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The Effects of Discovery Learning on Students' Success and Inquiry Learning Skills

Ali Günay Balım*

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Abstract

Problem Statement: In this study, the unit "If It Weren't for The Pressure?" in the Science and Technology course at the Elementary 7th grade was tackled in two different ways. The first way is the discovery learning method along with the daily plans and activities. The second is the traditional teaching method. This study particularly aims at answering the question: "How does teaching science through the discovery learning approach affect students' academic achievement, perception of inquiry learning skills, and retention of knowledge?"

Purpose of Study: This study aims at identifying the effects of the discovery learning method upon the students' perceptions of inquiry learning skills, academic achievements, and retention of knowledge. This research also investigates whether there is a significant difference between the experimental and control groups in learning the subjects of the unit "If It Weren't for The Pressure?" from the point of cognitive and affective learning levels.

Findings and Results: A quasi-experimental research design with a pre-test and post-test control group was used in this study. Fifty-seven seventh graders participated in this study during the spring term of the 2006-2007 academic year.

The result of the study shows that there is a significant difference in favour of the experimental group over the control group regarding the average of academic achievement, scores of retention of learning, and perception of inquiry learning skills scores, both on cognitive and affective levels.

Conclusions and Recommendations: The conclusions of the study showed that there is a significant difference in favor of the experimental group over the control group in terms of academic achievement scores, perception of inquiry learning scores, and retention of learning scores in both cognitive and affective levels. Thus, it can be stated that the experimental group

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students, who scored high in the post-achievement test, have high perception of inquiry learning skills scores. Using the discovery learning method, which is one of the various teaching methods in which the students are active and are guided by the teacher, is considered to increase students' success and inquiry learning skills more than the traditional teaching methods.
Keywords: Discovery learning method, perception of inquiry learning skills, science education, curriculum.

Teaching students with the notion of discovering, critical thinking, questioning, and problem solving skills is one of the main principles of science and technology teaching. Thus, science and technology teaching curriculum should accordingly be developed to educate science-literate students who are able to inquire and solve problems they face. Today, it is believed that methods in accordance with the constructivist approach in which the students learn more effectively by constructing their own knowledge, should be used. One of these methods is discovery learning.

The basis of science teaching is understanding that natural phenomena and the nature of science requires inquiring and discovering. Inquiry in science consists of experiments and inquiring natural phenomena by discovery learning (Bruner, 1996; Lee et al., 2004). Bruner points out that any individual has the will to learn and this will should be used in such activities that it should raise curiosity and direct students to studying and discovering knowledge. Bruner (1961) states that learning happens by discovery, which prioritizes reflection, thinking, experimenting, and exploring. People who use self discovery in learning turn out to be more self confident. Discovery is a way from the unknown to the known by the learners themselves (Bruner, 1966). The active participation of the learner in the learning process is called discovery learning (Bruner, 1968; Kara & Özgün-Koca, 2004; Kipnis, 2005). In discovery learning, students construct knowledge based on new information and data collected by them in an explorative learning environment (De Jong & Van Joolingen, 1998; Njoo, 1994).

Harlen (2004) states that inquiry learning in science develops the perception skills of students because it allows them to understand the natural phenomena and the world by using their cognitive and physical skills. It is suggested that this kind of learning shows students the nature of scientific studies and the ways learning is realized. Thus, it develops their discovery skills (National Research Council [NRC], 2004). Therefore, inquiry learning requires active participation of students in the learning process (Matson, 2006).

According to Matson (2006), inquiry and discovery based science teaching is the process of inquiring the nature and structure of the universe. Inquiry and discovery based learning requires students to take examples from daily life, to propose hypotheses, test them like scientists, and meanwhile, to gain advanced level cognitive skills (Matthews, 2002). Discovery learning is a method that encourages students to arrive at a conclusion based upon their own activities and observations. Inclusion of activities based on discovery learning in science teaching in Turkey is important for meaningful and lifelong learning. The activities in science teaching

raise the curiosity of students and drive them to inquire their priorities and perceive the natural phenomena from different aspects. Such activities help to correct the conceptual errors of students (Kaptan & Korkmaz, 2000).

Erdal and Öngel (1993), state that when learners take part in an inquiry, they get a complementary excitement and satisfaction by what they do, sense, and share, and what and how others do and sense during the discovery process. In this study, the subjects related to the unit "If It Weren't for The Pressure," and were taught through daily plans and activities that are consistent with the discovery learning method and the effects of the method upon the students' perceptions of inquiry learning skills and academic achievements.

Methods

Purpose of the Study

This study aims at identifying the effects of the discovery learning method upon the students' perception of inquiry learning skills, academic achievement, and retention of knowledge. Below are the research questions which this study also seeks answers to: The primary question of this study can be formulated as follows:

"Does discovery learning based science teaching have any effects on the students' academic achievement, perception of inquiry learning skills, and retention of knowledge?"

Below are the related research questions:

1. Is there a significant difference, in terms of academic achievement, between the experimental group, in which the discovery learning method was trialed, and the control group taught through traditional teaching methods?

2. Is there a significant difference between the experimental and control groups from the point of perception scale scores of inquiry learning skills of students?

3. Is there a significant difference between the scores of the experimental and control group students in the post-test scale of inquiry learning skills and the students' academic achievement?

4. Is there a significant difference between the total retention scores of the experimental and control groups?

5. What are the opinions of experimental group students about the preparation of concept maps and activities given to them?

Participants

In this study, a quasi-experimental design with a pre-test and post-test control and comparison groups was used. Fifty-seven seventh graders (30 boys and 27 girls) participated in this study from a public elementary school with a middle class economic profile in Izmir, the third largest city in Turkey. Twenty-eight of the students were in the experimental and 29 of them were in the control group. The studies continued for three

hours a week, during four weeks in the spring term of the 2006-2007 academic year. The study has shown that the academic achievement levels of students in science lessons in both groups were equal as given in table 3 (t=.149; p=.874>.05).

Instruments

The data in this study were collected by means of the Academic Achievement Test in Science, Perception Scale of Inquiry Learning Skills and Semi-Structured Interview Test. The Academic Achievement Test in Science Concerning the Unit "If It Weren't for the Pressure?": The Academic Achievement Test in Science consisted of multiple questions covering the subjects of the unit "If It Weren't for the Pressure?" in the 7th grade. In developing the achievement test, its validity and reliability were examined. In order to examine validity of the scale, content validity was carried out. The validity of the achievement test was confirmed in terms of its content validity. Content validity refers to the extent that the content of the items measure what is claimed to be measured (Anastasi, 1988); in this case content validity was ascertained by responses during the process of developing the instrument, from science education staff from the education faculty, and experienced science teachers from elementary school. To test the content validity of the achievement scale, the researcher selected 8 experts from the university and elementary school (six science education staff from faculty of education and two science teachers from the elementary school). The experts were asked to examine each item based on relevance, clarity, and simplicity. Then, all experts gathered in a meeting and compared their evaluations with each other. According to group evaluation, some items were discarded. The scale was reduced to 24 items in this process. Experts assessed the items of the test in accordance with the acquisitions and their cognitive areas and they were asked to rate the items as "suitable" or "unsuitable." Then, the Kappa value and agreement percentage was estimated. If agreement percentage is higher than .70, it means that there is an agreement. In addition, if the Kappa value is .0-.20, it means slight agreement: .20- .40 is fair agreement, .40-.60 is moderate agreement, .60-.80 is substantial agreement and higher than .80 means almost perfect agreement (Şencan, 2005). The analysis shows that the mean of Kappa value between experts is .49 and the significance values for all of them are .05. Besides this, the agreement percentage between experts is 0.81.

While developing the achievement test, the pilot experiment was carried out on the upper class students who had already learned the subjects of the unit "If It Weren't for The Pressure?" Initially the test was a 32-item test and it was given to 168 students in the 8th grade. After the pilot experiment, the KR-20 reliability coefficient was confirmed as 0.82.

After the item analysis, eight questions in the pilot experiment were removed as their distinguishing indexes were less than 0.30. The removed questions do not have any effect upon the test's validity of scope (Table, 2). The questions removed and their sections are as below: 4 questions from cognitive area's knowledge level, 2 questions from level of comprehension, 2 questions from the level of application. The test, which was developed after these changes, consisted of 10 knowledge, 8 comprehension and 6 practice questions. The removed questions do not have any effect upon the test's

validity of scope (Table, 1). Reliability is the consistency of a set of measurements or measuring instruments (Özgüven, 1998). The difficulty of the test varies from .322 to .628. The average difficulty of the test is .465. The highest score that can be obtained from the test is 24; the lowest is 0. Table 1 shows the difficulty levels of the test items, their correlations and discriminations. The final form of the test is a 24-item multiple questions test. The objective of using the Achievement Test is to examine the students' knowledge on the unit "If It Weren't for The Pressure?" by means of a pre-test and post-test and then find out the cognitive level differences, which may be caused by the method implemented, between the groups.

Table 1

The results of the academic achievement test related to the Unit of "If it weren't for the Pressure?"

Item No	Item Difficulties	Total-Item Correlation	Item Discrimination
2	.618	.4116	.705
3	.576	.2784	.524
5	.381	.3102	.546
6	.452	.2691	.447
8	.457	.3485	.445
9	.412	.3798	.559
11	.431	.3339	.522
12	.423	.2815	.432
13	.597	.3474	.542
15	.364	.2538	.387
17	.416	.3705	.472
18	.628	.3066	.458
19	.571	.4276	.643
20	.342	.3390	.382
21	.367	.2754	.341
22	.602	.4268	.642
23	.518	.3864	.525
24	.352	.2744	.422
25	.484	.3921	.536
26	.388	.2325	.317
27	.322	.3124	.465
29	.346	.3367	.482
30	.420	.3662	.524
32	.357	.4098	.512

Table 2

The last table of specifications for "If it weren't for the Pressure?"

Topics	Acquisitions about the unit	knowledge	understanding	application	Total questions	percentage
I apply force and create pressure	1.1 It determines the vertical force applied by the object and its area.	2, 5		18	3	**37,6**
	1.2 It defines the pressure and its unit.	9	3	21	3	
	1.3 It explains the role of the pressure on the sand or soft snow.	15	8, 11		3	
Apply pressure on a fluid and it will convey everywhere	2.1 It measures fluid pressure and clarifies its instruments.	12	6		2	**33,3**
	2.2 Pressure is conveyed by fluid.	19, 32		22	3	
	2.3 It explains the Pascal law and exemplifies it.		13	25, 26	3	
Water cannot float every object.	3.1 Any object, wholly or partly immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object .		17, 20		2	**29,1**
	3.2 It explains Archimedes' principle.	23, 24	30		3	
	3.3 It defines the floating conditions of the object immersed in a fluid.	29		27	2	
Total questions		**10**	**8**	**6**	**24**	
percentage		**41,7**	**33,3**	**25**		**100**

Perception Scale of Inquiry Learning Skills: This scale point is about the importance of inquiry learning skills in Science Teaching. The Perception Scale of Inquiry Learning Skills was developed by Taşkoyan (2007). The data analysis was made in SPSS program and it was initially a 44-item scale. The factor analysis was performed for the construct validity and the scale was collected in three sub-factors by taking the Eigen values (self-values) into consideration. The factors forming the scale were identified as "negative perception items," "positive perception items," and "perception items of inquiring the correctness." The reliability of factors concerning the scale were .73, .67, and .71. The last form of the scale consists of 22 perception items. The alpha reliability concerning the whole scale was identified as .84, and the Spearman-Brown test halfway coefficient of inner-consistency as .82.

