THE EFFECTS OF CONCEPT MAPPING ON STUDENTS' ACHIEVEMENTS IN LANGUAGE TEACHING

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ABSTRACT

The main purpose of this study has been to compare the concept mapping with the traditional instruction method in consideration of student's achievements in English course. The students who took "English" class in 9th grade at Balakgazi High School in 2005-2006 attended this study.

An experimental group and a control group consisting of 23 members each, were organized. The concept mapping was carried out to the experimental group. Traditional instructional method was carried out to the control group. Various concept maps related to these subjects were developed. An achievement test was used to collect the data and then a Questionnaire was developed to determine the students' views about the concept mapping.

The primary findings indicate that;

- Comparing the control group the experimental group that the concept mapping was carried out has become more successful.
- In permanent of knowledge there has been no significant difference between groups.
- The students have had some difficulties while developing concept maps on their own.

According to the results of this study, it may be recommended that;

- While using concept maps in language teaching, teacher-made maps firstly should be used.
- The students should be encouraged to develop their own concept maps.

Keywords: Concept Map, Teaching Method, Language Teaching

INTRODUCTION

Today, teachers and teaching methods have an indispensable role in ensuring long-lasting and efficient learning. Traditionally, classrooms have been teacher-centered domains where students have been assigned a passive and submissive role. Recently, however, this method has come under much criticism and new methods have surfaced. One such modern method of teaching is concept-mapping, which aims to empower students by giving them an active role in the educational environment. The present study aims to experimentally compare how the traditional grammar-translation method and the modern concept-mapping method affects student success.

Problem

Language teaching has attracted the interest of many scientists, sociologists and, more recently, linguists as well (Demirel, 2003:2). The number of languages spoken around the world today is estimated to be around 3,500. The ever-increasing international relations of our day makes it impossible for individuals and nations to communicate solely in their own languages and necessitates the learning of foreign languages (Demirel, 2003:4). Foreign language learning gained particular importance for Turkey when she became a candidate for European Union membership, which will necessitate people carrying "language passports" and being entitled to free movement within Europe. Therefore, language-teaching strategies commonly used in the country should be carefully revisited so that the overall quality of language instruction can be improved (Mirici, 2004:224).

Not all popular language teaching strategies are at the same time functional. For instance, despite its wide popularity, having students memorize grammatical rules is not conducive to competent production and use of language. Such incorrect convictions may stem from teachers themselves or from faulty techniques and methods promoted in the realm of language teaching.

Some of the best-known methods and techniques used in foreign language teaching are the Translation Method, Grammar-Translation Method, Phonetic Method, Natural Approach, Eclectic Method, Direct Method, Audio-Lingual Method and, more recently, the Communicative Approach (Demircan, 2002:144-248; Mackey 1965:154). As most of these methods aim to teach language in the shortest time possible, they are mostly inadequate. However, the aim of language teaching should be to enable students to actually use the target language in their lives (Başkan cited in İşeri, 2006). Such issues have necessitated the search for an alternative method and, consequently, concept-mapping has arisen as a viable modern alternative. Developed for the first time in the mid-1970s by Joseph D. Novak and a group of Cornell University graduates, concept-mapping is a method that represents events, concepts and ideas visually, and explains the relationships between them. They are

instructional tools that represent the totality of an event or topic, and display the relationships between concepts (Akkayüz, 2003:40; Karapür, 2002:18; Megendoller and Sack, 1994:589). They are composed of networks of "nodes" that represent concepts and "links" that accurately and meaningfully represent relations between these nodes. All stages and branches of education have benefited from the use of concept maps (Novak and Gowin, 2004: 15-55).

Concept maps are formed using a hierarchical arrangement of circles or boxes. The most general concept is placed at the top or in the middle of the map and equally important concepts are placed parallel to each other. More specific concepts are grouped under more general concepts. A concept that is at the bottom of the map can move to the top when the emphasis in the map changes. Two or more concepts are associated to each other with words or statements known as "propositions" (Kabaca, 2002: 22).

