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# The Comparative Effect of Individually created and collaboratively created Concept Maps on EFL Learners' Essay Writing

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### ABSTRACT

The present study was an attempt to investigate the comparative effects of individually created and collaboratively created Concept Maps on EFL learners' essay writing. To fulfill the purpose of this study, 60 male and female learners of a total number of 90 intermediate learners studying at Kish Mehr Language School in Tehran were chosen based on their performance on a piloted PET. The 60 learners thus were divided into two groups and each of the groups were taught writing through one of the two forms of concept mapping, namely, individually created and collaboratively created. At the end of the study, the participants in both groups were given a writing posttest. The design of this study was quasi-experimental and posttest only and ANCOVA was used which led to the rejection of the null hypothesis. Thus, individually created concept maps proved to be more effective than collaboratively created concept maps on intermediate EFL learners' essay writing. The finding of this study has implications for EFL teachers, teacher educators, and material developers

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**Keywords:** *concept mapping- individually created- collaboratively created- writing-intermediate EFL learners.*

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### INTRODUCTION

Within a constructivist framework, learning takes place as learners progressively differentiate concepts into more complex understandings and also reconcile abstract understanding with concepts acquired from experience. New knowledge is constructed when learners establish connections among knowledge learned, previous experiences, and the context in which they find themselves (Bransford, 2000; Daley, 2002; Jonassen, 1994). Chang, Sung, and Chen (2001) propose that concept mapping, a form of visualization, is a powerful learning strategy consistent with constructivist learning theory in that it is a study strategy that helps learners visualize interrelationships among concepts (Duffy, Lowy, & Jonassen, 1991).

Recently, concept mapping has been used as a tool for learning and teaching. Concept maps are tools that make ideas visual. They allow prior experience and understanding to be taken into consideration when building new concepts into the perceptual framework. By using concept maps, learners use their prior knowledge to understand the new concepts. It makes a link between unknown and known information that leads to deeper understanding (Novak, 2010). By choosing concepts and linking words carefully, learners can use concept maps as a learning tool to catch every nuances of meaning, and summarize their knowledge. Concept mapping relies heavily on cognitive theory and Ausubel's assimilation (Novak & Cañas, 2008) theory. According to assimilation theory, learning is the most effective when new knowledge is related to previously learned material.

Concept maps can be considered both a cognitive and constructivist learning strategy. Based on Ausubel, Novak and Hanesian's (1986) view of cognitive learning, when learners generate concept maps they are focusing on determining relationships between and among concepts within their cognitive structures.

Rao (2007) investigated the effect of brainstorming on developing writing skill. The findings of this study revealed that students who have been trained in brainstorming strategy outperformed the other group of students who did not receive any instruction. Also, the attitudinal part of the survey indicated that students who used brainstorming had a positive idea about the effectiveness of the brainstorming technique. So, it is of paramount importance to invent activities before asking students to compose an essay. There has been great body of research on the effect of concept mapping in education in the first language. However, there has been limited number of research in the second language area (Vakilifard & Armand, 2006).

Concept mapping has been applied as a pre-writing strategy. However, there has been limited number of research in this field. Lin (2003) studied the effect of computer-based concept mapping as a pre-writing strategy for middle school students. In this study, the researcher compared the computer based concept mapping as a pre-writing strategy with paper-and-pencil concept mapping. According to the findings of the study, computer-based concept mapping was effective in enhancing idea generation and the total quality of the students' pre-writing concept maps in preparation for a persuasive writing task. In comparison with computer-based concept mapping, the students who constructed the paper and-pencil concept maps scored better in persuasive writing according to the criteria contained in the state authorized writing rubric than the students who generated computer-based concept maps.

Ojima (2006) conducted a case study of three Japanese ESL writers in Japan on the effect of concept mapping as pre-task planning. The results of the study indicated that concept mapping as a pre-task planning task was influential in improving ESL learners composition skills, but in ways unique to individual experience, motivation, and task conditions.