Semi-Structured Interview Form: An interview form, concerning the activities practiced in the experimental group, was prepared for students. A semi-structured interview technique was used in this study. The researcher also asked for the opinions and suggestions of the academicians (n=3), research assistants (n=1), and teachers of Science (n=1). In order to provide the form's validity of scope, the necessary changes were made according to the suggestions and corrections of the experts. The main purpose of using the interview technique was not actually to test a hypothesis but to try to understand experiences of other people and how they give meaning to their experiences (Türnüklü, 2000).

Treatment

The dependent variables of the research are the students' academic achievements and perception of inquiry learning skills. The independent variable is the discovery learning method. The effects of the discovery learning method while studying the unit "If It Weren't for The Pressure?" were analyzed by using quasi-experimental design. The subjects were taught by discovery learning method in the experimental group and by the traditional method in the control group. In this sense, discovery learning method is an Intervention Program. The method and its content are explained below:

Two of the seventh-year classes, which were taught by the same teacher in the same school, were chosen as experiment group and control group. The research continued for four weeks, and pre-tests were administered during the first week. A week after this four-week experimental practice, the achievement test and perception scale of inquiry learning skills were administered as the post-test to both control and experiment group and then student interviews were held and the test of retention was administered 30 days after the post-test. With the help of the teacher, students were divided into heterogenic groups of four, based on their success levels. Only one group in the control group consisted of five students. Discovery learning activities concerning the unit "If It Weren't for The Pressure" were performed as group-work and all groups were made to practice the same activities at the same time. Below are some examples of activities done in the experiment group for the unit "If It Weren't for The Pressure," which are prepared for the three lesson hours:

The materials prepared were as follows: Six Open-Ended experiments and worksheets for students to study with their friends during the experiments or activities. One signboard included the subjects "I Apply Force and I Create Pressure," "Apply Pressure On The Liquid and It Will Be Transmitted Every Direction," and "Not Everything Can Float In Water." The students in the experiment group were encouraged to develop their own questions to find out what they would like to learn in the activities. Small group discussions were held to reach more than one conclusion out of one single activity. The whole class summarized the discussions and criticized the concepts discovered in the activities. The students were motivated to discuss and asked questions such as "Why do drawing pins and nails have sharp ends?," "Why can't we walk easily at the beach or on snow when we are on stilettos?", "Why is it easier to swim when we are in fins?" and so forth, thus the students kept discussing together until they found the

correct answers. The students also made various experiments and activities to define pressure and understand pressure units and the effects of pressure on our daily lives better. After the concept of "force" was reminded, the correlation of force with pressure was explained. The teacher explained that the implications of pressure were similar to those of force. Some students were given balloons to inflate, thus students learned that pressure has the capability to change the forms of objects. The role of pressure in blowing up the huge volumes of rocks while building roads or bridges was given as an example. The students were made to interconnect the concept of pressure with their daily lives. Then students were given an uncompleted map with concepts related to pressure, force, and surface related to the subject "I apply force and create pressure" and were asked to complete the map. The worksheets of each group were collected and reviewed through class discussions and the reviewed worksheets were returned to students and they were given feedback.

In the plans prepared for the control group within the research, traditional teaching methods were used. The course book was closely followed in the control group in which the teaching was carried out in a teacher-oriented direct teaching method. In the control group, the teacher wrote the concepts on the board and made explanations about the topic; the students listened to the teacher and rarely asked questions as passive participants.

Analysis of Data

In order to analyze the data obtained from control and experiment groups in this study, both groups were compared using the t-test, ANCOVA, and one-way ANOVA and then the data were organized into tables. The comparisons were made on an alpha significant level of 0,05. To determine whether there is a significant difference between the post-test academic achievement scores and post-test perception scale of inquiry learning skills scores of both groups, Pearson's Multiplication of Moments Correlation Coefficient was performed. After the semi-structured interview, the experiment was completed and six students from the control group (two low-, two middle-, and two high-success level students) were chosen. In teaching the unit "If It Weren't for The Pressure?", activities and open-ended experiments that are parallel to the discovery learning method were carried out with those students to determine the difference between the discovery learning method and concept-mapping technique which is based upon the constructivist approach, and find out the benefits of using the discovery learning method to learn scientific subjects and the opinions of students about learning subjects through this method. Students consented to their interview's being recorded by sound recorder devices.

Findings and Results

In this part of the study, the answers given by the experimental and control groups to the questions on the Academic Achievement Test in Science and Perception Scale of Inquiry Learning Skills and the data obtained from the interviews with the students were presented as tables including research questions. The first research question was; "Is there a significant difference, in terms of academic success, between the experimental group

(using discovery learning method) and the control group (using traditional method)?" The findings concerning the first research question were given in Tables 3 and 4. The average scores of the pre-achievement tests which were given to both groups in the beginning and the t-test analysis results are shown in Table 3.

Table 3

Comparison of Control and Experimental Groups' Pre-Test Achievement Scores

Group	*N*	*X*	*SD*	*t- value*	*P*	*Sig*
Experiment	28	7.07	2.58	0.149	0.874	p>.05
Control	29	7.09	2.54			

When the pre-test achievement average scores were analyzed, the experimental group's average score was 7.07; the control group's was 7.09. The analysis and average scores point out that statistically there is no significant difference between the groups. The average score comparisons of the post-test achievement tests which were given to both groups are shown in Table 4.

Table 4

Comparison of Control and Experimental Groups' Final-Achievement Test Scores

Group	*N*	*X*	*SD*	*t-value*	*P*	*Sig*
Experiment	28	14.84	3.18	9.476	0.000	p>.05
Control	29	9.95	2.37			

As shown in Table 4, the average score of the experimental group was 14.84 and control group was 9.95. In order to test whether the mathematical difference between the averages scores of both groups was also statistically significant, a t-test was performed and a significant difference was observed. According to this value, there is a significant difference between the control and experimental groups and the activities, which are prepared consistently with the discovery learning method, and have positive effects upon the success of students.

The second research question was; "Is there a significant score difference between the experimental group and control group from the point of perception scale of inquiry learning skills of students?" The findings concerning this research question are shown in Tables 5, 6, and 7. The results of the comparison of the scores of Perception Scale of Inquiry Learning Skills and the t-test are shown in Table 5.

Table 5

Comparison of Control and Experimental Groups' Scores of Pre-Test Perception Scale of Inquiry Learning Skills

Group	*N*	*X*	*SD*	*t-value*	*P*	*Sig*
Experiment	28	67.47	6.18	0.048	0.956	p>.05
Control	29	66.28	9.86			

As shown in Table 5, the pre-test Perception Scale of Inquiry Learning Skills average of the experimental group was 67.47 and control group's was 66.28. The table shows that there is no statistically significant difference between the experimental and control groups' scores in pre-test Perception Scale of Inquiry Learning Skills. After the application, the scores of Perception Scale of Inquiry Learning Skills were given again and the results from the comparison of those scores with the t-test are shown in Table 6.

Table 6

Comparison of Control and Experimental Groups' Scores of Post-test Perception Scale of Inquiry Learning Skills

Group	*N*	*X*	*SD*	*t-value*	*P*	*Sig*
Experiment	28	71.17	7.12	4.687	0.000	p>.05
Control	29	67.03	8.94			

As pointed out in Table 6, the average scores of Perception Scale of Inquiry Learning Skills of experimental group students was 71.17 after the application; the control group students' was 67.03. There is a significant positive difference for the experimental group in the scores of Perception Scale of Inquiry Learning Skills. The experimental group students displayed a more significant progress than the control

group students in the Perception Scale of Inquiry Learning Skills. In his research, Suters (2004) concludes that the discovery learning method has positive effects upon students' learning because it activates them, drives them to inquire, and affects them positively toward learning scientific concepts.

The pre-test and post-test average scores of Perception Scale of Inquiry Learning Skills of experiment group students and control group students were compared and the results are shown in Table 7.

Table 7

Comparison of Experimental Group and Control Group's Pre-Test and Post-test Scores of Perception Scale of Inquiry Learning Skills

Group	*Test*	*N*	*X*	*SD*	*t-value*	*P*	*Sig*
Experiment	Pre-Test	28	67.47	6.18	-4.335	0.000	p<.05
	Post-Test	28	71.17	7.12			
Control	Pre-Test	29	66.28	9.86	0.788	0.447	p>.05
	Post-Test	29	67.03	8.94			

It can be seen that there is a statistically significant difference between the post-test and pre-test scores of perception scale of inquiry learning skills in the experimental group. The average scores of Perception Scale of Inquiry Learning Skills have increased after the application in the experimental group. Although a similar increase has been observed in the control group also, this increase has not been found statistically significant enough. The third research question was; "Is there a significant difference between the scores of the experimental and control group students in the perception scale of post-test inquiry learning skills and their academic achievement?". The relation between the final-achievement test scores and final perception scale of inquiry learning skills scores in experimental and control groups are shown in Table 8.

Table 8

The Relation between the Post-Achievement Test Scores and Post Perception Scale of Inquiry Learning Skills Scores in Experimental and Control Groups

Groups		*R*	*P*
Experiment	Post Achievement Test Scores	0.394	0.017
	Post Perception Scale of Inquiry Learning Skills Scores		
Control	Post Achievement Test Scores	0.201	
	Post Perception Scale of Inquiry Learning Skills Scores		0.225

Table 8 points out that in the experimental group, there is a moderate, meaningful, and positive difference between the post-achievement test scores and post-test perception scale of inquiry learning skills scores ($r = 0.394$; $p<.05$). According to this table, it can be stated that the students who had high scores in the final-achievement test had positive scores in Perception of Inquiry Learning Skills as well. According to Table 8, there is a low level positive relation between the post-test scores and post-test perception scale of inquiry learning scores of the control group students ($r=0.202$; $p>.05$). This can be explained by the fact that although the control group students have increased their post-test achievement scores, their Perception Scale of Inquiry Learning Skills scores have not changed at all.

The fourth research question was; "Is there a significant difference between the total retention scores of the experiment and control group?". Table 9 gives the results of the total retention scores in the experimental group, to whom the discovery learning method, and the control group, to whom the traditional method, was applied.

Table 9

Comparison of Experimental and Control Groups' Total Retention Scores and T-Test Scorers

Group	*N*	*Post Test x*	*Retention x*	*S*	*t-value*	*p*	*Sig*
Experiment	28	15.84	15.03	3.01	9.126	0.000	p<.05
Control	29	8.95	7.87	1.98			

As shown above, the experimental group's average score of retention was 15.03, whereas the control group's was 7.87. A significant difference was found according to the results of the t-test to determine if there was a statistically significant difference in the average scores of both groups. It can be said that the difference is more significant in the experimental group than the traditional group in enabling permanent success, and also the discovery learning method has affected students' learning positively.

