DOI 10.47176/kurmanj.4.1.1

Original Article

SRPH

KURMANJ, 2022; 4(1): 1-7

The Effect of Computer-Based Concept Mapping Learning Strategy on Iranian Intermediate EFL Learners' Writing Accuracy and Fluency

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Received: 15 December, 2021
Accepted: 18 January, 2022
Published: 25 January, 2022

ABSTRACT

The present study aimed to find the effect of computer-based concept mapping for teaching English writing accuracy and fluency to Iranian intermediate EFL learners; concept-mapping procedure as a technique that elicited the schemata, background knowledge and students' ideas as well. Forty students were chosen majoring in English language from a private language Institute of Tehran, Iran. Then, they were homogenized by Nelson Proficiency Test. The concept-mapping group was taught writing skill through computer-based concept- mapping technique in College institute, but the control group was instructed by traditional approaches. In fact, they were our two independent groups who were at intermediate level of proficiency. To evaluate the effect of instructional treatment, both groups were given the same items as a pretest and posttest. After the eight sessions of treatment, the data was analyzed by independent t-test through SPSS version 21 to compare the results of pretests and posttests of both groups. The results revealed that the computer-based concept-map group outperformed on the post-test of writing accuracy than the control group, but writing fluency of both groups appear to have been unaffected by the experiment.

Keywords: Computer-based Concept Mapping, Writing Accuracy, Writing Fluency

Introduction

In today's world, one of the biggest social and professional aspects of life is being able to communicate information and thoughts. Communication can be verbal or written. Knowing how to write well is undoubtedly a requirement for many people. University students usually need to write essays, reports, research proposals, articles, and dissertations. Many jobs require the applicants to write resumes, cover letters, compelling LinkedIn profiles, reports, emails, business cases, press releases, and the list goes on. All these types of written forms require skill and a particular style. Writing is, therefore, a form of communicating ideas; poor writing can make poor impressions, which in turn can lead to many opportunities being lost. Learning how to write well takes sufficient amount of instruction of any kind, practice, and experience.

Writing skill is an inseparable part of any language learning process. However, many EFL learners have problems with producing a written text that is comprehensive and accurate. Many Iranian EFL students consider themselves as poor writers and find writing composition a demanding task. Consequently, EFL teachers are responsible for assisting students to cope with their writing problems. Unfortunately, in a usual writing class, when the teacher requests the students to write the texts, there are some kind of monotonous writing activities. These kinds of writing activities usually result in bored students and sleepy atmosphere. Teachers usually have few innovations to have more interactive writing activities in the class to probe students to be active. It seems there are a kind of

[DOI: 10.47176/kurmanj.4.1.1]

Publisher: Scientific Research Publishing House (SRPH), Shirvan, Iran
http://srpub.org
Email: kurmanj@srpub.org

satisfaction with this sort of teaching which only on the presented texts. The teaching media in teaching writing is rarely varied. Most of the teachers only depend on the textbooks as the major source of the teaching of writing. Teachers as the experts prefer presenting the materials to the students and students just write some limited sentences. Therefore, it leads to having students who do not like writing activities in the class because of the boring sense these writing activities induce. Students in this typical classroom usually tend to discuss extraneous topics instead of writing the text.

Although the importance of writing is crystal-clear to many teachers and language researchers and in spite of many kinds of research in cooperative language learning methods and new techniques such as concept mapping learning, a few of these teachers desire to use fundamental strategies to improve writing skills. In addition, computer-based concept mapping learning, because of the innovation, has rarely been studied in second language learning. So, this study aims to investigate the effect of computer-based concept-mapping learning strategy as well as the degree to which these aims result in better writing accuracy and fluency in Iranian intermediate EFL learners.

To fulfill the purpose of this study, the following research questions were raised**:**

Q1. Does computer-based concept mapping have any significant effect on writing accuracy of Iranian Intermediate EFL Learners?

Q2. Does computer-based concept mapping have any significant effect on writing fluency of Iranian Intermediate EFL Learners?

