, where students are given pretest, taught with the assigned treatment, then they were given the posttest (Price, Jhangiani, & Chiang, 2015).

4.1-Participants

The sample of this study consisted of two classes of (72) EFL female learners who are studying linguistics texts as an elective class at King Khalid University in the Aseer region in Saudi Arabia. Each class contained 36 students. They were assigned into two groups using quasi-experimental nonequivalent design where randomly one class was assigned to form the treatment group and the other class to form the control group (Price, Jhangiani, & Chiang, 2015).

4.2-Instruments:

4.3.1-Grammar tests.

The measures for data collection of this study consisted of pre-test, post-test and the retention test. All the tests were written in a way to be equivalent, and they were given in different times and for different purposes. The pretest was given to see if both groups are comparable, while the posttest was provided to measure grammar knowledge. Further, retention test was given to measure retention of grammar knowledge in a long-term memory for the experimental group.

The tests included three general questions and each question consisted of 5 to 7 items. They were written in a way to measure different levels of knowledge as categorized by Bloom taxonomy; they cover some lower level thinking skills such as knowledge and comprehension and higher thinking skills such as application and synthesis. Regarding the knowledge level, students were asked to write the correct form of the past or present tense facing the base verbs (Q1). Regarding the comprehension level, they were asked to answer some questions using the correct tenses (Q3, A). In addition, for the application level, students were asked to complete incomplete sentences with affirmative forms of the verbs, past or present (Q2). Further, for the synthesis level, they were required to create questions out of lists of words for both past and present tenses (Q3, B).

4.3.2-Validity:

The tests were written in a way that is comparable to what the students are provided within their class and their textbook for the course. For examining the validity of the grammar achievement tests, the tests were given to a jury of professors of EFL curriculum and instruction and educational psychology. The juries suggested some revisions to some questions. Then, the researcher modified it based on their suggestions and comments.

4.3.3-Reliability:

To ensure the test reliability, the test was given to a group of students who were studying the same course that the study was conducted in but in an earlier semester of the same year. Then, the test stability has been evaluated using Cronbach's Alpha method =0.74 which means good stability Coefficient. Test stability has been also evaluated using split-half method with Spearman-Brown equation: Spearman-Brown Coefficient= 0.78 which means good stability Coefficient. In addition, regarding reliability consistency of test, it has been evaluated using the bivariate correlation between the degree of question and total degree on the test as; question 1 =0.71, question 2 =0.69, & question 3 =0.89).

4.3-Procedure of the study

In order to carry out the study, the researcher which is the course teacher did the following. In the mid of the semester, the researcher explained to the students that she will conduct a study and the purpose of it is to know the effect of a strategy on grammar. Students were aware that the participation of the study is optional, so there is no penalty of not participating and class scores won't be affected. The researcher also assured students that the participation of the study is confidential, which means they will not be identified. Thus, they were asked to write codes on the tests rather than names. Then, the students in both sections were given the pre-test to measure their background about the two grammar rules (simple past tense and simple present tense that they were assigned to study in that period of time), and to see if the groups are equivalent. Then, each section was randomly assigned to form either the experimental group or the traditional group. After that, one section was taught the topics with the concept mapping strategy while the other section was taught with the traditional strategy. The students in the concept group were told that they will be taught some lessons with a new strategy called concept mapping. Then, they were introduced with it, and were given some examples to understand how it works. After that, they were taught two topics: simple past tense and simple present tense. Each topic was taught in a class period and it took around one and a half hour for each topic and in different days. A week later, both groups were given the posttest to measure the effects of using concept mapping strategy on achieving grammar rules, many studies in the literature used one-week period to measure strategy effectiveness (Liu, 2016). Then, a month later the concept mapping group was given the retention test to see whether the strategy helped learners retain the knowledge or not. Retaining the information after a

long period of time means the knowledge is transferred from the short-term memory to the long-term memory (Novak & Canas, 2008). Therefore, it should stay in the memory, which is the purpose of learning.

Regarding the concept mapping strategy group, the researcher adapted the steps from the literature and modified them to suit teaching grammar rules (Talebinezhad & Negari, 2007). The steps are listed below with the explanation of the way they were implemented in this study. Then, a sample of one of the lessons is attached under. The Microsoft word program was used to create the concept map in the class with students' interaction.