The fifth research question was; "What are the opinions of experimental group students (to whom Discovery Learning based Science Teaching applied) on preparing concept maps and activities given to them?". In order to seek answers to this research question, 6 students were given a semi-structured interview. Students' answers, the frequencies, and percentages are given below:

1. The students' answers as to the question "Did you like the activities based on discovery learning method?" are given below: The students in the experimental group were asked if they liked the activities based on the discovery learning method while learning the unit "If It Weren't for The Pressure?" All the students interviewed liked the activities based on the discovery learning method very much. Of the students, 70% expressed that doing the activities related to the subject was fun (%40

of them said that they liked the activities and 30 % of them said that the activities were enjoyable, nice, and easy). The students also expressed that while they were doing the activities based on the discovery learning method, they learned many things as a result of doing research, found what they were looking for right away, organized the activities easily and used plenty of materials as they liked. 30% of the students said that activities based on discovery learning method were useful.

2. The students' answers as to the question "Would you like to learn the Science lessons based on discovery learning method from now on?" are given below: The students in the experimental group were asked if they would like to learn the Science lessons based on discovery learning method from then on. All the students in the experimental group expressed that they would. 60% of the students expressed that they found this method educational and 40% expressed that they found this method fun as the reason why they preferred the discovery learning method.

3. The students' answer codes, frequencies, and percentages for the question "How did you benefit from learning the subjects by the discovery learning method in Science lessons?" are given below: The students in the experimental group were asked how they benefited from learning the subjects by the discovery learning method in Science lessons. All the students interviewed in the experiment group expressed that the discovery learning method was beneficial in Science lessons. 57% of the students expressed that they learned the subject better and remembered more easily, 14,3% of the students expressed that they learned the subject by summarizing it. 14,3% of the students expressed that they could research and find out the images and information regarding the subject by means of the concept maps. 14,3% of the students also expressed that preparing concept maps was a thought provoking activity. Various answers and comments of experimental group students as to the question "How did you benefit from learning the subjects by the discovery learning method in Science lessons?" are given below:

Buse: "I like studying discover things. We summarize and learn, thus it is easier to learn and remember."

Fırat: "… we noted down what we found out in our studies and did research and we still remember some of the subjects. We have learned very well."

Hande: "My research skills have improved…"

Deniz: **"**We found the information and images from the internet and pasted them onto our homework."

Emin: "… I have understood better... I have learned pressure, force, and surface also from the computer…"

Aras: **"**Your knowledge grows as you prepare concept maps and it drives us to think more."

In the interviews, all of the students expressed that they found the discovery learning method beneficial for learning and liked the activities which are based on it; they added that they would love science lessons to be studied with this method.

Discussion

The experimental group to whom Science Teaching which is based upon the discovery learning method was applied had higher total average scores than the control group to whom traditional teaching methods were applied in studying the unit "If It Weren't for the Pressure?". These total average scores are comprised of post-test achievement test and retention scores. This difference between the average scores, which is significant on the level of 0,05, shows that the experimental group students are more successful than the control group. After the teaching process was completed, both groups made some kind of a progress in their success levels according to the results of the achievement test; however, the experimental group proved to be more successful.

When students are taught about pressure by traditional methods in Science lessons, they have difficulty comprehending the concepts regarding the subject and correlating them to their previous learning. This conclusion is supported by the fact that experimental group students gave more correct answers than the control group students on the academic achievement test. This result obtained from this study is also confirmed by other research studies in which the discovery learning method is compared with traditional teaching methods from the point of academic achievement (Hammer, 1997; Gijlers & Jong, 2005; Ünal & Ergin, 2006; Kipnis, 2007).

While there is no significant difference in the scores of Perception of Inquiry Learning Skills of experimental and control group students according to the pre-test results, there is a significant positive difference for the experimental group in the scores of final Inquiry Learning Skills. This significant difference here points out that the discovery learning method, which is based upon the constructivist approach, has a positive effect on the Perception of Inquiry Learning Skills. It has been found out that students who are taught Science lessons in a group-work along with activities and experiments have more positive Perception of Inquiry Learning Skills than those of the students who are taught Science lessons with traditional methods. This result supports the result obtained from Tatar and Kuru's research (2006), on the unit "Let's Get To Know and Protect Our Blue Planet, The Common Home For All Living Beings" with seventh-year students. Tatar and Kuru's research shows that Inquiry Based Learning improves student success much more than traditional methods. Keys and Bryan (2001) correlated the inquiry with the discovery and development of the scientific process skills and stated that the discovery method based on inquiry was effective for learners in correlating the various concepts.

When the correlation between the post-achievement test scores and the post-test Perception of Inquiry Learning Skills scores within the experiment and control groups is examined, it is concluded that a positive and significant correlation exists between the academic achievement of the experimental group and their Perception of Inquiry Learning Skills scores. Thus, it can be stated that the experimental group students, who scored well in the post-test achievement test, have high Perception of Inquiry Learning Skills scores as well. A positive correlation of a low level is observed between the post-test achievement test scores and the post-test Perception of Inquiry Learning Skills scores of the control group. Six students were interviewed

on the discovery learning method based Science teaching and activities done in the lessons. The results obtained from their opinions can be stated as follows:

1. When the students' answers as to the question "Did you like the activities based on discovery learning method?" were analyzed, it was found that all students liked doing the activities based upon discovery learning method very much. It can be said that students found the discovery learning method more enjoyable and beneficial because it allowed them to organize the activities and use different materials and techniques.

2. When the students' answers as to the question "Would you like to learn the Science lessons based on discovery learning method from now on?" were analyzed, it was found that all of the students said that they would. Most of the students added that they found the discovery learning method educational, and some of them said it was enjoyable.

3. When the students' answers as to the question "How did you benefit from learning the subjects by discovery learning method in Science lessons?" were analyzed, it was found that all of the students agreed the discovery learning method in Science lessons was beneficial. While most of the students expressed that they learned the subjects better and remembered more easily, a small number of students expressed that they learned the subjects by summarizing conducting research, and found images and information regarding the subjects with the help of concept maps.

Data from the interviews with students in the experimental group revealed that learners found discovery learning educational, entertaining, and useful. Positive feedback from the interviews seems to have resulted in a meaningful difference in the posttest scores of the students in the experiment and the control group, and that the discovery learning method had positive effects on student success. Furthermore, comparison of the perception of inquiry learning skills posttest scores of the students in the experimental and the control group revealed a significant difference between them. When the qualitative and quantitative data collected in the study were compared, the results indicated that the methods used had a positive effect on student success and the perception of inquiry learning skills.

It can also be stated that when compared with traditional teaching methods, using the activities that are based on teaching and inquiring through the discovery learning method in teaching the unit "If It Weren't For The Pressure?" to seventh-year elementary students enhances the students' success and perception of inquiry learning skills. In their study, Ünal and Engin (2006) have also reached the conclusion that activities structured through the discovery learning method along with the constructivist learning approach are more effective on the success of students in Science in the subject "Pressure of The Liquids and Gases". In science courses, it is considered that the activities, which are based on inquiry within the discovery learning method, can be used with the purpose of drawing the attention of the students and activating them to participate more in the classes, and it is also useful to organize In-Service Trainings and courses for the teachers to have them comprehend the importance of the activities based on this approach.

The discovery learning method necessitates the students' commenting on the concepts, information, and incidents by discussing and asking questions and reaching the information themselves, in other words, discovering and finding the solution through practice. That is why the students should participate in the class activities in groups and use the science labs more actively. Using the discovery learning method, which is one of the various teaching methods in which the students are active and the teacher guides them, is believed to increase the students' success and inquiry learning skills more than traditional teaching methods do.

References

Anastasi, A. (1988). *Psychological testing*. New York: Macmillan.

Bruner, J. S. (1961). The act of discovery. Harvard Educational Review, 31, 21–32.

Bruner, J. S. (1966). Some elements of discovery. In Shulman L. S., Keislar, E. R. (Ed.),

Learning by discovery: A critical appraisal. Chicago: Rand McNally, pp. 104-111.

Bruner, J. S. (1968). *Toward a theory of instruction.* New York: W.W. Norton and Company.

De Jong, T., & Van Joolingen, W. R. (1998). Discovery learning with computer simulations of conceptual domains. Review of Educational Research, 68, 179–201.

Gijlers, H., de Jong, T. (2005). The relation between prior knowledge and students' collaborative discovery learning processes. *Journal of Research in Science Teaching, 42*, 264-282.

Hammer, D. (1997). Discovery learning and discovery teaching. *Cognition and Instruction*, 15(4), 485-529.

Kaptan, F., & Korkmaz, H. (2000). Yapisalcilik (constructivism) kurami ve fen ögretimi, *Çagdas Egitim Dergisi, 265,* 22-27.

Kara, Y. & Ozgün-Koca, S. A. (2004). The application of discovery learning and meaningful learning approaches in mathematics classes: Two lesson plans on "the square of addition of two terms". *Ilkogretim Online, 3*(1), 2-10

Keys, C. W. & Bryan, L. A. (2001). Co-constructing inquiry-based science with teachers: Essential research for lasting reform. *Journal of Research in Science Teaching,* 38, 631-645

Kipnis, N. (2005). 'Chance in science: The discovery of electromagnetism by H.C. Oesrsted', *Science & Education,* 14, 1-28.

Kipnis, N. (2007). Discovery in science and in science education, *Science & Education,* 16, 883-920.

Lee, O., Hart, J. E., Cuevas, P. & Enders, C. (2004). Professional development in inquiry-based science for elementary teachers of diverse student groups, *Journal of Research in Science Teaching,* 41(10), 1021-1043.

Matson, J. O. (2006). Misconceptions about the nature of science, inquiry-based instruction, and constructivism: Creating confusion in the science classroom, *Electronic Journal of Literacy through Science,* 5(6), 1-10.

Matthews, M. R. (2002). Constructivism and science education: A further appraisal, *Journal of Science and Technology,* 11(2), 121-134.

National Research Council ([NRC], 2004). *National science education standards*, Washington, DC: National Academy Press.

Njoo, M. K. H. (1994). *Exploratory learning with a computer simulation: Learning processes and instructional support.* Eindhoven: Technische Universiteit Eindhoven.

Özgüven, İ. E. (1998). *Psikolojik Testler.* Ankara: Pdrem Yayınları.

Suters, A. L. (2004). *An exploratory study of the impact of an inquiry-based professional development course on the beliefs and instructional practices of urban in-service teachers.* The Annual Meeting of the National Association for Research in Science Teaching. The University of Tennessee, Knoxville

Şencan, H. (2005). *Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik*. Ankara: Seçkin Yayıncılık.

Taşkoyan, N. S. (2007). Fen ve teknoloji ogretiminde sorgulayici ogrenme stratejilerinin ogrencilerin sorgulayici oğrenme becerileri, akademik başarilari ve tutumlari uzerindeki etkisi **(**Unpublished Mastering Thesis). Dokuz Eylul University, Institute of Educational Sciences, Izmir.

Tatar, N. & Kuru, M. (2006). The effect of inquiry-based learning approach in science education on academic achievement, *Hacettepe University Journal of Education,* 31, 147-158

Turnuklu, A. (2000). Egitimbilim araştirmalarinda etkin olarak kullanilabilecek nitel bir araştirma tekniği: Gorusme. *Kuram ve Uygulamada Egitim Yonetimi,* 6 (24), 543-559.

Tuzun, H. (2006). Egitsel bilgisayar oyunlari ve bir ornek: Quest Atlantis**.** *Hacettepe University Journal of Education,* 30, 220-229.

Unal, G. & Ergin, Ö. (2006). Bulus yoluyla fen ögretiminin ögrencilerin akademik başarilarina, ögrenme yaklaşimlarina ve tutumlarina etkisi, *Journal of Turkish Science Education,* 3(1), 36-52.

