

The effect of using concept maps in writing education on the development of writing skills

Neşet Mutlu¹

Computer Education and Instructional Technology, Erciyes University, Kayseri, Turkey
<https://orcid.org/0000-0002-3378-4986>

Mahmut Akkuş

Turkish Education, MoNE, Kayseri, Turkey <https://orcid.org/0009-0005-9837-9497>

Mehmet Alperen Mertaş

Turkish Education, MoNE, Gaziantep, Turkey <https://orcid.org/0009-0004-7205-5817>

Sinan Ziya

Turkish Education, MoNE, Kayseri, Turkey <https://orcid.org/0009-0002-8470-113X>

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Concept maps, developed by Novak, Gowin and Kahle (1984), are important tools that enables information to be organized and learnt in a concrete and visual way in the mind and has been used frequently in education recently. Using concept maps in education has many advantages. Among these advantages of concept maps, it can be mentioned that the students are able to understand the concepts better, to restructure the knowledge and to make it more permanent. The aim of this study is to examine the effectiveness of concept maps on writing skills which is one of the four basic language skills in Turkish education. Quasi-experimental method was used in the study within the framework of quantitative research approach. The study was conducted on 50 students in two classes randomly selected from the 5th grade level of a secondary school in Develi district. One of the groups was randomly selected as the experimental group and the other as the control group. While the experimental group was made to work on writing with concept map, the control group was made to work on writing with traditional methods. ANCOVA (Analysis of Covariance) was used to observe the change between the pre-test and post-test scores of the experimental and control group students. In addition, descriptive data analysis techniques such as mean, standard deviation, percentage and frequency were also used. According to the results of the data analysis, it was determined that there was a significant difference between the group in which concept map was implemented and the group in which writing activities were carried out according to traditional methods. Accordingly, it was concluded that the use of concept map in Turkish writing education is useful and should be preferred as an alternative tool in writing education.

¹ Corresponding author: neset@erciyes.edu.tr

Introduction

While learning a language, the method of gaining skills is generally preferred instead of the direct instruction method. Therefore, language consists of some skill areas. Language skills are analyzed in two groups as receptive and expressive skills. Reading and listening are considered as receptive skills and speaking and writing are considered as expressive skills. Of these skills, writing is the last skill to be acquired and developed. Since writing is a skill based on mind and muscle coordination, it has a more complex structure than other language skills. Writing is the transfer of human wishes, feelings, opinions and thoughts on stone, fabric, wood, wood, paper, screen, etc. with various symbols (Özbay & Daşöz, 2016). Writing is the process of transferring knowledge, manners, feelings and thoughts to others through symbols. This process is linked to all language skills and is a complex and intricate set of processes that the human brain achieves with great effort. Since human being needs to transfer what he/she sees, hears, feels, lives, wants and needs, he/she uses writing in almost every aspect of life (Topuzkanamış, 2014).

Having knowledge of method is of great importance in writing skills. The selected subject should be explained in a way that has certain form and content features and within a plan. The technique of writing is tried to be comprehended by students in the primary education period and is developed in the following education levels. In Turkish lessons at the first and second levels of primary education, copying (writing what is seen by looking) and dictation (writing what is listened to by understanding) are among the activities that constitute the basis for writing skills in primary education (Azimi & Mousavi Pour, 2014). This process of gaining writing skills requires a long learning process.

Today, when it comes to writing, the first thing that comes to mind is compositions consisting of introduction, development and conclusion sections and in the form of explaining short pithy words. This situation creates an obstacle in the progress of writing skill, which is a complex skill and requires a long process to develop. According to Şentürk (2009), the word composition used in traditional language teaching is used as the equivalent of expository essay and it is not a correct approach to consider the concept of composition only as written expression. Choosing topics that appeal to the imagination and can be developed instead of shallow and superficial topics will facilitate the achievement of the goals of writing education and improve the effective writing skills of individuals.