Pishgadam and Ghanizadeh (2006) investigated the impact of concept mapping as a pre-writing activity on EFL learners' writing ability. The findings of the study revealed that the students in the experimental group outperformed the students in the control group in terms of quantity and quality of generating, organizing, and associating ideas. Also, the results of the study indicated that concept mapping could be effective for affective as well as cognitive instructional objectives.

In the only research study found investigating the comparative effects of individually vs. collaboratively generated concept maps, Brown (2003) compared test scores among students who collaboratively generated concept maps or individually generated concept maps on paper. A comparison of student comprehension of concepts showed that those students who collaboratively-generated concept maps on paper outperformed students who individually generated concept maps on paper in high school biology.

As was suggested by Harmer (1998), the writing skill had finally been recognized as an important skill for language learning. Having said that, through extensive research, a number of approaches and techniques have been provided regarding ESL or L2 writing during the last decade. Concept mapping is also used in different areas of L2 research covering language Skills. Several studies aimed at surveying the effect of concept mapping on writing ability of Iranian EFL learners.

Second language learning has been subjected to extensive number of studies and researches. These research studies mainly focus on different language skills and different ways of teaching and learning those skills. Moreover, with the growing importance of writing as one of the language skills and as a means of communication, selecting correct and proper methods of teaching writing has gained a vital role in TEFL (Elbow, 1999). This is due to the fact that writing is one of the most important gifts given to human beings. The ability to create ideas and transform them into sentences and connect the sentences together is a power many take for granted (Wright, 2012).

As mentioned above, writing is an outlet for thoughts and emotions and despite the fact that writing skill comes late on the ladder of acquisition; it still forms an important component of second/foreign language learning (Fageeh, 2011). Over almost the last 50 years, the number of inquiries into L2 writing issues has grown rapidly and has produced fruitful results (Zhang Jun, 2008). For example, researchers in 1970s and 1980s attempted to study writing process and the skills involved in writing (Emig, 1971; Flower & Hayes, 1981). Moreover, due to the perceived need for writing some second language writing scholars have undertaken descriptions of the teaching of EFL writing in various international settings, describing the role of contextual factors in shaping instruction (e.g., Alred, 1997; Brock & Walters, 1993; Li, 1996; Purves, 1988; Reichelt, 1997; You, 2004, as cited in Reichelt, 2005). Leki (2001) notes that everyday difficulties of teaching EFL writing can include coping with large class size and time constraints, accommodating local needs, and dealing with teachers' lack of experience teaching L2 writing and with students' lack of instruction in L1 writing.

It seems that teaching writing is a demanding task for teachers and requires considerations because few people write spontaneously and few feel comfortable with a formal writing task (Hamp- Lyons & Heasley, 1987; Lavelle, 2006).

There have been different methods of teaching writing. According to what mentioned before, Concept mapping has also been used in different contexts. In summary, studies have investigated the effects of concept mapping on paper, concept mapping on computers, and concept mapping individually and collaboratively on paper, and this study aimed at surveying which method of concept mapping ,namely, individually created or collaboratively created, is more effective in EFL learners' essay writing.

### **Research Question and Hypothesis**

To fulfill the purpose of this study, the following research question was posed:

*Q: Is there any significant difference between the effect of individually created and collaboratively created concept maps on EFL learners' essay writing?*

To begin doing the research the following null hypothesis is formulated:

*H<sub>0</sub>: there is no significant difference between the effect individually created and collaboratively created concept maps on EFL learners' essay writing*

### **Methodology**

#### **Participants**

The participants of this study were 60 intermediate EFL learners who were selected from a sample of 90 (both male and female) intermediate students in Kishe mehr Language School based on their performance on a sample PET which was previously piloted with 30 students with the same characteristics (i.e., age, gender, and level) from another language school (Mofid Omid Language School). The students were selected non-randomly since the classes were assigned to the researcher and she did not have any choice over the selection of the students. The 60 selected participants were the ones whose scores fell one standard deviation below and above the sample mean.