The steps for creating the map were:

1- Put the concept (grammar rule such as simple past tense) that needs to be learned in the center of the paper in any shape. The researcher for this step put the simple past in the center as shown in Figure 1.

2- Draw arrows or lines in all directions to connect the major categories to the subcategories. For example, from the simple past, two lines were drawn to show the forms and uses of the simple past.

3- Write the subcategories (parts of speech, phrases, and concepts) in shapes. Here, the subcategories for the forms of the simple past was connected with lines and written as (+form) for affirmative, (-form) for negative and (? form) for questions.

4- Use a variety of colors to represent different parts of speech (if preferred). The researcher added one step, which is adding a sentence for each rule to make it understandable.

5- The researcher used the Microsoft word program to create the concept mapping strategy in the class with students' interaction.
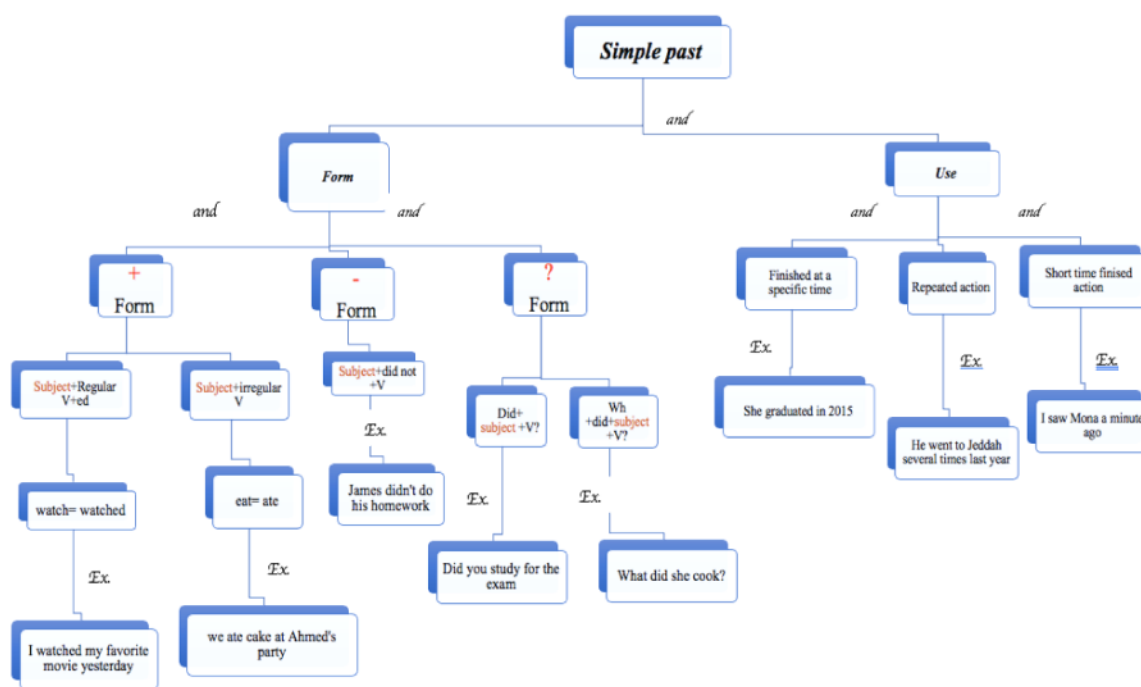
Figure (1) Concept map sample for simple past lesson

Regarding the control group, the researcher used the traditional method. She first started by telling them what the topic is and provided them with the rules of it. She explained the rules and provided a lot of examples to clarify the rules. Then, students were asked to solve some exercises such as fill in the blank with the correct form of the verb or provide specific form for the given verb. After that, they were asked to provide some examples to show their understanding of the topic. The traditional method is described as teacher centered strategy while students are passive (Abu Nada, 2018).