A concept is an information form structure that represents the common characteristics of different objects and events that can change and can be defined as a variable (Ülgen, 2004). Concepts are one of the most important elements necessary for thinking. Understanding concepts is necessary for understanding principles, problem solving and understanding the world. Concepts turn very comprehensive information into usable units (Senemoğlu, 2004). Concepts are the building blocks of knowledge. The links of the chain of thought from concepts to the principles of science consist of relationships between concepts. Concepts are taught together with the important relationships between them. Concepts are the building blocks of knowledge and the relationships between concepts constitute scientific principles (Ayas, 2005). Newly learnt concepts are explained with previously learnt or developed concepts. This situation shows that the material that operates the thinking process of human beings is concepts and that unknowns are tried to be explained through known concepts (Kendirli, 2008). Concept learning is the creation of information in the mind by categorizing stimuli into certain categories (Ülgen, 2004).

A concept map is a system that shows the relationships between concepts with lines and puts concepts into a hierarchy (Canas & Novak, 2008; Kaptan, 1998). In concept maps, concepts should have a hierarchical order. General concepts are placed at the top of the map, while narrower and specialized concepts should be placed at the bottom. Each concept is represented by categorized boxes or circles and these boxes/circles are connected to each other by lines or arrows that present/describe the relationships or connections between concepts. In addition to the concepts and defined relational links, the concept map also contains cross-links that connect the independent branches of the concepts (Canas & Novak, 2008). Cross-connections can provide information about how the learner synthesizes concept groups consisting of different concepts by connecting them to each other and to what extent he/she has creative thinking. Concept maps have a dynamic structure. As the learner gains new experiences, he/she can add new concepts and relationships to the map, and as the relationships in the map are examined more deeply, new concepts and relationships can emerge (Atasayar, 2008; Lestari et al., 2019).

According to Novak, Gowin and Kahle (1984), knowledge is not something that is found as a result of an individual's search, such as gold or oil, but knowledge is a subjective whole developed by the individual, such as a car or pyramids, and formed by bringing together each of its parts. According to the cognitivist theory, the structure of knowledge can be shown by dividing it into a number of sub-units (Farrokhnia et al., 2019). The main subject is divided into organized sub-units, the organized sub-units are divided into side and main ideas and finally into concepts which are the smallest building blocks of knowledge (Farrokhnia et al., 2019). In this respect, the use of concept maps comes to the forefront at every stage of teaching all over the world and the effect of concept maps on the internalization of learning content at a high level from pre-school education to university is emphasized. Concept maps are included in the curricula in Turkey and it is supported by research results that concept maps can be used effectively in different disciplines (Acat, 2003). Concept maps can be used for many purposes such as revealing the existing knowledge of students in the learning process, examining the level of knowledge in the learning process and evaluating students' learning (Farrokhnia et al., 2019).

Concept maps can be used as a teaching technique at the beginning, development, explanation, and evaluation stages of teaching. Concept maps also serve as a transition between units or chapters by helping to establish connections between subjects (Gündüz, 2014). For many students, concept maps can be a good way to prepare for exams as well as reviewing a topic or a unit. Concept maps can also be used individually as well as in group work. Thus, concept maps used individually and in groups help to understand how much the subject is understood and which concepts are confused (Yağdıran, 2005). The most important advantage of the concept map technique is that it enables to obtain a visual presentation of the thoughts in the learner, appeals to different learning styles and differences between learners and is easy to use (Kaptan, 1998; Lestari et al., 2019). Instead of drowning in long and complex sentences, students can learn the whole subject in a single table and learn difficult concepts by associating them with easy concepts (Bond et al., 2019; Şahin, Kurudayıoğlu & Öztürk, 2013).