Buluş Yoluyla Öğrenmenin Öğrencilerin Başarıları ve Sorgulayıcı Öğrenme Becerileri Üzerindeki Etkisi

(Özet)

Problem Durumu: Bilim ve teknoloji alanında nitelikli bireyler yetiştirmeyi sağlamadaki en önemli araçlardan biri, doğru kullanılan farklı öğretim yöntem ve teknikleridir. Öğrencilerin keşfeden, eleştirel düşünen, sorgulayan ve problem çözme becerileri gelişmiş bireyler olarak yetişmeleri, Fen ve teknoloji öğretiminin temel ilkeleri arasında yer almaktadır. Bu nedenle Türkiye'de de Fen Öğretim Programı da karşılaştığı problemleri sorgulayan ve çözebilen, Fen okuryazarı bireyler yetiştirmeyi amaçlayan programlar olarak geliştirilmelidir. Günümüzde de bireylerin kendi bilgilerini kendilerinin oluşturarak daha iyi öğrendikleri yapılandırmacı öğrenme yaklaşımına uygun yöntemlerin kullanılması gerektiği düşünülmektedir. Bu yöntemlerden biri de buluş yoluyla öğrenmedir.

Çalışmada, ilköğretim 7. sınıflardaki öğrencilerin Fen derslerinde "Ya Basınç Olmasaydı?" ünitesine ait konuların Buluş yoluyla öğrenme yöntemine dayalı fen öğretiminde günlük plan ve etkinliklerle, geleneksel öğretime göre öğrencilerin akademik başarılarına, sorgulayıcı öğrenme becerileri algılarına ve kalıcılığa etkisi belirlenmeye çalışılmıştır.

Araştırmanın Amacı: Buluş yoluyla öğrenme yöntemine dayalı etkileşimli bir öğrenme ortamı sağlayarak; Türkiye'deki Fen öğretim programına uygun ve yapılandırmacı yaklaşımı temel alan sorgulayıcı öğrenme becerilerini geliştirmeye yönelik olarak hazırlanmış, öğrencilerin pasif durumdan aktif duruma geçmelerini sağlayacak etkinliklerin öğrencilerin öğrenme düzeylerine etkisini araştırarak, geleneksel öğretim yöntemiyle ders sunulan grubun öğrenme düzeyiyle karşılaştırmaktır.

Araştırmanın Yöntemi: Araştırmada ön test-son test kontrol gruplu yarı deneysel desen kullanılmıştır. Bu araştırmanın problemi, "Buluş Yoluyla Öğrenme Yöntemine Dayalı Fen öğretiminin, öğrencilerin akademik başarıları, sorgulayıcı öğrenme becerileri algıları ve bilgilerin kalıcılığı üzerinde etkisi var mıdır?" şeklinde ifade edilebilir. Araştırma grubunu, Türkiye'nin büyük bir şehri olan İzmir ilindeki orta düzeyde bir gelir dağılımı olan resmi bir ilköğretim okulu'nda 7. sınıflarında okuyan 28'i deney, 29'u kontrol grubu olmak üzere toplam 57 (30 Erkek-27 Kız) öğrenciyle çalışılarak gerçekleştirilmiştir. Öğretim 2006-2007 öğretim yılının ikinci döneminde, dört haftalık bir sürede haftada üç ders saati olmak üzere toplam 12 ders saati olarak gerçekleştirilmiştir. Öğrencilere öğretimden önce ve sonra sorgulayıcı öğrenme becerileri algı ölçeği ile "Ya Basınç Olmasaydı" ünitesine ait Akademik başarı testi uygulanmıştır. Her

iki grupta da buluş yoluyla öğrenme yöntemi konusunda deneyimli aynı fen öğretmeni ile öğretim yapılmıştır.

Araştırmanın Bulguları: Deney ve kontrol gruplarındaki öğrencilerin uygulama öncesindeki akademik başarı düzeyleri ve sorgulayıcı öğrenme becerileri algıları, uygulamadan sonra artmıştır. Fakat, ön test akademik başarıları ve sorgulayıcı öğrenme becerileri algılarında anlamlı bir farklılık olmayan iki gruptan deney grubunun, kontrol grubuna göre son testte daha başarılı olduğu ve sorgulayıcı öğrenme becerileri algılarında bir artış gözlendiği belirlenmiştir. Deney grubu öğrencilerinin son test başarı puanları ile son test sorgulayıcı öğrenme becerileri algısı ölçeği puanları arasında orta düzeyde, pozitif ve anlamlı bir ilişki olduğu görülmektedir ($r=0,394$; $p<0,05$). Buna göre, son başarı testinden yüksek puan alan öğrencilerin sorgulayıcı öğrenme becerileri algılarının da olumlu olduğu söylenebilir. Kontrol grubu öğrencilerinin son test başarı puanları ile son test sorgulayıcı öğrenme becerileri algısı ölçeği puanları arasında düşük düzeyde, pozitif bir ilişki vardır ($r=0,201$; $p>0,05$). Bu durum, kontrol grubundaki öğrencilerin son test başarı puanları artmış olsa bile, sorgulayıcı öğrenme becerileri algısı ölçeği puanlarının fazla değişmemesi şeklinde açıklanabilir. Deney ve kontrol grubundaki başarıların kalıcılığını sağlamada, deney grubunda geleneksel gruba göre farkın anlamlı olduğu ve buluş yoluyla öğrenme yöntemiyle yapılan uygulamaların öğrenciler üzerinde olumlu değişiklikler yarattığı söylenebilir. Öğrencilerin tümü yapılan görüşmelerde buluş yoluyla öğrenme yöntemine dayalı uygulamaları sevdiklerini, bundan sonra yapılacak olan fen derslerinin bu yönteme dayalı olarak yapılmasını istediklerini ve derslerde bu yöntemin öğrenmeye faydası olduğunu ifade etmişlerdir.

Araştırmanın Sonuçları ve Önerileri: Deney ve kontrol gruplarının her ikisinde de başarı testi sonuçlarına göre öğretim sonrasında başarı düzeylerinde bir yükselme saptanmıştır. Fakat başarı düzeyindeki bu artış, deney grubunda daha fazladır. Deney ve kontrol gruplarındaki öğrencilerin ön test sonuçlarına göre Sorgulayıcı Öğrenme Becerileri Algısı puanlarında anlamlı herhangi bir farklılık görülmezken, son Sorgulayıcı Öğrenme Becerileri Algısı puanları arasında deney grubu lehine anlamlı bir farklılık vardır. Deney ve kontrol gruplarının son Sorgulayıcı Öğrenme Becerileri Algısı puanları arasında anlamlı bir farkın olması, yapılandırmacı yaklaşıma dayalı buluş yoluyla öğrenme yönteminin Sorgulayıcı Öğrenme Becerileri Algılarını olumlu yönde etkilediğini göstermektedir. Fen derslerini, grup çalışmaları şeklinde etkinlikler ve deneyler yaparak işleyen öğrencilerin Sorgulayıcı Öğrenme Becerileri Algılarının, geleneksel öğretimle ders yapılan öğrencilere göre daha olumlu olduğu belirlenmiştir. Buluş yoluyla öğrenme yöntemine göre öğrenciler kendi bilgilerini kendileri keşfettiklerinden, bilgiyi geleneksel öğretim yöntemleri ile doğrudan aktarmak yerine, öğrencilerin aktif oldukları, grup halinde çalıştıkları, kavram ve bilgileri sorgulayarak

kendilerinin keşfetmelerini sağlayan; yaparak, yaşayarak ve düşünerek öğrenmelerini gerçekleştirebilecekleri öğrenme ortamları oluşturulmalıdır. Buluş yoluyla öğrenmeye dayalı uygulamaların daha verimli olması için öğrencilerin gruplar halinde sınıf içi etkinliklere katılmalarını ve fen laboratuarını aktif olarak kullanmalarını gerektirmektedir. Fen derslerinde, pahalı ve bulunması zor olan araç-gereçler yerine basit ve ucuz araç-gereçler kullanılarak çeşitli etkinlikler yapılabilir. Derslerde geleneksel öğretim yöntemleri yerine öğrencilerin aktif oldukları, öğretmenin ise onlara rehberlik ettiği çeşitli öğretim yöntemlerinden biri olan buluş yoluyla öğrenmenin kullanılmasının öğrenci başarısını, sorgulayıcı öğrenme becerilerini arttıracağı ve öğrenmede kalıcılığa etkisi olacağı düşünülmektedir.

Anahtar Sözcükler: Buluş yoluyla öğrenme yöntemi, sorgulayıcı öğrenme becerileri algısı, fen öğretimi, öğretim programı

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Micropolitics of the Staff Meeting in a Taiwanese Primary School

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Abstract

Problem Statement: Micropolitics can be used as a useful lens to investigate how shareholders within the school exercise their formal and informal power to achieve their goals and protect their interests. Although quite a few studies have concentrated on teacher culture and school management, less attention has been paid to staff relationships through the lens of micropolitics. This study focuses on the staff meeting, which as part of a weekly routine within the school, can become a political arena. The study explores, through the lens of micropolitics, how teachers and administrators (including the principal) interact with one another at the researched site.

Purpose of the Study: The research aims to investigate how teachers and administrators use formal and informal power, particularly at the staff meetings at the researched site, from the micropolitical perspective, taking into account power struggles, professional dilemmas and political tensions that impact school innovations and teacher culture and practices.

Methods: This study employs the ethnographic case-study approach, through participant observation and in-depth interviews, conducted over a 5-month period in a Taiwanese primary school. The data was triangulated and analyzed thematically.

Findings and Results: Research findings indicate that the staff meetings at the school reinforced collegial intimacy and enhanced staff morale. However, despite some positive outcomes, such as building a sense of community, the staff meeting is under the political control of administrators (particularly the principal) who often transmit information through pseudo-participation to legitimate and maintain the nature of hierarchy. In addition, micropolitical tensions between teaching and senior staff due to their divergent interests could be found at the staff meeting.

Conclusions and Recommendations: On the whole, the relationships among school members at the investigated site seemed to be positive, with a positive outlook for the future; however, hidden conflicts might still emerge. This study suggests that the micropolitical lens should be applied

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to both negative forms (i.e. conflict) of interpersonal relationships as well as in cooperative ones (i.e. collaboration, collegial) within school settings.
Keywords: Micropolitics, collegial intimacy, intergroup conflict, pseudo-participation

You make adjustments, learn to protect yourself; you're cautious about what you say and to whom… You become more calculating… plan your moves and learn to anticipate consequences…

(A teacher's perspective, quoted in Blase & Anderson, 1995, p. 66)

Quite a few studies have concentrated on teacher culture and school management, but less attention has been paid to staff relationships through the lens of micropolitics (Achinstein, 2002). In this article, I argue that academic investigation into staff relationships would benefit from increased use of the micropolitical perspective. I posit that research on the micropolitical aspects of staff relationships would provide a new approach to developing deeper understandings of interpersonal and intergroup interactions in schools, with both theoretical and practical significance for school management and improvement.

In order to survive in a school, teachers must learn how to deal with complex interpersonal interactions and relationships. Schools are problematic and tension-ridden formations in which structural variations are best explained through meanings, negotiations and strategies of individual agents. The school can be conceived of not only as a stable structure but also as a product of the collective and implicit accommodations among teachers, students and administrators (Tyler, 1988). In this sense, schools are complex, unpredictable social organisations within which micropolitical behavior can be explicitly or implicitly observed (Blase, 1991a).