Concept maps make it easy for students to understand basic ideas and grasp the relationships between them. They can thus link old information to new information. By promoting meaningful learning instead of memorization, concept maps enable teachers to find new ways of discussing concepts with students and identify incorrect learning. Concept maps can be used at all stages of instruction provided that they are implemented accurately. Concept maps are similar to concept webs; but differ from them in that the relationships between concepts in concept maps are given as "propositions" or "principles". Concept maps may be developed through a whole-class or small group activity (Akgündüz, 2002:8; Taş, 2001:25).

As students learn how to map concepts, they also learn how to view them as a meaningful whole instead of in isolation from each other. Novak and Gowin (2004:6) contend that concept maps are more effective when they are created with active student participation as students need to link the ideas in their minds as they draw.

One of the main advantages of concept-mapping is that they allow for easy recognition of visual symbols. Additionally, they can better explain concepts that words cannot, they are student-centered, they encourage teacher-student interaction, and they help students retain information longer (Taşpınar, 2005:105). Conversely, the main disadvantage is that students who are unfamiliar to concept-mapping may have difficulty in interpreting complicated maps (Kabaca, 2002:29). Further, it may be difficult for younger students to produce their own maps.

Dansereau has categorized concept maps into three: (1) spider concept maps, (2) chain concept maps and (3) hierarchy concept maps. Apart from these three, there are other types such as hybrid maps, flow chart concept maps, system concept maps and mandala concept maps (Chardan, 1985:58; Kabaca, 2002:23; Uiuc, 2005).

Many studies have been conducted in Turkey and worldwide about concept-mapping. These have shown that the method is most commonly used in science and mathematics (Akgündüz, 2002; Akkayüz, 2003; Çardak, 2002; Gürlek, 2002; Kabaca, 2002; Taş, 2001). Findings have generally suggested that student success tends to increase with the use of concept-mapping. Mclay and Brown (2003) studied the use of concept-mapping in primary school administrators' education, Hsu (2005) studied its effects in nursing education, Franc (2004) investigated its use in nutrition education, Roberts (1999) in statistics education and Brandt and Elen (2001) in chemistry instruction. They concluded in unison that this method affects student success positively. Similarly, Slotte and Lonka (1999) found in their study that concept maps are effective in better understanding complicated concepts.

Kinchin (2001) examined the reasons why concept maps have not been used commonly in areas other than science. It is the researcher's belief that concept maps can be used in social sciences, and more specifically in foreign language instruction. When learning languages, it is important for students to recognize and understand concepts that are present in the target language. Further, in order for students to achieve meaningful and permanent foreign language learning, it is crucial to establish relationships between concepts and solidify abstract ideas.

Concept-mapping may therefore be considered as an alternative method in language teaching as it ensures meaningful learning rather than memorization. The present study aims to introduce the use of concept maps in the foreign language classroom, and thus contribute to the field.

Aim

The general aim of the study is to compare the effects of concept mapping and the traditional method on student success with respect to achieving the objectives of 9th grade English lesson "Tenses in English". The following supporting aims have also been identified in line with the general aim mentioned above.

The Supporting Aims of the Study

The supporting aims are:

1. To determine whether student success varies with the use of concept-mapping in teaching the Simple Present and Present Continuous Tenses in the English lesson.
2. To identify student opinion about concept mapping.

Hypotheses

As regards **the first supporting aim**, the following hypotheses have been tested:

1. There is no meaningful difference between the pre-test and post-test point averages of the experimental group.
2. There is no meaningful difference between the pre-test and post-test point averages of the control group.
3. There is no meaningful difference between the post-test point averages of the experimental and control groups.
4. There is no meaningful difference between the gain point averages of the experimental and control groups.
5. There is no meaningful difference between the post-test and delayed test point averages of the experimental group.
6. There is no meaningful difference between the post-test and delayed test point averages of the control group.
7. There is no meaningful difference between the delayed test point averages of the experimental and control groups.

As regards **the second supporting aim**, the following research question was formed:

1. What are the opinions of the experimental group students about concept-mapping?

Limitations and Assumptions

The study was limited to Elazığ Balakgazi High School, 2005-2006 academic year, fall semester, 9-B, 9-F, 9-H, 9-M classes.

The study was devised with the following assumptions:

- When forming the experimental and control groups, gender, student marks obtained in 8th grade Turkish and English classes, and achievement pre-test points were considered sufficient evidence for objectivity.
- The content of the experimental classes was considered appropriate for concept-mapping.