Review of Related Literature

Todays and in this modern world, writing is a vital communication channel which is used in daily communications. Writing is one of basic skills that the learners must have to fully complete on the path of communicative competence. In the process of teaching and learning, writing plays a significant role through which learners can be assessed and is considered as the most difficult among four major skills of English language i.e. listening, speaking, reading and writing. Writing is a complex process that requires learner's skills and ability to successfully combine different components of language [1-3]. Therefore, in the case of writing, learner should be more skilled to make communication process most productive. When speaking about such activity as writing, it is worthwhile to name the general keys of this activity. Key concepts of writing include content (information and ideas the learner wants to convey to the readers), style (scientific, general, official or academic), genre (poetry, short story, novel, etc.), vocabulary aspects (essential to possess rich enough vocabulary), grammar correctness (formal aspects of language), spelling and other. Pilus (1993) contains written texts and answering questions based has contended that the skill of writing great is not an actually obtained, but instead should be exercised and learned through involvement [4]. Palmira (2001) has demonstrated that written work is actually an intuitive procedure between the writer and the reader. Writing includes conceptualizing thoughts, and in addition[4] mental extension of information and experience. Similarly, Pilus (1993) has said that written work resembles an uneven correspondence in which the writer bears the strains of cooperating by relying upon semantic components. It needs conscious work on the part of the writer who has to develop his/her own thoughts as well as being competent in all the written aspects of a language, from mechanics to discourse. In other words, he/she is required to master various and complex range of vocabulary and follow the less flexible conventions of writing. i.e., a writer not only needs language competence but also other communicative skills, which include sociolinguistic and strategic factors of language. As indicated by Nunan [4], delivering an extensive bit of writing that is reasonable is presumably the most difficult piece of learning a language.

Concept-Mapping

According to Novak [5] "Concept-Mapping refers to a strategy for examining learners understanding of relationships among concepts". According to Kao et al. [6] "Concept maps can also be used as a cognitive tool to help students organize the knowledge and learning experiences and increase self-awareness through reflective thinking". This strategy has been extensively investigated in a variety of contexts which include reading comprehension for the recall of information, writing skills, science education and testing, with different age groups ranging from elementary to graduate students, especially in the L1 context though some research has also been conducted related to the enhancement of reading comprehension in L2 [7]. By this technique, students can explain the perception of the text in a visual categorized chart. The matter that is actually created is a graphic representation of individual's knowledge that is carried out through encoding the information. According to Morse and Jutras [8], concept mappings can be used either at the starting point or at the end of a topic in the class to gain of the prior knowledge or to summarize new learned topic respectively. Concept mapping has been recognized as an effective educational technique and a metacognitive strategy for many subjects [5 and 9]. Concept is defined as "a perceived regularity in events or objects, or records of events or objects, which can be designated by a label" [10].

[DOI: 10.47176/kurmanj.4.1.1]

Many researches have been carried out to investigate concept mapping for organizing and representing For example, Clariana et al. [11] has investigated to evaluate a computer-assisted approach to practice concept maps. Accordingly, in another study Ghanizadeh [12] has reported a positive effect of concept map construction on EFL learners' reading comprehension and also on the learners' attitudes toward EFL reading comprehension.

Computer-based Concept Mapping

Using of software plays an important role for constructing and organizing conceptions in concept mapping learning. Computerized concept mapping in a learning procedure can lead learners to organize concept maps actively to achieve positive effects in learning in a simple and effectual way. Being corrected easily and constructing concept maps quickly are some advantages of computer-based concept mapping. The use of computerized mapping makes instructors and learners interactive as well [13, 14]. In addition, computers can track and record learners' concept-constructing processes, analyze their thinking patterns, and resolve test results [15, 16].

Methodology

Participants and Setting

In the current study 40 Iranian intermediate EFL students majoring in English language were selected from a private language institute in Tehran, Iran. They were selected among 80 students to act as the participants of the current study. The students were only female with the age range of 14 to 16 years old (Mean age = 15). They were seated non-randomly in two groups each consisting of 20 subjects: class experimental group and control one. All participants were native speakers of Persian and had studied English for approximately six semesters at this private institute and around two years at school. The homogeneity of the participants regarding their general language proficiency was checked before starting the data collection procedures through Nelson Proficiency Test.