The staff meeting, regarded as a sort of school routine, is regularly held in primary schools in Taiwan. The staff meeting provides a regular site where the researcher could easily investigate how members of staff interact, how they communicate and how they shape a specific teacher culture. Specifically, this article analyzes the micropolitics between teaching and administrative staff at the staff meeting, wherein I explore how the two sides interact. In order to achieve the purpose of the research, this study is based on an ethnographic case-study approach to investigate the complexity of the staff meeting. Participant observation and individual interviews are both employed in this research project.

This study extends the discourses of the complex conceptions of the teaching professional community in terms of the micropolitical perspective, taking into account power struggles, professional dilemmas and political tensions that impact school innovations and teacher culture and practices (Hargreaves, 1994). It attempts to explore how teachers define the notion of community and how they deal with hierarchical power. In the meantime, subjects actively engaged in conflicts between teaching and administrative groups. These conflicts rendered a picture of teachers

engaged in power struggles in order to protect their interest and needs, whereas administrators were more concerned with maintaining their authority. In particular, the principal was aware of hidden conflict between two camps and took further action to mediate the parties involved in order to maintain collective harmony.

Literature Review

There has been an increasing interest in educational administration in recent years (Blase & Anderson, 1995; Blase, 1987, 1991a). Correspondent with this interest, micropolitics can be constructive and likely to promote school innovation (A. Hargreaves, 1991). In general, "micropolitics embraces those strategies by which individuals and groups in organisational contexts seek to use their resources of power and influence to further their interests" (Hoyle, 1988, p. 256). Burns (1961) argues that micropolitics refers to "the exploitation of resources, both physical and human, for the achievement of more control over others, and thus of safer, more comfortable or more satisfying terms of individual existence" (p.278). Similarly, Pfeffer (1981) suggests that organisational micropolitics "involves those activities taken within organisations to acquire, develop and use power and other resources to obtain one's preferred outcomes in a situation in which there is uncertainty and dissension" (p. 7). Based on the scholarly definitions given above, I regard micropolitics as an analytic framework which examines the dynamic and complex interpersonal context of a school in order to understand the school operations (Chen, 2004).

In the context of school operations, micropolitics is involved in sensitivities associated with day-to-day interactions with the principal, senior staff, teachers and pupils. These sensitivities, according to Blase (1991b), "contribute to the development of a calculative orientation in teachers consisting of self-monitoring and timely adjustments of behavior to deal effectively with others" (pp. 185-186). Specifically, micropolitics employed by teachers aims to develop strategic agency based on the exercise of power to achieve the purposes of both influence and protection (Blase, 1987).

Recently, more and more educational studies have used the lens of micropolitics, whereby investigations have offered new findings, understandings and implications of various aspects of education. For example, some studies concentrate on how teachers survive in school settings (Achinstein, 2006; Curry, et al., 2008; Kelchtermans, 2005; Kelchtermans & Ballet, 2002; Young & Brooks, 2004), or on how the professional community develops within the school (Scribner, Hager, & Warne, 2002), or on teacher supervision and evaluation (Cooper, Ehrensal, & Bromme, 2005), or on senior management teams in schools (Ehrich & Cranston, 2004), or on leadership styles (Blase, 1989, 1990) or on teacher-parent relationships (Mayrowetz & Price, 2005). However, educational researchers have not turned the lens of micropolitics on the issue of staff meetings.

Based on symbolic interactionism, my project tries to explore the formation of school routines, as well as the understanding of school participants' interaction, in

terms of school micropolitics. As Atkinson (1983) argues, symbolic interactionists aim to study "how members of occupations operate pragmatically and survive amid conflicting pressure in the everyday performance of their work" (p. 227). In the following section, I will analyze the staff meeting as a collective occasion to investigate school micropolitics.

The staff meeting is a collective gathering that allows the researcher to explore the interpersonal interactions among teachers. At the staff meetings at the investigation site, all staff members greeted each other first, as a matter of ritual. Then administrators (staff in the Academic Studies Office, Discipline Office, General Affairs Office and Guidance Office) would give a report on administrative affairs and convey the requirements from the local educational authority (LEA). The principal often emphasized that the whole staff worked together as a team or a family. Sometimes, one or two teaching staff members would propose questions, but in fact the teaching staff keeps silent most of the time, or, at the most, chat privately in the meeting. The larger the teaching staff, the less communication occurs between members (cf. King, 1983).

The staff meeting was a regular event in the research site school. The main purpose of staff meetings, according to McLaren (1993), is to provide an occasion to "discuss problems of morale, to provide information on forthcoming workshops and events, and to serve as a collective forum to signify unity" (p. 121). However, Gronn (1988) maintains that "it is a time when teachers relax, expecting to listen to the headteacher addressing them, and is not normally seen as an opportunity for discussion or debate" (p. 301).

Staff meetings are characterized by a high level of participation in decision-making, which allows teachers to feel a sense of community (Acker, 1999). In Acker's case study, she describes how the staff in her subject school share and discuss in the staffroom or in staff meetings, and every member feels that he/she is fully participating in decision-making. Thus, collaboration and participation are highly valued.

However, Rudduck's study (1991) uncovers that teachers' attitudes toward staff meetings seem to be indifferent. As one teacher points out:

Eventually, things come down to a staff meeting. The head does his best. He suggests what he wants to happen and then there's a strained silence because no-one else has been involved. … It's disastrous (Rudduck, 1991, p. 127).

In this case, the staffroom meeting is dominated by the principal so that teachers feel excluded from involvement. This could correspond to what Ball (1987) calls "pseudo-participation". In Ball's study (1987), some teachers recognize their rights of participation are merely, in Lukes' term (1977), a political "ritual", which lends support to what is in reality the existence of authoritative leadership, by bestowing "spurious" legitimacy on it. This seems to correspond to what Ball coins "pseudo-

participation" in school decision-making. Ball cites one teacher's statement as follows:

I think there was a lot of feeling last year in terms of the new head's appointment and the fact there was no involvement. A lot of staff felt they ought to have a lot more say in the kind of head they had; and there sort of wasn't any formal way for them to have any—formally they had no say whatsoever. But the head did maintain that she listened to what the staff wanted (Ball, 1987, p. 126).

In my research study, I explore the interpersonal interactions in terms of school micropolitics in a Taiwanese context. Due to its overt characteristics, the occasion of the staff meeting enables me to delve into the complexities of the relationships among school members, noting how senior staff and teaching staff members in particular interact with each other in the staff meeting.

To sum up, I will explore school micropolitics by investigating the relationships between teachers and other school members in order to understand how teachers deal with power relations, the interest issue and conflict situations. This perspective allows me to acknowledge the complexity of school operations and to try to unfold the multiplicity of social relations inside the school. In recognizing the complex multiple micropolitical relations and interactions, I position teachers not as victims of structural constraints, but rather as "change agents" (Fullan, 1993; Havelock, 1973; Lewin, 1947) or "active agents" (Frost, 1997; Frost et al., 2000) who have the capacities to "make a difference," and, through reflective thinking, to change the structures which may have constrained and determined individual actions.

Methods

This research is based on a case-study ethnographic approach, via participant observation, interviews and the collection of written documents, in order to portray the "realistic" picture of school micropolitics in terms of the staff meeting. More specifically, the foci of the issue of school micropolitics will be on the relationships between senior and teaching staff to delve into the daily, explicit and implicit practices of school life. The case school, teachers and senior staff, and events studied were chosen intentionally (Bogdan & Biklen, 1998). This project employed the case-study approach to investigate a Taiwanese primary school, Hillview, as my fieldwork site. The school was chosen because it afforded an opportunity to explore the micropolitics of staff relationships in a context that is highly politicized and in an urban setting. This school is located in central Taiwan, and composed of 30 classes, about 1000 pupils and 50 staff. It has been established for more than eighty years. The principal had been the leader of this school for around four years. At the time of the study, this school was under intense pressure from parental demands and LEA's requirements to restructure school culture and enhance school effectiveness. As a result, the school had undertaken several curricular and reform initiatives.

Regarding data collection, both participant observation and interviews were employed for this study. In order to enter the fieldwork site, I got permission from the principal before on-site investigation started. The duration for data gathering was 5 months, based on intensive participant observation and interviews. My first task to build good rapport with the research subjects from the moment I entered the site. After getting permission from the principal, I was introduced to the whole staff, to whom I explained the purpose of my initial research purpose in order to obtain their cooperation. Regarding research subjects, participants were selected using intentional and snowball sampling techniques (Bogdan & Biklen, 1998). I intentionally sampled administrators and teaching staff according to his/her position. The principal was also included.

In-depth interviews were used as the primary strategy to investigate the phenomenon of the micropolitics of staff relationships. Interviews were developed and continuously revised to ensure in-depth descriptions of issues related to the study. Specifically, I asked teachers/administrators to answer questions about three areas of their participation in the staff meeting: the whole atmosphere of the staff meeting, the relations amongst participants in the meeting and processes of the meeting. The respondents were interviewed in order gain their perceptions of the principal's leadership style, their insight into the teacher culture or colleague relations, and their perspectives on the organizational hierarchy. Teachers and administrator interviews ranged from one to two hours. Interviews were audio-recorded and transcribed from Chinese to English. In total, 22 teachers and administrator and the principal were interviewed. Before interviewing the research subjects, I gained their consent and told them that the interview data would be used only for academic purposes, and would not be shared in any other way, in consideration of research ethics. To triangulate the interview data, participant observation was also employed to investigate the research setting, its participants and their behavior.

I analyzed data using the constant comparative method, an inductive approach that "blends systematic data collection, coding, and analysis with theoretical sampling into a comprehensive research strategy" (Haworth & Conrad, 1997, p. 221). Comparisons were made between data units coded from observation notes, field notes and interview transcriptions. Data units typically consisted of paragraphs or lines from interview or note transcripts. Then these data were further categorized by conceptual themes. In regard to validity and reliability, I employed multiple data sources, including participant observation, semi-structured interviews, and field notes, to triangulate research findings. To enhance the trustworthiness of my findings and to enhance the degree of research validity, the preliminary interpretive reports were read by key respondents (Guba & Lincoln, 1989).

Some possible research limitations may affect the data collected, and therefore should be discussed here. First, without a longer timeframe for the study, it was difficult to understand the extent to which the staff actually formed the teacher

culture. However, the majority of the teachers had worked at this school for more than 5 years, whereas some had worked there for more than 20 years. Therefore, although self-reports and recollections can be problematic, I believe that in this case respondents' perceptions of the staff meeting are credible to some extent. Finally, it must be noted that the relatively small number of faculty members interviewed may not be representative of the entire faculty's experience, which may influence the accuracy of the study.

Findings

The research findings are organized by themes that capture the micropolitical dynamics of the staff meeting. Based on my analysis, the strength of the staff meeting was that it created the opportunity for a community environment and the enhancement of staff morale. Nevertheless, a shortcoming of this regular event was that it was dominated by those with administrative power, the principal in particular. In addition, staff conflicts could be seen in emerging the meetings, due to different interests and perspectives held by the teaching group and senior staff.