METHODS

Study Model

The study investigated the effects of the independent variables of concept-mapping and traditional

Table 1: The Comparison of Groups with Respect to Objectivity Criteria

Criteria	Control group		Experimental Group		Levene's Test (F)	Sig. (2 tailed)	t	Sig. (2 tailed)
	$\overline{X}$	sd	$\overline{X}$	sd				
Pre-test	14	5,44	14,04	2,75	1,053	0,310	0,410	0,684
Turkish	4	0,797	4,30	0,702	0,343	0,561	1,373	0,177
English	4	0,662	4,08	0,596	3,214	0,080	1,871	068,0

The gender distributions of students were compared using chi-square analysis. In the experimental group,
lecturing on the dependent variable of student success. Therefore the study model chosen was "pre- and post-test control group". Concept-mapping was used in the experimental group and traditional lecturing was used in the control group.

Population and Sample

The population of the sample consisted of 187 students attending 9th grade in Elazığ Balakgazi High School during the 2005-2006 academic year. The sample comprised 46 students (23 in the experimental and 23 in the control group) who were chosen according to objectivity criteria.

Choosing the Sample

The following criteria were considered when making the experimental and control groups:

1. The gender of students.
2. Pre-test points of students.
3. Students' marks from 8th grade English class.
4. Students' marks from 8th grade Turkish class.

The data obtained, except gender, was grouped through cluster analysis. The general aim of cluster analysis is to categorize ungrouped data according to their similarities and thus provide researchers with appropriate and useful data in summary form. Since it was decided from the start that there would be two groups in the study (experimental + control), the k-means technique, which is a non-hierarchical clustering method, was used (Tatlıdil, 1992: 252-258).

Among the assignments with two, three and four groups made with the k-means technique, the groups with the largest number of members were compared and the group with 75 students with similarities was chosen. The characteristics of these students were examined and thus experimental and control groups were formed. Twenty-three students were assigned to each group. The groups have also been compared with respect to the objectivity variables. The data obtained may be seen in Table 1.

As shown in the table, according to Levene test results, parametric test assumption has been ensured. It was also found as a result of independent groups t-test that there was no meaningful difference with respect to objectivity criteria.

Questions with a discrimination index between 0,30 - 0,39 were not removed but reconsidered. As a result, 35 of the initial 50 questions featured in the final version of the test.

The reliability of the test was measured according to the KR-20 formula. (Erdoğan et al, 1984:60) The reliability coefficient was found to be 0,91. It can thus be argued that the achievement test was reliable. Additionally, the proportion of line width (R) to standard deviation was found to be between 4 and 6, more precisely 4,51, confirming the reliability of the test (Tekin, 1994:239).

The short distance between the test average ($\overline{X}$ = 13,95) and the median (M = 12) also indicates that test points are within normal distribution. As a result of the data obtained, it can be said that the test is valid and reliable.

Table 2: t-test Results of Hypotheses 1 and 2

GROUPS	N	$\overline{X}$	sd	df	r	Sig. (2 tailed)	K.S.Z	Sig. (2 tailed)	t	Sig. (2 tailed)
Hypothesis 1: There is no meaningful difference between the pre-test and post-test point averages of the experimental group.										
Exp. Grp. pre-test	23	14,04	2,75	22	,003	,988	,731	,658	7,703*	,000
Exp. Grp post-test	23	23,91	5,50				,629	,824		
Hypothesis 2: There is no meaningful difference between the pre-test and post-test point averages of the control group.										
Cont. Grp pre-test	23	14,56	5,44	22	,025	,911	,901	,392	2,318*	,030
Cont. Grp post-test	23	17,91	4,42				1,274	,078		

* $p < 0,05$ meaningful

there were 14 male and 9 female students whereas in the control group there were 12 male and 11 female students. No meaningful difference was detected at the $p > 0,05$ level according to the chi-square analysis ($X^2 = 0,354$ (Table $x^2 = 3,841$) df = 1). Thus it can be argued that the groups were constructed objectively.