Instruments

Four main tests were used in order to achieve the goals of the study: a genera English placement test, Nelson Proficiency Test (NPT), was used in order to ensure the homogeneity of students in their knowledge of grammar and vocabulary. Since this study aimed to evaluate the writing performance of the participants, a test of general English would not have been adequate. Therefore, along with the general English placement test, an additional placement writing task was knowledge as well as its effect on language learning.

administered to ensure the homogeneity and equality of all the participants before the study was carried out. A pretest, and a posttest of writing were conducted to measure and compare the writing skill of the two groups before the holistic and analytic scoring procedures were used. Along with the general language proficiency test, a criterion for evaluating the student 'written texts which was named ESL Composition Profile developed by Jacobs will be administered. This profile contained criteria for evaluating content, organization, vocabulary, language use and mechanics of each student's level of writing proficiency. Each part of this profile has four categories (*Very Poor, Fair to Poor, Good to Average, and Excellent to Very Good*) which raged their scores from 7-9, 10-13, 14-17, and 18-20 respectively. The raters assigned scores based on criteria which included in each category.

Data Collection Procedure

The present study explored the performance of some participants that have been chosen from one of private language school in Tehran, Iran. This study was run to measure the effect of computer-based concept mapping strategy on writing accuracy and fluency of Iranian intermediate EFL learners. The participants of this study were with the same gender, at the same level of English proficiency and at the same age. For more consistency, they had the same teacher. The procedure of selecting of samples was randomly from students with intermediate level. These samples were 40 students totally (each group 20 learners). A general English language proficiency test was conducted to make sure of students' homogeneity level and all learners were at the same level of English proficiency. Also, a general writing ability test was conducted to make sure of students' homogeneity level and all learners were at the same level of English proficiency in writing. The study was conducted in pretest/posttest procedure. It means that each group was given the same items for their pretest and posttest. Writing essay was worked in two classes by concept mapping strategy during the treatment phase. The treatment for both of them was run for 8 weeks (16 sessions, two sessions per week). After completion of the treatment, in the last session a posttest that is the same for each group was administrated to both groups in order to measure the students' writing accuracy and fluency. The test type and time was exactly the same for two groups.

In the experimental group, namely computer-based concept mapping learning group, prior to the conducting the study, the first three sessions were allocated for the defining of concept mapping, relationships between nods and their concepts and introducing its software. There were many useful concepts mapping software such as Inspiration, IHMC

[DOI: 10.47176/kurmanj.4.1.1]

Cmap tools, SemNet and etc. The software selected for this study was IHMC Cmap tools. There were several steps for concept maps. The first step was to determine the topic or main question. If more than one question was the aim of concept map, the task was more difficult in contrast to one question. After determining the topic or question, the most crucial or "general" concepts that were connected to the topic should be identified. Next, the concepts should be arranged from general to specific. This action should be in a hierarchical fashion that demonstrate sub Sumption relationships of concepts. After determining the key concepts and the orders of generality or specificity, the links should be added to form our rudimentary concept map. Then the relationships between concepts linking phrases were added. In this step preliminary shape of concept map was provided. Then cross-links were added. Cross-links were responsible in linking concepts together that were in different areas or sub-domains on the map and could help to manipulate how concepts were interrelated. Cross-links were some relationships between concepts in different domains of the concept map that make it possible to find out how some different domains of represented knowledge on the map were related to each other. Finally, the map was reviewed and the structure or content were altered if it was necessary. Students received as similar materials as those of control group but through computerized concept mapping. Having trained students how to connect pieces of information and 15 finding the relationship between the concepts, the students were asked to draw the concept-map based on the present texts.

Data Analysis

First, the data were analyzed and expressed descriptively to provide evidence whether the teaching technique causes any writing improvement in the writing of two groups. All assigned scores were treated statistically to find if there are any significant differences between the participants of the two groups based on their average analytic scores. The researcher run using SPSS statistical software 21. The data were analyzed using parametric tests such as paired-samples and independent-samples t-test. The Pearson correlation was run to probe the inter-rater reliability indices for the pretest of writing in the main study.

Results

The data were analyzed using parametric tests of paired-samples and independent-samples t-test which have a common assumption, i.e. normality of the data. Descriptive statistics were used to compare the experimental (Concept mapping) and the control groups' means on the pretest of writing in order to probe that they were homogenous in terms of their writing ability prior to the main study. Based on the results displayed in Table 1, it can be claimed that the experimental (M = 3.47, SD = .80) and control (M = 3.35, SD = .70) groups' means on the pretest of writing were almost the same.