Reinforcing collegial intimacy

At Hillview the staff meeting is a moment for collegial intimacy to flourish. There are both serious and light chats and conversations. As my notes frequently mentioned, monthly birthday celebrations are particularly highlighted as "joyful occasions." The celebration for every member's birthday held in the staff meeting is organized by the Hillview Teacher Association. Some examples from the field notes convey the sense of togetherness created in these meetings. The following is one sample celebration.

The atmosphere was very pleasant. With the music of "Happy Birthday to You" as the background, everyone enjoyed the music and sing together, claps following the rhythm, and the meeting was convivial. The president of the Hillview Teacher Association said, "We would like to organize the future birthday celebrations in every month and the celebration would be held at the last week's staff meeting. We hoped everyone could enjoy the celebration even if you were not the "birthday star" on this joyful occasion. Now let's sing the song together…"

"Happy birthday to you. Happy birthday to you.

Happy birthday to our colleagues.

Happy birthday to you …" (repeated)

In the process of celebration, every "birthday star" received a present and a flower from the principal. And he/she had a photo token with the principal. Although it lasted for around 40 minutes beyond the scheduled 20 minutes, "it was worth it to celebrate our colleagues' birthdays," as the principal said. (Observation notes)

The idea of celebrating colleagues' birthday(s) was to evoke and express all the staff members' affections towards one another and to enjoy the cheerful atmosphere. More specifically, with regular monthly birthday celebrations, the whole staff looked forward to each following celebration with great anticipation, since they highlighted the significance of collective cohesion. As the President of the Hillview Teacher Association put it:

The staff birthday celebrations had been held for two years and most teachers regarded it as a way to draw the whole staff closer… When the music was played, I got a feeling of gladness about how we were becoming closer. I thought it was a way to solidify our colleagues' friendship and collegiality.

Collegial intimacy could be found on the occasion of staff meetings where staff collegiality had gradually been strongly encouraged and solidified. The benefit of collegiality for organisational health and development was essential. Through such regular events, the gaps between school staff members were closing. For example:

The staff meeting held once a week provided an occasion in which we got much more familiarized with other colleagues, especially those who were not working in the same year group or in the same subject. There were around 100 staff members in this school and everyone was busy teaching; however, the staff meeting could be viewed as a good opportunity by which we could share opinions and communicate with each other. In this sense, I thought we indeed worked together in the school, rather than worked in each classroom respectively. (A year 2 class teacher)

This motto, "we are family," as emphasized by the principal, has become the ethos of the case school. Under this rationale, the staff meeting emphasizes community and harmony, which may be also influenced by Confucianism. It embodies claims about consensus and collective endeavors to bind school members together.

The staff meeting was an occasion when teachers shared their teaching experience and learnt possible solutions to their teaching difficulties. Teachers valued the significance of "sharing" and "empathy." For example:

When I talked to other teachers about the pupils' problematic behavior, it made your problems seemed all the less troublesome because you knew that others were also facing similar cases. … And then we shared each another's experiences about dealing with such troublesome children. … I felt much more relaxed even though we did not find better solutions to handle disruptive pupils…(A year 6 class teacher).

Some teachers expressed their highly positive feelings; they gained benefits from their colleagues' input which helped them to resolve pupils' learning difficulties and to improve teaching techniques. In particular, teachers were hard-pressed to find a suitable time when they could discuss classroom teaching and pupils' learning and behavior. The staff meeting to some degree formed a regular routine when teachers gathered to share their feelings and to enhance their professional capabilities through peer support.

Transmitting information through pseudo-participation

The staff meeting in the school was a routine meeting. The main purpose was to transmit recommendations from the local educational authority (LEA) and to order the teaching staff to follow them, even though the senior staff members might deliver them as "recommendations." As the same program had been delivered ever since it was organized four years ago, "the process of staff meeting became "monotonous" and "nothing special" as usual," according to one class teacher. She continued, describing her impression of the meeting:

Administrative staff reported some information and requirements from the LEA and the principal didn't monopolize the meeting, but I found myself expected to be like a robot, receiving worthless information. … I hoped the meeting could be an occasion in which we teaching staff could discuss some issues, such as the topic of post-selection…or even to make some decisions on the process of staff recruitment…(A year 4 class teacher)

The staff meeting at Hillview was typically dominated and controlled by the administrators, and the teaching staff often found themselves in a passive role, becoming recipients of information rather than participants in discussion. Teachers expressed dissatisfaction about the process of the staff meeting, without discussion about the school development. An English teacher, who was a core member of the school-based curriculum development committee, explained that many teachers were excluded from decision-making during the staff meeting. She said,

Although the principal often asked teachers whether they had any any contributions or questions to raise during the meeting, nobody did. Almost every school policy had been made by the top-group – directors and the principal. They have control of everything.

Clearly, this teacher was frustrated by what she perceived to be her colleagues' lack of opportunity for decision-making in the official gathering. Her comments reflected a closed decision-making process in which the principal and directors decided school policies.

However, some of the teaching staff considered the staff meeting to be a regular gathering in which the mission of senior staff and teaching staff was different: the former for delivering/retailing information or prescriptions from the LEA while the latter was there just for listening and receiving information, instead of discussing various issues. This was due to time constraints. As one teacher explained:

The staff meeting lasted merely for 20 minutes and there were many administrators reporting, and we hoped the meeting time could be controlled within the schedule. If the meeting time was exceeded, the next routines, cleaning time and class-teacher time, would be diminished. … We hoped the time for meeting would be shorter so that we could make the most of the time to prepare curriculum and instruction or other matters, like grading pupils' assignments. (A year 3 class teacher)

One senior member of staff with 20-year teaching experience added that the staff meeting was quite similar in several schools, no matter which the previous or the present school was. "I had become used to listening to and taking notes from administrators…I did not agree with the idea that the staff meeting was for participant discussion." In a sense, the staff meeting is typically an opportunity for the official definition of the school to be rehearsed and re-enacted. The teachers are cast in the position of audience. Gradually, the staff meeting becomes a non-decision but information-giving occasion.

Thus, at Hillview, a clash existed between two opposing views of the staff meeting as an occasion for decision-making. One view represented teachers as participants of school management, capable of and responsible for school decision-making. That is, they could not be excluded from the process of decision-making and some teachers were not satisfied with the dominance of the group of superiors in school policy-making. In this sense, participation can be reduced to an appearance of participation without access to any "decision making," and this could be viewed as "pseudo-participation" during the meeting. The other view regarded the staff meeting as an occasion during which the teaching group just received information and requirements from the administrative group, wihtout sufficient time for decision-making. As a result, most teachers were used to routinized experience – sitting and listening without any chance to discuss school affairs and make decisions with the administrative group.

Coming into conflict due to diverse interests

Although the staff meeting takes place regularly, the hidden tension/conflict between senior and teaching staff can be unearthed on some occasions. The tension or conflict, to some extent, is related to the divergent interests between the two camps. The senior staff's concern is to defend their established positions while the teaching staff aims to pursue their personal interests. During the process of pursuing these interests, the conflict will emerge. For example:

Two years ago I was the president of the teacher association…once I proposed that all senior staff, except directors, had to serve as duty teachers in turn, as other teaching staff did. And this proposal had been concluded last semester between the director of disciplinary affairs (DDA) and me (on behalf of all members of the teacher association). But you knew, the DDA went so far as to forget the conclusion…then I lost my temper accusing him of being a "tape recorder" who remembered every word we made except the conclusion … later on the DDA said that I had spoken badly vil of him and he would retain the right of legal prosecution. … Finally, the principal persuaded both of us to concede…(May, a former president of the Hillview teacher association, currently year 2 class teacher).

To some extent, conflict is built into the nature of the roles of the parties, each with different interests, involved in decision-making. Conflict may occur when one interest group tries to gain advantage over the other. We also should take into

account the power relationship between two parties. In this case, May, on behalf of the teacher association, strove for members' interests, while the DDA might feel that his authority had been undermined and attempt to reassert himself. If we see the school as a complex communal society, there will tend to be more direct, face-to-face interpersonal conflict. After the conflict, May would not speak to the DDA because their interpersonal anger was too strong. While it is possible to criticize a fellow staff member, it is also very possible that s/he won't like you as a consequence, and that your fellow colleague will treat you in the same way.

Another incidence of conflict happened between the principal of 6th year teachers and the officers of disciplinary affairs (ODA). The source of conflict arose from the groups' respective perspectives on "flexible work":

The head of year 6: on that day all the year 6 students and teachers had a school trip and we had a good time… You knew, a few days later the ODA came to me and required the class meeting minutes of each year 6 class to make up. I replied that it was impossible. … At today's staff meeting I without hesitation raised my question about making up the class meeting minutes. Some administrators, who viewed themselves as "experienced old hands," I blamed as "one-dimensional men" without flexible minds.

(After interviewing the head of year 6, I received the ODA's explanation)

ODA: I reckoned that the cause of the conflict arising was from the lack of communicative understanding. … She (the head of year 6 class teacher) failed to understand my point of view on recording the class meeting. My stance was to make up the minutes, if year 6 class teachers would only cooperate by making time; or if they couldn't, they could do nothing, that was all I meant. … But I felt considerable frustration about her reaction.

In fact, many problems of organisational governance are related to poor communication. In order to promote bilateral understanding, there should be multiple channels of communication, and communication of greater depth. The purpose is to work towards a win/win situation in which the two sides are willing to respect the different standpoints and commit to finding a mutually workable solution.

At Hillview, it was evident that teaching staff and administrators had different interests in terms of working conditions and well-being. Although they were colleagues and worked at the same school, and had the same goal to enhance teaching quality with administrative support, it was clear that clashes had occurred due to individual needs and interests. Teachers were more concerned about flexible work and more time to prepare teaching without dealing with administrative matters, whereas administrators were concerned about the efficiency and completion of administrative affairs, and their so-called "authority."

Discussion and Conclusions

If we believe that schools are sites of democracy, and agree with what John Dewey terms "interests held in common," then teacher-administrator relationships cannot be overlooked. Schools are complex organizations that can be smoothly and consensually run, or conflict-driven due to divergent needs and interests among the players. Micropolitics not only see conflict as inevitable but part of the essential dynamic of reflexive institutions. The inference is that without micropolitics and power struggles, schools would not be real (Davis, 1994). The study has investigated how teachers and administrators might perceive their relationships through the micropolitical lens in staff meetings. I echo what Andrew Hargreaves (1991) maintains, that "one of the benefits of qualitative research is the surprises that are primarily driven by the data" (p. 68). With this approach, the hidden "reality" of school micropolitical relationships and interactions among school staff could be discovered in detailed accounts. This article has portrayed some micropolitics taking place among school members during the staff meetings at the research site school. It is believed that teachers and administrators worked *together* to offer best education to students with some teaching beliefs and philosophy – educational love, children as the future pillars of national building, and so on, in spite of their different positions and tasks. However, the study of micropolitics cannot ignore the dimensions of conflictive, negative, and dysfunctional relationships between and among individuals and sub-groups in organizational settings.