The concept map, which is based on the division of the whole to be read, listened, written, or spoken in Turkish teaching into meaningful small parts in the form of basic concepts and sub-concepts, enables students to easily switch between concepts. There are many studies on the use of concept maps in lessons (Acat, 2003; Bond et al., 2019). According to Şenay (2007), concept maps can be used on different types of texts in Turkish lessons. In a study conducted to determine the effect of concept maps on reading comprehension and retention, while there

were no significant differences between the experimental and control groups in the pre-test results conducted using the "Reading Comprehension Achievement Test (RCAAT)" (Kırkkılıç, Maden, Şahin, & Girgin, 2011), significant differences were found in favor of the experimental group in the post-test implementation. Finally, Fu et al. (2019) conducted an experimental study on the development of writing performances of EFL students in their concept-mapping based approach study. As a result of this study, it was determined that the writing performance of EFL students increased as a result of the implementations enriched with concept maps. In this study, the researchers wanted to examine the contribution of using concept maps to writing studies. In this context, the research question and sub-questions are as follows:

What is the effect of using concept maps on 5th grade students' academic skills in essay writing?

- Is there a statistically significant difference between the mean of the pre-test scores of the experimental group and the control group?
- Is there a statistically significant difference between the mean of the post-test scores of the experimental group and the control group?

Method

Research Method

The research is a quantitative study designed in pretest-posttest quasi-experimental model. In the quasi-experimental design method, experimental and control groups are selected according to the criteria determined at the beginning of the research and with suitable measurements. In the quasi-experimental design method, the aim is to test whether the difference between the implementation group and the others in terms of a certain dependent variable is significant (Büyüköztürk, 2007). In this study, the control and experimental groups were initially given only a subject and asked to write an essay, and in the second stage, the students in the experimental group were given a concept map implementation, while the students in the control group were given only a subject and asked to write an essay. The Written Expression Assessment Scale (WEAS) was administered to both groups as a pre-test before the application and as a post-test after the implementation. The research was based on the data obtained from these tests.

Participants

The population of the study was composed of fifth grade students studying in Kayseri province. Randomly selected two fifth grade classes in a middle school constitutes the experimental and control group of the study. One of them was assigned as experimental group by simple random sampling method and the other was assigned as the control group. The experimental group of 25 students and the control group of 25 students who fully participated in the application. Both pre-test and post-test measurements implemented to the sample of the study.

Data Collection

As a data collection tool in the study, "Written Expression Assessment Scale (WEAS)" created by Karatosun (2014) was applied as a pre-test and post-test to measure the written

expression skills of the students in the experimental and control groups. The WEAS was created in line with the opinions of two faculty members working in the departments of Turkish Language Teaching and Classroom Teaching. The WEAS consists of three sub-headings: "Title, Paper Layout and Plan and Expression". There are three items under the sub-heading "Title", seven items under the subheading "Paper Layout" and nineteen items under the subheading "Plan and Expression". The scale is in the form of a 3-point Likert-type measurement tool. The grades for each item are weak, moderate and good, and a score of 1 is given for a weak item, 2 for a moderate item and 3 for a good item. The highest score to be obtained from the scale is 87 and the lowest score is 29. The compositions written by the students were evaluated in the pre-test and post-test with the WEAS. Two experts were consulted for content validity.

Implementation

In this quantitative study, designed in pretest-posttest quasi-experimental model, the students in the experimental group were given a concept map implementation in writing studies. However, the students in the control group were given only a subject and asked to write an essay freely. WEAS was administered to both groups as a pre-test before the implementation and as a post-test after the implementation. Writing activities were implemented for 2 weeks. During these two-week processes, 5 writing exercises were carried out. In this process, standard practices were carried out during the writing exercises in the control group. In the experimental group, in addition to the standard applications, some information about the concept map was given: what it is, for what purpose it is used and how it is created. Before the 5 writing exercises they would prepare, each student in the experimental group was asked to individually create concept maps about what they would write on a A4 paper. Afterwards, each student was given feedback by the teacher about the concept map they prepared. Finally, they were asked to begin their writing exercises based on the links in this concept map.

Data Analysis

Descriptive and inferential statistical methods were used to analyze the data. Mean and standard deviation were used as descriptive statistical methods to analyze the students' scores for writing activities. In order to reveal the difference between the writing activities of the experimental and control groups, ANCOVA (Analysis of Covariance) was applied to determine the difference between the post-tests by controlling the pre-test results since there was significant mean difference on pre-test scores.