Data Collection Tools

Data was collected with achievement test and opinion questionnaires about concept-mapping. The construction of these tools will be explained below. Concept maps were prepared about the Simple Present and Present Continuous tenses. The following actions were performed with regards to the achievement test:

Achievement test: Concept maps were developed with expert help. In line with the objectives of the course and the "knowledge-perception" levels of the cognitive domain, a 50-question draft achievement test was prepared. The test was administered to 141 students other than those in the experimental and control groups. An item analysis was carried out and, consequently, 2 questions that no student could answer were removed from the test. Seven other questions that had a discrimination index of 0,20 or below, and a further 8 questions with a discrimination index of 0,20 to 0,30 were also removed from the test.

As can be seen, single sample Kolmogorov-Smirnov Z (K. S. Z.) test was used to identify the normality of the distributions. After seeing that the distributions were normal, paired t - test data was used for

Questionnaires: To begin with, a 30-item pool was formed. The 10 items that passed expert opinion were administered to 10 students face to face. With this 5-item Likert scale questionnaire, student opinion regarding the use of concept-mapping was collected.

Data Collection and Interpretation

An achievement test, pre-test and post-test was followed 4 months later by a delayed test. The questionnaire was administered to the experimental group after the achievement test. The implementations within the groups can be summarized as follows:

In the experimental group, concept-mapping was used. Students were introduced to the idea of concept-mapping with a family tree map. Students were encouraged to engage in active learning with the help of teacher-made concept maps. They were then asked to produce their own maps; however not all students managed due to language difficulties.

The control group, on the other hand, received traditional instruction. Students were given information about the objectives of the course, course content, evaluation and requirements and they were asked to take notes. They were also told that the course would rely on source material about English grammar and the course book.

FINDINGS and INTERPRETATIONS

Findings and interpretations were considered together with the two supporting aims. Accordingly, seven hypotheses were tested for the first supporting aim, and student opinions from the questionnaire were presented for the second one.

Findings and Interpretations with Respect to the First Supporting Aim

Findings about Hypothesis 1 and Hypothesis 2 are given in Table 2.

As the distribution was considered normal according to the Single Sample Kolmogorov-Smirnov Z (K. S. Z.) test, paired t-test data was used as the basis for interpretations. As a result, the null hypothesis was rejected, and a meaningful difference was found.

As seen in Table 5, no meaningful difference was found between the delayed test point averages of the two groups at the level p>0,05. Therefore, both groups forgot previously learned information. In other words, concept-mapping was not found to be a more permanent method. English teaching with concept-mapping was not found more effective than the traditional method in terms of permanent of knowledge. However, it should be noted that the averages of the experimental group were higher.

TABLE 5: t-test Result of Hypotheses 7

GROUPS	N	$\overline{X}$	sd	df	Levene's Test (F)	Sig. (2 tailed)	t	Sig. (2 tailed)
Hypothesis 7: There is no meaningful difference between the delayed test point averages of the experimental and control groups.								
Experimental G.	23	13,30	2,78	44	,355	,554	-1,88	,066
Control G.	23	11,60	3,28					

interpretations According to this, both hypotheses were rejected as there was no meaningful difference between the two groups. As a result, it can be said that both in the experimental and the control groups, methods used affected student success positively.

between the two groups. Accordingly, it may be argued that the concept-map method has more influence on student success than does the traditional method.

Findings about Hypothesis 3 and Hypothesis 4 are given in Table 3.

TABLE 3: t-test Results of Hypotheses 3 and 4

GROUPS	N	$\overline{X}$	sd	df	Levene's Test (F)	Sig. (2 tailed)	t	Sig. (2 tailed)
Hypothesis 3: There is no meaningful difference between the post-test point averages of the experimental and control groups.								
Exp. Grp	23	23,91	5.50	44	1.772	,190	-4,077*	,000
Cont. Grp	23	17,91	4.42					
Hypothesis 4: There is no meaningful difference between the improvement point averages of the experimental and control groups.								
Exp. Grp	23	10,04	6,26	44	0.222	0.640	-3.439*	,001
Cont. Grp	23	3,34	6,92					

* p < 0,05 meaningful

As the distribution was considered to be normal according to Levene test results, the difference between the post-test and gain (the difference between the post-test and pre-test points) averages of the experimental and control groups was determined by using independent t-test. Both hypotheses were thus rejected, as there was no meaningful difference.

given in Table 4.
According to this, both groups had forgotten a considerable amount of information in the period

between the post-test and the re-administration of the achievement test (delayed test) 4 months later.