The age range of the participants was 10 to 15. Then the participants were divided randomly into two experimental groups with two classes in each experimental group. One EG used individually created concept maps during teaching writing, and the other used collaboratively created concept maps. Two raters scored the writing tests, the researcher and an experienced female English teacher who was chosen from the researcher's colleagues and was trained for the rating.

#### **Instrumentation and materials**

In order to achieve the purpose of this study, the following instruments were applied.

#### **PET**

In order to come up with homogeneous groups of participants with respect to their English proficiency, a sample of PET was administered. Three parts of PET, namely listening, reading, and writing were administered. The speaking section was not administered because the focus of this study was on writing.

#### **Writing Posttest**

In order to compare the impact of the two treatments, a writing posttest was administered to the participants in the two groups. The writing posttest was selected from the writing selection of another PET. The students performed on the writing posttest in 45 minutes.

#### **Writing Rating Scale**

The PET general mark scheme for writing provided by Cambridge was used as the rating scale to rate the writing section of PET for homogenizing the participants as well as the writing posttest. It includes a scale of 0-5 based on content, organization, cohesion, coherence, format, range, appropriacy, mechanical accuracy, word choice, dictation, and sentence structures.

#### **Material**

In this study "American English File 2" (Oxenden, Latham-Koenig & Seligson, 2006), was used as the main course book according to the syllabus of the language school. But to fulfill the purpose of this study, the researcher also taught a supplementary book for writing, which was "Paragraph Development" (Arnaudet & Barrett, 1990) with the permission of the language school. The book is designed to train students' writing abilities and strategies.

#### **Procedure**

As the first step, a sample PET was piloted with 30 intermediate students with similar characteristics to the target participants and after conducting item analysis (i.e., calculating item facility and item discrimination), the malfunctioning items were discarded from the test. Cronbach Alpha was also run prior to the main administration to ensure the reliability of the test.

The second step was administering the test to the target sample. The piloted PET (including reading, writing, and listening papers) was administered to 90 intermediate students at Kishe mehr Language School in Tehran who were selected non-randomly in order to homogenize them according to their language proficiency. Sixty students whose scores fell one standard deviation above and below the sample mean were selected as the target participants of the study. Then the researcher divided them into two experimental groups (individually created concept mapping and collaboratively created concept mapping) randomly.

As the next step, the PET writing scores of the two experimental groups were put into an independent samples t-test to make sure that there was no significant difference between the writing ability of the two groups. Two raters scored the writings with

the same). The inter-rater reliability was computed and turned out to be significant, so the average score given by the two raters was considered as the participants' final score on writing.

The instruction was carried out during 15 sessions; two sessions per week with each session lasting for 120 minutes. During the sessions, all the 60 participants underwent the same procedure of teaching in terms of listening, speaking, and reading. They had the same teacher (the researcher), the same course book, same hours of instruction, and also same assignments. The researcher followed the same mentioned procedure in all 15 sessions for both groups.

The difference was the kind of treatment the two groups underwent in terms of writing. In one group the researcher taught writing through individually created concept maps and in the other group through collaboratively created concept maps. Two different types of concept mappings will be explained in detail in the treatment section.

At the end of the semester, to test the null hypothesis and also to measure that either individually created or collaboratively created concept maps has greater impact on learners' essay writing ability, the writing section of another version of PET was administered as posttest.

### ***Treatment***

The differential treatment in this study consisted of individually created and collaboratively created concept maps. Prior to the beginning of each session, the students were supposed to choose some essay topics they were interested in. This was done because it helped the teacher to work on the topics that were interesting and motivating for the students. Then, one of the suggested topics was chosen by the teacher for that session.

In both groups, the teacher introduced the topic at the beginning of the class. Then, she asked the students to talk about it for a few minutes and raise their opinions in some sentences. She tried to talk about all the aspects of the topic. This was done for brainstorming the students and making them aware of the different aspects of the introduced topic in order to draw appropriate outlines and concept maps before starting to write.