Results

In this section, the findings and interpretations obtained by comparing the scores of the students in the writing activities applied to the students are presented. The first analysis was to investigate if there were differences between pre-test scores of experimental and control groups. The independent samples t-test results in Table 1 showed that there was a significant mean difference on the pre-test score between control and experimental group ($t(48) = -2.11, p = .04$). According to the descriptive statistics, the students in control group ($M=63.12, ss=13.14$) scored higher than the students in experimental group ($M=55.24, ss=13.40$).

Table 1. Results of the independent samples t-test scores of pre-test scores

Group	n	Mean	sd	t	df	P
Experimental	25	55.24	13.40	-2.11	48	0.04
Control	25	63.12	13.14			

To understand effect of concept map implementation on students' writing scores, ANCOVA (Analysis of Covariance) was conducted to observe the change between the pre-test and post-test scores of the experimental and control group students. The purpose of analysis of covariance is to control other variables that affect the research other than the variable tested in the research and thus reduce the margin of error (Kalaycı, 2017).

There are some assumptions to conduct ANCOVA. The first assumption is that covariate should be linearly related to the dependent variable. this assumption was tested in SPSS Statistics by plotting a grouped scatterplot of the covariate and post-test scores of the dependent variable. There was a linear relationship between covariate and post-test scores (Figure 1).

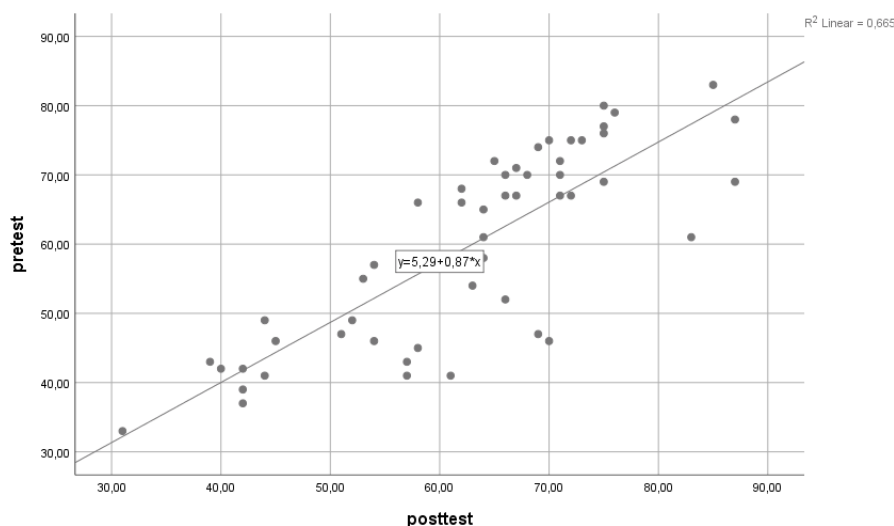


Figure 1. Scatter plot of covariate and dependent variable

Second assumption was that dependent variable should be normally distributed for each control and experimental group. This assumption was not violated according to results of Shapiro Wilks and Skewness-Kurtosis tests. Third assumption was homogeneity of variances. Levene's test scores revealed that this assumption was not violated. Last assumption was homogeneity of regression slopes. According to this assumption, there should not be interaction between the pre-test and the post-test. Interaction between covariate and dependent variable was not significant according to the Table 2 ($F(1,3)=.54, p>.05$). These results showed that all assumptions were not violated and results of the ANCOVA should be seen as valid.