Finding about Hypothesis 7 is given in Table 5.

Findings and Interpretations with Respect to the Second Supporting Aim

The questionnaire was administered to identify opinions of students in the experimental group about concept-mapping. Students reported positive opinions and stated that they found concept maps beneficial because grouping helped learning, visuals increased the retention of knowledge, maps helped moving from abstract to concrete information, and they no longer had to memorize. From this perspective, it can be argued that concept maps were favored.

Students did not find concept-mapping boring, and they stated positive opinions about class participation. However they only partially agreed that they learned English better with the help of this method. Further, they disagreed with the idea that this lesson should be taught only through concept-mapping. When the positive results arising from hypothesis tests are considered, it can be argued that students did not fully grasp the positive aspects of the method. This may be because all concept maps were fully designed by the teacher. Initially, the students were all encouraged to create their own concept maps. However, seeing that they were not able to create maps due to language barriers, teachers then created all the maps that were used.

TABLE 4: t-test Results of Hypotheses 5 and 6

GROUPS	N	$\overline{X}$	sd	df	r	Sig. (2 tailed)	K.S.Z	Sig. (2 tailed)	t	Sig. (2 tailed)
Hypothesis 5: There is no meaningful difference between the post-test and delayed test point averages of the experimental group.										
Exp. Group delayed test	23	13,30	2,78	22	-,197	,368	,700	,711	7,664*	,000
Deney Son.	23	23,91	5,50				,629	,824		
Hypothesis 6: There is no meaningful difference between the post-test and delayed test point averages of the control group.										
Cont. Group delayed test	23	11,60	3,28	22	-,281	,194	,874	,430	-4,87*	,000
Kontrol Son.	23	17,91	4,42				1,274	,078		

* $p < 0,05$ meaningful

RESULTS, DISCUSSION AND SUGGESTIONS

Results and Discussion

The results of the study are discussed below.

The Effects of Concept Mapping Method on Learning

Novak and Gowin (2004:6) stated that active student participation would be useful in the creation of concept maps. Although concept maps are attractive at first sight to students coming from traditional instructional backgrounds, it was also observed in the As such students are used to being spoon-fed, they find it difficult to actively construct knowledge themselves. The students in this study likewise found it difficult to create their own maps. According to Ausubel and Novak (Kabaca, 2002:22) concept maps actually represent how much the students know. Therefore, low linguistic skills may be the major reason why the students enrolled in the study had difficulty in making their own concept maps.

According to the achievement points obtained at the end of the study, concept-mapping was found to be more influential in student success than was the traditional method. This is in line with the findings of other experimental studies conducted by Taş (2001), Akgündüz (2002), Kabaca (2002), Çardak (2002), Mclay and Brown (2003), Roberts (1999), Mergendoller and Sacks (1994), Slotte and Lonka (1999), which compared concept-mapping to the traditional method and concluded that the former was more successful.

Another finding arising from the present study has been that there was no significant difference between concept maps and the traditional method as regards retention of knowledge. The study has shown that both groups went through a stage of forgetting. It can therefore be concluded that concept-mapping does not play an important role in the retention of knowledge.

Questionnaire Results about Concept-Mapping

The students embraced concept maps as these maps group topics meaningfully, represent them with visuals and thus make them more concrete, facilitate revision, create springboards for discussion in the classroom, and eliminate the need for memorization. In a study by Kabaca (2002:71), students likewise reported that they preferred concept maps as they offered the students mental organizers and improved learning. However they did not think that this method should be used in the English lesson. As Kabaca states (2002:34), students tend to become bored and apathetic until they finally become familiarized with this method. The present study also observed a similar pattern.

Suggestions

The following suggestions can be made in line with the findings of the study:

- Teachers should initially use their own concept maps and only then ask students to create their own.
- Concept-mapping should be used commonly in the English classroom as language teaching involves the presentation of many rules and generalizations.
- Teachers should be trained in concept-mapping.
- Students should become familiarized with concept maps as early as primary school.

SUGGESTIONS FOR FUTURE RESEARCH

In light of the results of the present study, the following can be suggested for future research:

- The concept-mapping method can be used in vocabulary teaching and reading in foreign language classrooms.
- The role of concept maps in teaching higher level cognitive skills (implementation-analysis-synthesis) may be investigated.

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