Then she talked about the patterns of writing (cause and effect, definition, comparison and contrast) and told them how they should write on the given topic. Then, she explained about some techniques they could use in the body of the essay to support topic sentence like (providing details, examples, anecdotes, facts, and statistics).

The teacher had chosen one of the mentioned patterns and elements to teach in that session according to the sequence presented in the book. They also analyzed some samples. This way, the students got familiar with that type of writing. The teacher also taught some related grammatical structures. Related grammatical structures refer to the structures which are related and are mostly used in the introduced topic. For example, when the topic was about wishes or regrets, the teacher taught past tense and emphasized on using it in that session. The teacher presented them with some examples prior to writing in order to familiarize them with correct ways of writing.

In the group which were supposed to individually create concept maps, after the descriptions of the teacher finished, each one of the students had a paper and pencil and started to create his/her own concept map according to the different aspect of the topic, vocabularies related to the topic and everything related to the topic which could be included in the writing. They used bubbles and links to create concept maps and bring their thoughts on the paper and use them as an outline for writing. Then, according to their concept maps, they started to write. This way, they knew what they are writing about exactly and they had organized and coherent essays.

The relatedness of the paragraphs, coherence, cohesion and organization of the whole essay was guaranteed by using concept maps.

It worth mentioning that, all the students in both groups were trained how to create and work with concept maps at the first session of the class. The researcher had spent all the first session teaching how to create concept maps and bringing samples to the class.

In the group which was supposed to collaboratively create concept maps, the students which were divided in six groups, five people per group, started to work with concept maps after descriptions of the teacher. The 5 students which had sat in circles were collaboratively creating concept maps according to the discussion which took place about the topic and their own information. In the concept maps, they tried to show interrelationships among concepts and create links and bubbles according to the input and information they had. Then, each student in the group started to write his/her own essay according to the unified concept map which was collaboratively created. Again, relatedness of the paragraphs, Coherence, cohesion and organization of the whole essay was guaranteed by using concept maps before writing.

It is good to mention that in both groups, the teacher supervised the students while creating concept maps and had an eye on all of them and responded their possible questions and solved their problems.

The time allotted to creating concept maps was 15 minutes and the time for writing essays was 20 minutes. In both groups, after finishing the process of writing, the teacher collected all the papers but did not correct them in that session. In the following session, the teacher returned to the students the corrected papers which included marginal comments and spent some time answering their questions.

The students revised their essays at home and handed in the revised draft the next session. In other words, the teacher gave feedback to both groups after they had revised their drafts. In both groups, she used marginal comments. In marginal comments, the teacher underlined the errors and wrote her comments in the margin next to the error. This way, it was easy for the students to trace the errors and relate it to the teacher's feedback on it. The total number of essays was 10

### Design

This study with non-random selection of the participants and random assignment of participants to the two experimental groups was quasi-experimental. Although the participants of the study were homogenized in terms of the general proficiency, further analysis of their writing scores prior to the treatment revealed a significant difference and thus the design of the study was pretest-posttest design. The study also underwent comparison group design because there were two experimental groups. The study had one independent variable, which was concept mapping with two modalities, namely, individually created concept maps and collaboratively created concept maps and one dependent variable which was essay writing. Also control variables of the study were the level of proficiency and age of the participants. Gender could have been the intervening variable as the number of the male and female participants was not equal.

### Results

This study began with piloting a Preliminary English Test (PET) among 30 intermediate learners at Mofid Omid Language School bearing almost the same characteristics as the target sample. The PET included four sections of Reading, Listening, Writing, and Speaking. The speaking section was excluded from the exam and the other three parts were administered since the focus of the study was on writing. All items went through an item analysis procedure and the analysis indicated that there were no malfunctioning items to remove from the test. Table 1 demonstrates the reliability coefficients obtained for the three parts of PET in the pilot study.