Table 2. Results for the homogeneity of regression slopes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6686.03	3	2228.68	53.56	.00
Intercept	328.65	1	328.65	7.90	.01
grup	129.38	1	129.38	3.11	.08
pretest	6563.54	1	6563.54	157.72	.00
grup * pretest	22.36	1	22.36	.54	.47

According to the Table 3, there was a difference between the pre-test score of the experimental group ($M=55.24$, $s=13.40$) and the pre-test score of the control group ($M=63.12$, $s=13.14$) in favor of the control group. In the post-test scores, it was determined that the post-test score of the experimental group ($M=63.24$, $s=13.80$) was higher than the score of the control group ($M=63.16$, $s=13.14$). After the experimental procedure, ANCOVA was applied to determine whether there was a significant difference between the posttest score of the experimental group ($M=66.60$, $sh=1.33$) and the posttest score of the control group ($M=57.76$, $sh=1.33$) corrected according to the pre-test results of the groups.

Table 3. Results of the groups' writing study pre-test and post-test scores

Group	n	test	Mean	sd	Corrected Mean Scores	Corrected Standard Error
Experimental	25	Pre	55.24	13.40	66.60	1.33
		Post	63.24	13.80		
Control	25	Pre	63.12	13.14	57.76	1.33
		Post	63.16	12.08		

When the data in the Table 4 were analyzed, it was determined that the post-test scores of the experimental and control groups showed a significant difference when the pre-test scores of the experimental and control groups were controlled ($F_{(1,37)} = 21.31$; $p < .05$). According to these findings, it is seen that the use of concept maps in writing education in the experimental study increased writing success. The experimental study on the effect of using concept maps on writing studies has a high-level effect value ($\eta^2 = .31$).

Table 4. ANCOVA results regarding the post-test scores of the groups corrected according to the writing study pre-test scores

Source	Sum of Squares	df	Mean Square	F	p	η^2
Pretest	6099.88	1	6099.88	145.14	.00	.76
Group	895.44	1	895.44	21.31	.00	.31
Error	1975.32	37	42.03			
Total	201449.00	50				

Discussion and Conclusion

In line with the findings obtained as a result of the statistical analysis of the data collected in this study, which was conducted to determine the effect of the concept map method on writing skills, the following conclusions were drawn, and suggestions were developed based

on these results. It can be concluded that concept maps can be developed to be used in writing studies in Turkish education. In the pre-test applied before the experimental study, a statistically significant difference was found between the average of the experimental group and the average of the control group in favor of the control group. According to the results of ANCOVA conducted to compare the post-test scores of the groups corrected according to the pre-test scores; it was determined that the application of using concept maps in the experimental study significantly increased academic achievement in writing education.

As a result of the research conducted by Belet and Yaşar (2007), it was seen that there were significant differences in favor of the experimental group between the writing skills of the students in the experimental group in which note-taking, summarizing and concept maps were used as learning strategies in the fifth-grade Turkish course and the control group in which traditional teaching was applied. Similarly, in a study conducted to determine the effect of creative writing practices on writing skills, it was concluded that creative writing practices including the concept map technique were more effective in the development of writing skills than the traditional method (Tonyalı, 2010). In another study conducted by Aydın (2010), it was determined that the effect of concept mapping technique on listening comprehension and retention was higher than traditional methods. The reason for this is that this technique increases students' interest in the lesson and makes the lessons more enjoyable. The findings obtained as a result of the research were found to be compatible with the results of these studies. According to these findings, it can be concluded that the use of concept maps in writing education contributed more positively to student achievement than the traditional method. The use of concept maps by Turkish lesson teachers in writing studies will attract students' interest, motivation and attention more and will enable them to transfer abstract information in their minds to their writings correctly.

According to the research results, it can be suggested that:

- the concept map method can also be used in the development of reading, listening, speaking skills and in the field of grammar learning.
- students' attitudes towards writing and the use of concept maps in writing education can be measured.
- opinions and suggestions of Turkish teacher candidates and Turkish teachers regarding the use of concept maps in Turkish lessons can be studied.

There were two main limitations of the study. The first limitation was the small number of students participating in the study. If number of the sample was higher, results would be more generalizable to the population. The second limitation was that the application was completed in a limited time. It would be better to increase implementation period to one semester to see the positive effect of concept maps on students' writing skills.

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