5-Results

The purpose of the study was to examine the impact of concept mapping on grammar skills. The researcher used the Statistical Package for Social Science (SPSS) program for analyzing the exams to answer the research question: What is the effect of applying concept mapping strategy on achieving grammar rules? The researcher first started by displaying the descriptive statistics as shown in Table (1) below. It showed the means and the standard deviations of both groups in all the three tests. First, regarding pre-test, concept mapping group's mean and standard deviation (M = 5.44, SD = 4.29), while the traditional group's mean and standard deviation (M = 5.69, SD = 3.1). Second, regarding post-test, concept mapping group's (M = 14.44, SD = 4.12), and for the traditional group (M = 12.69, SD = 3.03). Last, for retention-test, concept mapping group (M = 15.11, SD = 3.41), and for the traditional group (M = 12.69, SD = 3.03). In addition, it displayed that the data is symmetrical, the skewness is between -1.96 and +1.96,

which means it is normally distributed. Therefore, the independent t-test could be run to answer the research question.

Table (1). Descriptive statistics. N=36.

Group	Test	Mean	Std. Deviation	variance	Skewness	Kurtosis	Range
Experimental	Pre	5.44	4.29	18.42	1.66	2.45	17
	Post	14.44	4.12	17.05	-.599	-0.27	15
	retention	17.17	2.29	5.29	0.35-	1.21-	7
Control	Pre	5.69	3.1	9.64	-0.97	-1.31	9
	post	12.69	3.03	9.19	0.14	0.45	14

The researcher then tested the equivalency between the two groups to find out whether they are comparable or not. An independent sample t-test was run on the pre-test scores for both groups. Independent sample t.test helps to determine significant differences between two group means (Dornyei, 2007). Then, the results were analyzed as shown in Table (2) below. There were no statistically significant differences between students' grammar performance of the experimental group (M = 5.44, SD = 4.29), and the traditional (control) group in the pre-test (M = 5.69, SD = 3.1) and (t.= 0.28, p > .05). That means the two groups are equivalent and students' background of the topics are similar. Thus, the result is more likely to be because of the treatment.

Table (2) independent samples T-test for significant differences between experimental group and the traditional group in the pre-test.

group	N	Mean	Std. Deviation	Sig.	t	Sig. (2-tailed
Experimental	36	5.44	4.29	non	0.28	non
control	36	5.69	3.11			0.38

5.1-Results of research hypotheses 1:

It has been hypothesized that there are no statistically significant differences at ($\alpha \leq 0.05$) between students' grammar performance of the experimental group and the traditional group in the post-test. To test this hypothesis, independent samples T-test was used to verify the result as shown in Table (3) below. The mean score for the post-test for the experimental group was (14.44), while the mean score for the traditional group was (12.69). The table indicated that there was a statistically significant difference between both groups' performances in regarding to the post-test p < 0.05. The difference was having higher scores for the experimental group with effect size =0.057.

Table (3) independent samples T-test for significant differences between experimental group and the traditional group in the post-test.

Group	N	Mean	Std. Deviation	t	Sig(2 tailed)
Experimental	36	14.44	4.13	2.05	0.04
Control	36	12.69	3.03		

5.2-Results of research hypotheses 2:

It has been hypothesized that there are no statistically significant differences at ($\alpha \leq 0.05$) between the post and the retention test of students' grammar performance of the experimental group. To test this hypothesis the researcher analyzed data using paired samples T-test as shown in Table (4) below, paired sample T.test helps determine differences between two mean scores for the same group (Dornyei, 2007). It revealed that the mean score of the post test was (14.44), and the mean score of the retention test was (17.17). The result showed that there was a statistically significant difference between post and retention-test of students' grammar performance of the experimental group ($p < 0.05$). The difference was having higher scores in the retention test with effect size =0.72 which means high size effect. That means students increased their scores in the retention-test, which was done later in the semester. Improving the retention scores refers to the effectiveness of concept mapping strategy on students' grammar performance in the long-term memory.

Table (4) paired samples T-test for significant differences between post and retention-test of the experimental group

Test	N	Mean	Std. Deviation	t	Sig. (2-tailed)
post	36	14.44	4.13	25.28	0.00
retention	36	17.17	2.29		

6-Discussion

This study tested the impacts of concept mapping strategy on learning grammar rules. The researcher compared both groups in the pre-test to find out whether both groups are comparable. The t-test showed no statistically significant differences between students' grammar performance of the experimental group and the traditional group in the pre-test, which means that the two groups are equivalent in the pre-test. That means the result that occurs is more likely to be related to the treatment used with each group (Price, Jhangiani, & Chiang, 2015).