Using the ethnographic case-study approach, I found that the micropolitical relationships among school members were both positive and negative. In the case of positive relationships, the staff meeting could be seen as a formal occasion at which participants felt relax.ed This scenario made teachers' school life more joyful and enabled them to leave behind their sense of busy-ness (Ball, 1990) and overwork (Cusack, 1993) for a moment. The staff meeting provides a regular occasion in which school staff can make contact and break the "cellular" organization of school, and help to them overcome a perceived sense of isolation (Lortie, 1975). These purposes are embedded in one another and can be mutually reinforcing in the signals they set for teachers' professional lives and collegial relationships (Talbert & McLaughlin, 1996). One of the political intentions by school practitioners planning the meetings was to bring about the development of collegiality through such collective ritual. The formation of a collective gathering focuses on the importance of solidarity in order to foster a sense of community. During the period of the staff meeting, teachers and administrative staff can exchange their different opinions on some agendas, and this seems to develop a sense of "shared professional community" (A. Hargreaves & Goodson, 1996, p. 10) or "solidarity" (Jeffrey & Woods, 1998). As Shulman (1989) maintains, "teacher collegiality is not merely important for the improvement of morale and teacher satisfaction… but are absolutely necessary if we wish teacher professionalism to be of the highest order" (with some modification, quoted in A. Hargreaves, 1991, p. 47).

In terms of negative relationships, the findings revealed that the regular meeting did not provide opportunities for teaching staff to discuss school affairs, or to make decisions about these affairs. Some teachers indicated that their participation in real decision-making had been curtailed by the administrative group. In Robert Merton's analysis (1957), the manifest function of staff meetings is to convey administrative information and requirements but the hidden function is to transmit information, as a political ritual, to legitimate decisions taken by administrators with a voluntary "no reaction" from other participants (Saunders, 1981). The study strongly suggests that the senior staff, particularly for the principal, should value teachers as critical human resources in decision-making, creating an open atmosphere to empower teachers to become real shareholders, rather than regarding teachers as merely the executors of school policies. Nevertheless, power relations between the senior staff and the teaching group were unbalanced and the program of the staff meeting was routinized so that most of the teachers had a sense of non-participation. The reality of the staff meeting was a moment of closure. The situational limitations seemed to emphasize the reproduction of hierarchy. In a sense, the principal was unable to allow his followers to discuss school regulations and policies, which meant teachers could not actively restructure school management. Although the principal, when interviewed, indicated that he would like to create a democratic climate in which teachers felt free to talk or even criticize what the school had done, the staff meeting was far from the principals' ideal picture of democratic school (Ball, 1987). Consideration of schools as democratic sites assumes a greater prominence when stronger connections among the shareholders in education are valued, pursued and reinforced. Yet, the data from this study tells us that these connections are ignored. What this suggests is that the principal really leads the school as a democratic laboratory where faculty members can feel free to discuss vital school affairs and in the long term they can make the school better. The lack of encouraging discussion and decision-making during the staff meeting caused teachers to believe that they were pawns, failing to challenge organizational hierarchy and to contribute their wisdom to the making of school policies.

Another clash was uncovered between teaching staff and administrators regarding working conditions, labor division and well-being. Sometimes the meeting could be the site of critical incidents in which some teaching staff might challenge the authority of senior positions due to a clash of interests. The relationships between the teaching group and the administrative bloc have been changing, especially due to the introduction of the school-based teachers' association, which emphasizes that teachers have the right to negotiate their needs and interests with administrators. In addition, the school located in Taipei (the capital of Taiwan and its the political and economic center), has strongly influenced people's thinking in terms of democracy and individual rights. Under such circumstances, teachers were made gradually aware of their rights to fight against those with power and authority. The study suggests that teachers and administrators should develop good channels of

communication, which may provide a non-threatening environment and encourage the exchange of faculty members' ideas (Deutsch & Coleman, 2000).

Sometimes mis-understandings may provoke inter-group strife, corresponding to what Baldridge (1971) calls, "communication fallacy." The findings indicated that one teacher refused a request from an officer, and conflict consequently occurred due to inadequate communication. In this case, there is a breakdown in communication, with each party only expressing its own message without further clarifying or caring about the response of the other. If the conflict between two sides is still unresolved, the principal is often expected to be the mediator and facilitate a negotiation between the two parties in dispute. The principal is asked to work with conflicting parties and to help them interact in a way that will produce, at least relief, and ideally, consensus or even reconciliation. In Chinese societies, the processes of mediation better take place in informal occasions on which the parties involved could express each standpoint without public intervention, and importantly, protect their "faces."

On the whole, the relationships among school members at the reserach site seemed to be positive and optimistic, yet hidden conflicts still might emerge. I would argue that researching school micropolitics should be analyzed with the perspective of balanced reports, and examined both from positive and negative angles. If we would like to position school as a democratic laboratory, we must take a closer look at the micropolitical relationships within schools and reconsider teachers' potential to assert themselves in the face of against hierarchical imperatives. From this study, it would be argued that it is essential to develop more harmonic connections between teachers and administrators. Those with power should involve more teachers in the process of decision-making. It is time for researchers and scholars to take the lead in portraying teachers as critical colleagues – they can contribute their professional ideas along with their individual rights and needs to administrators when they take the school management as a whole. And it is crucial for principals to value the shaping of democratic community through teacher-administrator discourses.

The regularly scheduled staff meeting provides a formal occasion on which all of the staff come together; it is a particularly fruitful research site for educational ethnographers, as faculty members' interactions and relationships can be analyzed, portraying the outline of the teacher culture. Nowadays one analytic focus with great international potential is that of micropolitics in school life (Blase & Blase, 1997). Through the micropolitical lens, the ecology of teacher culture and school management has presented a new horizon – reflecting the daily "reality" of management life in schools.

Implications for further research and educational reform

This study raises several issues and questions which may contribute to further research. The data for this paper came from a selected school in which the author focused particularly on the micropolitical actions between teachers and administrators in staff meetings. To develop more generalizable claims about the

themes presented in this analysis, the study needs more staff meetings across multiple schools in which more uncertain and complex situations may occur.

In addition, this paper examined micropolitical interactions only during the staff meeting between teachers and administrators. What do teacher-administrator interactions look like in multiple settings, such as other formal meetings and informal occasions? Would it possibly find a more whole picture of micropolitical interactions between teachers and administrators? Could other forms of micropolitical interactions or relationships between teachers and administrators branch off from the staff meeting?

Finally, there could be some implications for educational reform based on this research. An extensive body of research indicates that many aspects of schools can be redesigned so as to be more inclusive of teacher participation in decision-making. Workplace conditions within the school can be changed (Rosenholtz & Simpson, 1990; Rowan, 1990) Power can be shared (Lally & Scaife, 1995). Efforts at strengthening teacher-administrator relationships, however, are all too clearly undermined by today's sweeping reform agendas whose other emphases (such as accountability and evaluation) and cumulative effects often eat away at the very core of collaborative relationships between teachers and administrators. In that respect, an impartant policy implication of the research reported here is to look not only at the elements needed for more successful teacher-administrator relationships, but also at how other reforms, individually and together, threaten the possibilities for collaborative relationships by undermining teachers' sense of professional confidence and security, and by overloading them with other reform obligations.

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References

Achinstein, B. (2002). Conflict amid community: The micropolitics of teacher collaboration. *Teachers College Record, 104* (3), 421-455.

Achinstein, B. (2006). New teacher and mentor political literacy: Reading, navigating and transforming induction contexts. *Teachers and Teaching, 12*(2), 123-138.

Acker, S. (1999). *The realities of teachers' work: Never a dull moment*. London: Cassell.

Atkinson, P. (1983). The reproduction of the professional community. In R. Dingwall & P. Lewis (Eds.), *The sociology of the professions: Lawyers, doctors and others* (pp. 221-245). London: Macmillan.

Baldridge, J. V. (1971). *Power and conflict in the university: Research in the sociology of complex organisations*. New York: John Wiley & Sons.

Ball, S. J. (1987). *The micropolitics of the school: Towards a theory of school organisation*. London: Methuen.

Ball, S. J. (1990). *Politics and policy making in education: Explorations in policy sociology*. London: Routledge.

Blase, J. (1987). Political interaction among teachers: Sociocultural contexts in the schools. *Urban Education, 22*(3), 286-309.

Blase, J. (1989). The micropolitics of the school: The everyday political orientation of teachers toward open school principals. *Educational Administration Quarterly, 25*(4), 377-407.

Blase, J. (1990). Some negative effects of principals' control-oriented and protective political behaviour. *American Educational Research Journal, 27*(4), 727-753.

Blase, J. (1991a). The micropolitical perspective. In J. Blase (Ed.), *The politics of life in schools: Power, conflict and cooperation* (pp. 1-18). London: Sage.

Blase, J. (1991b). Everyday political perspectives of teachers toward students. In J. Blase (Ed.), *The politics of life in schools: Power, conflict and cooperation* (pp. 185-206). London: Sage.

Blase, J. & Anderson, G. (1995). *The micropolitics of educational leadership: From control to empowerment*. London: Cassell.

Blase, J., & Blase, J. (1997). The micropolitical orientation of facilitative school principals and its effects on teachers' sense of empowerment. *Journal of Educational Administration, 35*, 138-164.

Bogdan, R. C., & Biklen, S. K. (1998). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn & Bacon.

Burns, T. (1961). Micropolitics: mechanisms of institutional change. *Administration Science Quarterly, 6*, 257-281.

Cooper, B. S., Ehrensal, P. A. L., & Bromme, M. (2005). School-level politics and professional development: Traps in evaluating the quality of practicing teachers. *Educational Policy, 19*(1), 112-125.

Chen, H.-J. (2004). *Parental participation in school decision-making: Exploring the school affairs committee in a Taiwanese primary school*. Paper presented at the International Symposium on Democratic Education. 20-21, May, 2004. University of Canakkale, Turkey.

Curry, M., Jaxon, K., Russell, J. L., Callahan, M. A., & Bicais, J. (2008). Examining the practice of beginning teachers' micropolitical literacy within professional inquiry communities. *Teaching and Teacher Education, 24*(3), 660-673.

Cusack, I. (1993). Looking back in anger. *The Times Educational Supplement, 8 January*, 7.

Davis, L. (1994). *Beyond authoritarian school management: The challenge for transparency*. Ticknall, Derbyshire: Education Now.

Deutsch, M., & Coleman, P. T. (Eds.). (2000). *The handbook of conflict solution: Theory and practice*. San Francisco, CA: Jossey-Bass.

Ehrich, L. C., & Cranston, N. (2004). Developing senior management teams in schools: Can micropolitics help? *ISEA, 32*(1), 21-31.

Frost, D. (1997). *Reflective action planning for teachers: A guide to teacher-led school and professional development*. London: David Fulton.

Frost, D., Durrant, J., Head, M. & Holden, G. (2000). *Teacher-led school improvement*. London: RoutledgeFalmer.

Fullan, M. (1993). *Change forces: Probing the depths of educational reform*. London: Falmer Press.

Gronn, P. (1988). Talk as the work: the accomplishment of school administration. In A. Westoby (Ed.), *Culture and power in educational organizations* (pp. 289-314). Milton Keynes: Open University Press.

Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation*. Newbury Park, CA: Sage.

Hargreaves, A. (1991). Contrived collegiality: The micropolitics of teacher collaboration. In J. Blase (Ed.), *The politics of life in schools: Power, conflict and cooperation* (pp. 46-72). Newbury Park, CA: Sage.

Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the post-modern age*. London: Cassell.

Hargreaves, A. & Goodson, I. F. (1996). Teachers' professional lives: aspirations and actualities. In I. F. Goodson & A. Hargreaves (Eds.), *Teachers' professional lives* (pp. 1-27). London: Falmer Press.