Table 1
Descriptive Statistics; Pretest of Writing by Groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	CDL	20	3.47	0.80	0.17
	DI	20	3.35	0.70	0.19

Comparing pre- and post- paragraph essays of the experimental group

A paired sample t-test was run in order to find out if there was any significant difference between pre- and post-paragraph essays of the experimental (Computer-based concept mapping) group and also to verify if there was any improvement in subjects' writing accuracy and fluency on pre- and post-essays were compared. Based on the results displayed in Table 2, it can be claimed that the experimental group had a higher mean on the posttest of writing (M = 5.50, SD = 1.41) compared with mean on the pretest (M = 5.40, SD = 0.60).

Table 2
Paired Samples Statistics; Pretest and Posttest of Writing of Experimental Group

Group	Mean	N	Std. Deviation	Std. Error Mean
Posttest	3.47	20	0.80	0.17
Pretest	5.50	20	1.50	0.34

The results of the paired-samples t-test (t (19) = 9.70, p= 0.000, r = 0.89 representing a large effect size) (Table 3) indicated that there was a significant difference between the experimental group's mean scores on the pretest and posttest of writing.

[DOI: 10.47176/kurmanj.4.1.1]

Table 3
Paired Samples Test; Pretest and Posttest of Writing of Experimental Group

	Paired Differences							
				95% Confidence Interval of the Difference				
Group	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Posttest-Pretest	2.03	0.968	0.216	2.55	1.64	9.70	19	0.000

Comparing pre- and post-paragraph essays of the control group

A paired-samples t-test was run to compare the control group's means on the pretest and posttest of writing in order to verify if there was any improvement in subjects' writing accuracy and fluency on pre- and post-essays were compared. Based on the results displayed in Table 4, it can be claimed that the control group had a little higher mean on the posttest of writing (M = 4.20, SD = 1.40) compared with mean on the pretest (M = 3.35, SD = 0.70).

Table 4
Paired Samples Statistics; Pretest and Posttest of Writing of Control Group

Group	Mean	N	Std. Deviation	Std. Error Mean
Posttest	3.35	20	0.70	0.19
Pretest	4.20	20	1.40	0.30

The results of the paired-samples t-test (t (19) = 8.45, p = 0.000, r = 0.69 representing a large effect size) (Table 5) indicated that there was a little difference between the control group's mean scores on the pretest and posttest of writing. Therefore, it can be concluded that there has been an improvement on the subjects' one paragraph essay writing in the control group.

Table 5
Paired Samples Test; Pretest and Posttest of Writing of Control Group

	Paired Differences							
				95% Confidence Interval of the Difference				
Group	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Posttest- Pretest	1.85	0.789	0.180	2.30	2.42	8.45	19	0.000

Comparing post-tests of both experimental and control groups

An independent t-test was run to compare the experimental and control groups' means on the posttest of writing in this study. Based on the results displayed in Table 6, it can be claimed that the experimental group (M = 5.50, SD = 1.40) had a higher mean than the control group (M = 4.20, SD = 1.50) on the posttest of writing.

Table 6
Descriptive Statistics; Posttest of Writing by Groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Experimental	20	5.50	1.50	0.34
	Control	20	4.20	1.40	0.30

The results of the independent t-test (t (38) = 5.36, p= 0.000, r = 0.69 representing a large effect size) (Table 7) indicated that there was a moderate difference between the two groups' mean scores on the posttest of writing. In other words, the subjects of the experimental group (Computer-based concept mapping) have performed better on writing post-paragraph essays than the control group.

[DOI: 10.47176/kurmanj.4.1.1]

Table 7
Independent Samples Test; Posttest of Writing by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0.000	2.412	5.368	38	.000	1.03	0.419	1.402	3.098
Equal variances not assumed			5.368	33.407	.000	0.85	0.419	1.398	3.102

Calculating writing accuracy and fluency of both experimental groups

The students' writing accuracy scores were measured using two different types of measure: holistic scoring and the percentage of correct usage of target structure. According to Wolfe-Quintero et al. (1998) in order to measure writing fluency; total number of structural units written in 30 minutes was measured. Total number of dependent clauses written in 30 minutes per total clauses was calculated in order to measure complexity. Group means and standard deviations were then calculated for each experimental group on pretest and posttest occasions. Tests of statistical significance were carried out by means of t-test.