Table 1. Reliability Statistics of PET Pilot Study

PET	N of Items	Cronbach's Alpha
Reading	35	.862
Listening	25	.823
Writing	5	.627

The two parts of the writing of PET were rated by two raters (the researcher and a colleague) and inter-rater consistency was computed through Pearson correlation. Prior to running correlation, the normality of both distributions were computed. The skewness ratios for the distributions turned out to be in the acceptable range of  $\pm 1.96$ .

All the correlations turned out to be significant and inter-rater consistency was established and thus the two raters could confidently rate the writings of the main administration.

Next, the researcher administered the piloted PET to 90 students studying at Kische Mehr Language school in order to homogenize them. The first rater's mean and SD were 56.96 and 18.95 and the second rater 56.94 and 18.98. To establish inter-rater consistency, correlation had to be run between the two raters' ratings. Based on result of the skewness ratios of the two sets of scores (1.65), running Pearson correlation was legitimate.

The correlation between the two raters were significant ( $r = .99$ ,  $p = .0005 < .05$ ). Therefore, the average of the ratings of the two raters was considered as the final score of writing for the participants.

The mean and SD for the PET main administration were 56.97 and 18.96. To select homogenous participants, scores falling one SD above and below the mean were computed and 60 participants were chosen. Then, they were randomly divided into two equal groups, namely, individually created concept maps and collaboratively created concept maps.

### Descriptive Statistics of PET Main Administration

N	Mean	Std. Deviation
90	56.9667	18.95871

After dividing the selected participants to the two groups, in order to make sure that they bore no significant difference in terms of writing ability, their writing PET scores were compared through an independent-samples t-test. Before running the independent-samples t-test, the distributions had to be checked for normality. The skewness ratio for both groups fell into the acceptable range of  $\pm 1.96$ . So the distributions were normal and the independent-samples t-test was legitimated.

Table 2. Independent-Samples t-Test on the PET Writing Scores of the two Experimental Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Equal variances assumed		2.195	.144	2.077	58	.041	1.76557	.87054	.06415 3.46930
Equal variances not assumed				2.077	53.568	.042	1.76557	.87054	.06214 3.47230

The results revealed that there was a significant difference between the writing PET scores of the two groups prior to the treatment ( $t=2.077$ ,  $df=58$ ,  $p=.041<.05$ ). Therefore, in comparing their posttest scores, pretest scores needed to be considered as a covariate and the design turned out to be pretest-posttest design. After the treatment, the writing posttest was conducted in both groups.

After computing the descriptive statistics of the writing scores assigned by the two raters, it was revealed that the first rater's mean and SD were 50.62 and 8.92 and the second rater 50.65 and 8.86, respectively. Then in order to establish inter-rater consistency, correlation had to be computed between the two sets of ratings. To check the assumption of normality of the distributions for parametric correlation, the skewness ratios were computed for the two distributions of scores. The skewness ratio for the first raters' scores turned out to be 1.03, and for the second raters' 1.09. Since both distributions turned out to be acceptably normal, Pearson correlation could be run.

Correlation between the two raters turned out to be significant ( $r=0.999$ ,  $p=.0005<.050$ ). Therefore, the average of the ratings of the two raters was considered as the final writing scores for the participants.

### Testing the Null Hypothesis

1. *In order to test the null hypothesis of the study, ANCOVA needed to be run. There were three assumptions for running ANCOVA which were supposed to be checked before running it: normality of all the distributions, Linearity between the covariate and the dependent variable, Homogeneity of regression slopes. All these assumptions were checked and running ANCOVA was legitimate.*

Table 3. Tests of Between-Subjects Effects (ANCOVA)