The findings of this study indicated that there were statistically significant differences between both groups in the post-test, where the experimental group outperformed the control group. This result is consistent with other studies in the literature (Abu Nada, 2008; Khajavi & Ketabi, 2012; Ahour & Sakhaei,

2015; Kassem, 2017; Laight, 2004). The result assured the usefulness of concept mapping strategy in learning grammar rules. The strategy helps learners learn through the use of verbal and visual systems which helps attract both sides of the brain. Learning using both coding systems helps recall the information easier and better (Paivio, 1991; Kalhor & Shakibaei, 2012).

Results of the study indicated that there were significant differences between the experimental group scores in the retention test and the post-test favoring the retention test. The increasing of their scores in the delayed post-test explains the usefulness of the strategy for the long-term learning, which is the purpose of learning. The strategy assists in transferring the knowledge to the long-term memory because it helps relate the new information to the existing one. Thus, it fosters meaningful learning, which helps improve learning (Novak & Canas, 2008).

The researcher realized that students who were taught the topics with concept mapping strategy participated in those classes more than usual, and they showed a desire for learning. In addition, one student wrote in Arabic under the retention test "I wish I knew about that strategy before, and I will use it in other subjects". Further, another student said, "Thank you for using a fun strategy with us and I hope you can keep using it for other topics." Thus, the results of this strategy proved that concept mapping strategy is an enjoyable and useful strategy, which is required for learning grammar (Perween, 2018).

This study's results add to the literature the importance of using concept mapping on learning grammar rules for some reasons. It helps activate both codes, visual and verbal, in the brain, which helps students learn faster and retain information. Using concept mapping strategy to teach grammar rules is done through creating an organizer to arrange information visually. Decoding information using pictorial helps to reduce the overload in the mind (Paivio, 1991; Kalhor & Shakibaei, 2012). In addition, it helps to make learning meaningful when creating relationships between information. Thus, it can be transferred to the long-term memory (Novak & Canas, 2008). Further, concept mapping makes learning pleasant. Thus, it helps in acquiring grammar (Perween, 2018).

7-Conclusion

The study investigated the impacts of using concept mapping strategy on EFL students' grammar performance skills. Students, who were already enrolled in two sections, were randomly assigned to form two groups; experimental and traditional. Each section was provided with pre-test to see if both groups are equivalent. The findings of the pre-test showed that there was no statistical difference between both groups, which means the groups are comparable. Then, each group was taught some grammar rules with either the concept mapping strategy or the traditional method. One week later, they were given a post-test. The results of the post-test indicated that there were statistically significant differences between both groups, where the experimental group scored higher. Therefore, the concept mapping strategy is beneficial for learning grammar for ELL. Then, a month later, the concept mapping group was provided

with a retention test to measure the strategy's effect on recalling information for a longer time. The findings of this study support other literature in that the concept mapping strategy helped learners improve their performance in grammar. It also assisted students to be engaged and active in learning, while enjoying it. It adds to the literature that the strategy helps in learning for the long-term.

7.1-Recommendations and future research

Based on the results of this study, supervisors and specialists should implement training courses for teachers to introduce them with concept mapping strategy and encourage them to apply it in their classrooms. Students should be taught how to apply this strategy into their learning to help them attain the knowledge and remember it for a longer period of time. In addition, English curriculum developer should create some concept maps and attach them to the textbooks for the teacher to benefit from. Further, they can design some activities and assessments based on concept maps and attach them to the textbooks. They should also provide some websites for creating maps to assist both teachers and learners to create their own.

This study used a quasi-experimental nonequivalent design, so the result's generalization is limited. Therefore, next research should be done with random samples to be able to generalize the results on a larger population. Furthermore, this research was conducted on female only, so it will be interesting to do research comparing both genders' performance regarding using concept mapping strategy. It is important to test the impacts of concept mapping strategy on learning contents for students with different learning styles. Further, research should be implemented on students' perspectives toward the concept mapping strategy. Moreover, research should be conducted on the impacts of students creating their own concept mapping on their performance in grammar skills. Further research should be conducted on the effects of using concept mapping on grammar performance of different school age. In addition, future studies should be conducted for a longer time, for example, it can be conducted on all topics assigned in the semester.

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