The first research question investigated the effect of computer-based concept mapping on writing accuracy. A t-tests was conducted for both experimental and control groups before the treatment to compare the means of two groups. The t-test for equality of means showed that significant value is 0.129 which is greater than 0.05, i.e. there is no significant difference between the groups at the beginning of treatment. The Leven's test of homogeneity of variances F= 2.41 is much higher than the significant level. Consequently, it can be claimed that the participants of the study were homogenous in their writing accuracy prior to the beginning of the study. A t-test analysis performed on the means of the posttest and confirmed that the significant value is less than 0.05, i e. there was a significant difference between the treatment and mean scores of the posttest of writing accuracy of the experimental group after the administration of computer-based concept mapping and the posttest of writing accuracy of the control group (Table 7).

The second research question investigated the effect of computer-based concept mapping on writing fluency. Two t-tests were run to compare the means of the experimental and control groups on the pretests and posttests. Writing fluency was not significantly different from one group to the next at both the pretest and posttest occasions, but the experimental group demonstrated higher fluency score although it is not significant. Thus, writing fluency of both groups appear to have been unaffected by the experiment.

Conclusion and Discussion

The significance of writing as a means of communication was previously highlighted in this study. It was also mentioned that for many Iranian EFL learners, producing a coherently acceptable written text including paragraph can be a challenging task. This issue may stem from the weaknesses in instructional methodologies and lack of exposure to genuine and authentic approaches of writing texts. The main research question in this study was concerned with the significant difference in writing accuracy and fluency of Iranian intermediate EFL learners. As it was explained in methodology part, writing skill was investigated in both studied groups and computer-based concept mapping strategy was run in the experimental group whereas traditional instruction was run in control group. The analyses indicated that students of the experimental group had better writing accuracy in the post-test.

Regarding the research questions, the findings revealed that concept mapping learning strategy as helping tool has been suggested to use in both first language and also second language learning contexts instruction. It can change the traditional classroom into an active one by engaging students in their own learning process. It could be practical to increase learning ability and help to success of many students, ranging from students who may be intellectually gifted to those who suffer from a mild learning problem [17]. Wang, Cheung, Lee and Kwok (2008)[18] state that concept map is an educational tool that by meaning presentation of concepts it can make connections between new information and prior knowledge. Concept mapping is a technique to let one person convey meaning and relationships to another person in a visual format, and concept maps have been shown to foster a joint understanding between two individuals viewing the same map. The concept map is believed to enhance recall and memory, aid in negotiation and balancing of conflicting needs, and create mutual understanding.

The current study also presented evidence which conformed that learners who underwent the cooperative language learning approach based on cooperation and interaction that occurs among the

[DOI: 10.47176/kurmanj.4.1.1]

students in classroom, and showed more improvement than those who were directly instructed by the traditional approach. Pertaining to its advantages, through sharing information and providing an environment to get mutual helps among students, it is an approach that can bring a secure and flourishing atmosphere for learners to develop their communicative strategies and to increase their motivation. Kessler [19] argues that CLL classrooms, in contrast to traditional classrooms, are often more relaxed and enjoyable. It can establish a positive learning environment in which the students are more concentrated on their specified tasks and consequently they would enhance their academic achievement.

It is important to note that, as the famous saying 'one size does not fit all', one type of instructional method does not fit all students, as individual differences, various backgrounds, and prior knowledge can undoubtedly impact learning. Therefore, instructional strategies should be devised and investigated to optimally meet the needs of all students.

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Citation: Ebrahimi E, HadaviZade A. The Effect of Computer-Based Concept Mapping Learning Strategy on Iranian Intermediate EFL Learners' Writing Accuracy and Fluency. KURMANJ, 2022; 4(1): 1-7.

https://doi.org/10.47176/kurmanj.4.1.1

[DOI: 10.47176/kurmanj.4.1.1]