Dependent Variable: PosttestWriting								
Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
Corrected Model	4680.180 <sup>a</sup>	2	2340.090	782.075	.000	.965	1564.149	1.000
Intercept	44.376	1	44.376	14.831	.000	.206	14.831	.966
PretestWriting	3057.780	1	3057.780	1.022E3	.000	.947	1021.932	1.000
Group	1695.720	1	1695.720	566.722	.000	.909	566.722	1.000
Error	170.553	57	2.992					
Total	157462.000	60						
Corrected Total	4850.733	59						

a. R Squared = .965 (Adjusted R Squared = .964)

b. Computed using alpha = .05

The line for pretest writing in Table 3, demonstrates that writing pretest scores were a statistical covariate ( $F_{1,57}=1.022$ ,  $p=.0005<.05$ ). This means that the pretest scores had a strong effect on how the participants performed on the posttest.

Moreover, the effect of group also turned out to be significant ( $F_{1,57}=566.722$ ,  $p=.0005<.05$ ). This means that when posttest scores were adjusted for the pretest scores, grouping was a factor in explaining the variance in the model. This in fact means that there is a significant difference between the effect of individually created concept maps and collaboratively created concept maps on the writing of EFL learners. Therefore, the null hypothesis was rejected at .05 level.

Then, there were the estimates for the means which were the posttest means for the two experimental groups, but adjusted for the pretest. The adjusted writing posttest mean score of the individual group was higher than that of the collaborative group, so, it is concluded that individually created concept maps was significantly more effective than collaboratively created concept maps on EFL learners' writing.

Finally, the partial eta square for the group effect turned out to be .92 and the observed power equaled one. This is a strong effect size and means that the difference in the treatment between the two groups accounted for 92% of the variance in the writing posttest scores. This means that the outcome of the study is strongly generalizable.

## Discussion and Conclusion

The present study investigated the comparative effect of individually created concept maps and collaboratively created concept maps on EFL learners' essay writing. The null hypothesis of the study was rejected according to the results of the ANCOVA. The findings of the study revealed that the group which used individually created concept maps improved their writing ability significantly more than the collaboratively created concept maps group. In other words, the individual group demonstrated significant improvement from writing pretest to posttest.

There is no conclusive research in literature upon which to base a choice of one over the other; rather, both approaches of concept mapping seem to be effective depending upon the classroom circumstances. According to Fischer, Bruhn, Grasel, and Mandl, (2002) collaborative processes can support learners' scientific knowledge construction more effectively than independent processes. Lumpe and Staver (1995) demonstrated that collaboratively creating propositions using paper and pencil in small groups can have positive effects on student achievement. They compared collaborative conceptualizing of photosynthesis with individual conceptualizing of photosynthesis and found that high school students who collaborated out-performed those who worked independently on a comprehension test. It could be concluded that some of the researches are in support of the collaboratively created concept maps.

Conclusively, it can be mentioned that these studies mainly compared the collaboratively concept mapping with individually concept mapping or they just focused on the effect of concept mapping in learning and teaching as a whole, whereas the present study compared individually and collaboratively created concept maps which targeted writing skill. Moreover, the participants of this study were only intermediate, whereas the mentioned studies worked on pre-intermediate, intermediate, and advanced students.

On the other hand, some studies have been conducted on the support of individually created concept maps (e.g., So Young Kwon and Lauren Cifuentes (2007)). The findings of this study is supportive of the findings of the present study. But, on the whole it is clear that there are contradictions between the results of different studies.

Finally, as the results of the present study suggest, individually created concept maps were more successful in improving students' writing. With regard to the fact that essay writing is an individual and private task and does not lend itself to collaborative and group workings, it can be concluded that creating concept maps is also a task that needs concentration and thinking and relating the different issues and personal experiences in mind. As a result, when a student thinks by him/herself without any disturbance from other students(member of the group), he/she can concentrate and write more cohesively and coherently.

Nevertheless, the finding of this study strongly and with a with a large effect size supported the idea that individually created concept maps made the students improve their writing much more than collaboratively created concept maps with the context of this research. Therefore, when the intention is to improve EFL learners' essay writing, it is more effective to use individual concept mapping than collaborative one

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