Havelock, R. G. (1973). *The change agent's guide to innovation in education*. Englewood Cliffs, New Jersey: Educational Technology.

Haworth, J. G., & Conrad, C. (1997). *Emblems of quality in higher education: Developing and sustaining high quality programs*. Boston: Allyn & Bacon.

Hoyle, E. (1988). Micropolitics of educational organisations. In A. Westoby (Ed.), *Culture and power in educational organisations* (pp. 247-271). Milton Keynes: Open University Press.

Jeffrey, B. & Woods, P. (1998). *Testing teachers: The effect of school inspections on primary teachers*. London: Falmer Press.

Kelchtermans, G. (2005). Teachers' emotions in educational reforms: Self-understanding, vulnerable commitment and micropolitical literacy. *Teaching and Teacher Education, 21*(8), 995-1006.

Kelchtermans, G., Ballet, K. (2002). The micropolitics of teacher induction. A narrative-biographical study on teacher socialisation. *Teaching and Teacher Education, 18*(1), 105-120.

King, R. (1983). *The sociology of school organisation: Contemporary sociology of the school*. London: Methuen.

Lally, V., & Scaife, J. (1995). Towards a collaborative approach to teacher empowerment. *British Educational Research Journal, 21*(3), 323-338.

Lewin, K., Lippitt, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology, 10*, 271-299.

Lortie, D. C. (1975). *Schoolteacher: A sociological study*. Chicago: The University of Chicago Press.

Lukes, S. (1977). *Essays in social theory*. London: Macmillan.

Mayrowetz, D., & Price, J. (2005). Contested territory: parents and teachers wrestle for power in an urban neighborhood school located within a Gentrifying community. *Journal of Cases in Educational Leadership, 8*(3), 72-87.

McLaren, P. (1993). *Schooling as a ritual performance: Towards a political economy of educational symbols and gestures*. London: Routledge.

Merton, R. K. (1957). *Social theory and social structure* (Rev. ed.). Glencoe, IL: Free Press.

Pfeffer, J. (1981). *Power in organisations*. Cambridge, MA: Pitman.

Rosenholtz, S. J., & Simpson, C. (1990). Workplace conditions and the rise and fall of teachers' commitment. *Sociology of Education, 63*(4), 241-257.

Rowan, B. (1990). Commitment and control: Alternative strategies for the organizational design of schools. *Review of Research in Education, 16*, 353-389.

Rudduck, J. (1991). *Innovation, involvement and understandings*. Milton Keynes: Open University Press.

Scribner, J. P., Hager, D. R., & Warne, T. R. (2002). The paradox of professional community: Tales from two high schools. *Educational Administration Quarterly, 38*(1), 45-76.

Talbert, J, E. & McLaughlin, M. W. (1996). Teacher professionalism in local school context. In I. F. Goodson & A. Hargreaves (Eds.), *Teachers' professional lives* (pp. 127-153). London: Falmer Press.

Tyler, W. (1988). *School organization: A sociological perspective*. London: Croom Helm.

Young, B., & Brooks, M. (2004). Part-time politics: The micropolitical world of part-time teaching. *Educational Management Administration and Leadership, 32*(2), 129-148.

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Preparing Teachers as Researchers: Evaluating the Quality of Research Reports Prepared by Student Teachers

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Abstract

Problem Statement: The ability to carry out educational research is often cited as an attribute a teacher should possess. However, there are very little empirical data available on the evaluation of teacher research.

Purpose of study: This paper reports on an attempt to develop such an attribute in a group of 50 science student teachers in Turkey. This study aims to evaluate the quality of the research reports prepared by science student teachers during their teacher-training course.

Methods: The participants were 50 science student teachers enrolled in a course called Special Topics in Science II, in which they were introduced to techniques to critically evaluate academic articles, design and conduct a small-scale research project, and write a research report in terms of the basic methodological requirements needed in an academic paper. A document analysis of 12 research reports was undertaken to evaluate the quality of the research reports prepared by student teachers.

Findings and Results: The results suggest that student teachers who were guided by a mentor or other knowledgeable figures were capable of designing and conducting a research project, writing a research paper, and communicating their findings to others at conferences.

Conclusions and Recommendations: This study articulated ways in which a teachers-as-researchers approach can be built in the design of a course in pre-service teacher education. This study has not simply investigated the outcomes of the course—it also made explicit the actual design of it. The study contributes to the literature because it provides an example of teacher research that may be useful to other science educators with similar goals. Some possible implications for pre-service and in-service teacher education and further research are also discussed in this paper.

Keywords: teachers as researchers, teacher research, action research, teacher education

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The ability to carry out educational research is often cited as a positive attribute for a teacher. This paper reports on an attempt to develop such an attribute in a group of 50 science student teachers (STs) in Turkey. In order to explain the rationale for instruction, it is necessary to review some literature on teacher research.

Why Do We Need to Educate Teachers as Researchers?

It is claimed that teachers benefit from carrying out education research, rather than just reading about it (van Zee, 1998; Bennett & Campbell, 2002; Sozbilir, 2007). The concept of teachers as researchers is not new (Corey, 1953), but harkens back to the early works of John Dewey in the 1920s (Fueyo & Koorland, 1997). Nevertheless, the concept is associated mostly with the work of British curriculum theorist Lawrence Stenhouse, who sought to promote an active role for teachers in educational research and curriculum development (Stenhouse, 1975). Cochran-Smith and Lytle (1999) use the term *teacher research* to refer to research carried out by teachers to seek practical solutions to issues and problems in their professional and community lives. In the literature, the terms "teacher research" and "action research" are used interchangeably (Cochran-Smith & Lytle, 1999). Although teacher research has the goal of some type of action to improve practice, as noted by Meier and Henderson (2007), not all teacher research is action research. Today, teacher research is a worldwide movement, which includes a variety of action research approaches that differ in teacher roles and research purposes (Calhoun, 1993; Henson, 1996; Stremmel, 2002). This movement has helped teachers to become more reflective practitioners and to take action to improve their practices. Cochran-Smith and Lytle (1999) define teacher research as:

".all forms of practitioner inquiry that involve systematic, intentional, and self-critical inquiry about one's work in K-12, higher education, or continuing education classrooms, schools, programs, and other formal educational settings. This definition includes inquiries that others may refer to as action research, practitioner inquiry, teacher inquiry, teacher or educator self study, and so on, but does not necessarily include reflection or other terms that refer to being thoughtful about one's educational work in ways that are not necessarily systematic or intentional" (p. 15).

However termed, most teacher educators and researchers agree that the notion of teachers as researchers ought to be incorporated into teacher preparation and professional development programs (Hammersley, 1993; Cepni & Akdeniz, 1996; Pekarek, Krockover, & Shepardson, 1996; van Zee, 1998; Kempa, 2002; Gilbert, Justi, van Driel, de Jong, & Treagust, 2004; Demircioglu, 2008). Rationales for their arguments vary, as summarised below.

To create a professional culture which encourages teachers to explore current research findings and use them effectively in teaching. In recent years, a significant change has taken place in teacher education programs. Previously, getting teachers to read and follow research findings was a major priority of many teacher education programs (Gitlin, Barlow, Burbank, Kauchak, & Stevens, 1999). However, today some teacher educators ask STs to engage in a variety of activities including becoming critical consumers of research and participating in research (Keating, Diaz-Greenberg,

Baldwin, & Thousand, 1998; van Zee, 1998). The intention was to create a professional culture which encourages teachers to explore current research findings, translate outcomes of research into practical actions, and use research evidence systematically in the evaluation of their own practice (Ratcliffe et al., 2005). Evidence suggests that teachers who have been involved in research are likely to become more reflective, critical, and analytical in their teaching, more open and committed to professional development, and more likely to use relevant findings from the literature to improve their classroom practice (Henson, 1996; Kempa, 2002; Stremmel, 2002). Bearing these points in mind, Gilbert et al. (2004) claimed that increasing teacher awareness of educational research, improving the use of research findings by teachers, and involving teachers in educational research could help to bridge the gap between educational research and classroom practice. This paper examines one way to develop STs as researchers in pre-service teacher education that would help them learn about educational research and use research findings in the course of their classroom practice. Indeed, we agree with the view that attitudes and habits that are supportive of research need to be developed during pre-service teacher training courses (Rudduck, 1985; Ekiz, 2006).

Teachers are more likely to change their practice by reading reports of research written by other teachers rather than by university researchers. McInytre (1998) has suggested that there are five types of educational research, each of which has a different relationship to policy and/or practice. Teacher research is one of those five, and highly influences teacher practices. Teachers are more likely to change their practice by reading reports of research written by other teachers rather than by university researchers (van Zee, 1998). One of the reasons for this might be that research carried out by teachers is considered more practical (directly applicable to classroom practice) and makes more sense to teachers. Nonetheless, there is a low proportion of this type of research. For instance, Gilbert et al. (2004) report that research conducted as part of chemistry teachers' efforts to bring about the reform of science education in classroom practice is seen rarely in chemistry education literature. The lack of teacher skills, incentives, and time to conduct such studies and to write up their work for publications are possible reasons for that (Gilbert et al., 2004).

To facilitate teachers to construct better understandings of certain aspects of nature of science. Despite various attempts to improve teachers' nature of science views, the results of relevant studies have shown that much is needed and alternative ways should be considered (Lederman, 2007). By conducting research, teachers can make sense of what science is and how it works, understand underlying ideas about educational research, and be aware of students' difficulties in science and nature of science (van Zee, 1998). A student teacher as a researcher is a natural consequence of the development of the teachers-as-researchers approach. Such activities would help STs construct better understandings of certain aspects of nature of science.

What is the Issue? The Research Aims and Significance of the Study

Although these arguments given above seem reasonable, the call for the teachers-as-researchers approach raises a number of questions including, "how do teachers

think about research?" "Do teachers have enough knowledge and skills to use research evidence from the literature in their own practice, to conduct an empirical research, and to use research evidence systematically in evaluation of their own practice?" "Can teachers write up their work for publications?" and "What does research have to say to teachers?" Specifically, there are very little empirical data available on the evaluation of teacher research. However, empirical evaluation studies seem to be more in the sciences (including mathematics and engineering) and in professional education such as nursing and business. A comprehensive review of undergraduate research can be found in Seymour, Hunter, Laursen, and Deantoni (2004). What is largely missing from the literature is the nature of teacher research and its role in teacher preparation and professional development programs. Hence, there is a need to understand how the design of an environment supports a small-scale research project conducted by a student teacher. Accordingly, this study was designed to provide better understanding of teacher research to inform the ability of curriculum development to meet teachers' needs. More specifically, this study aimed to:

- evaluate the quality of the research reports prepared by the student teachers in terms of meeting the methodological requirements.

Design and Methodology

Participants

The participants in the present study were a class of 50 STs, trained as primary school teachers but with a particular expertise in science. Participants opted to take this course in the spring semester of their final (fourth) year of an undergraduate course. The study was undertaken in a university in Turkey during the 2007–2008 academic year.

Participants' Pre-Knowledge about Research Methodology

STs were taught about basic educational research methodologies in a previous semester of *Special Topics in Science I* (STiS-I) course, taught by a different lecturer.

Context and Intervention

The study was undertaken in the context of *Special Topics in Science II* (STiS-II), taught by the author. Classes were held weekly in three-hour blocks throughout the semester (14 weeks). An outline of the course content is presented below. This teaching sequence was developed on the basis of a pilot study conducted in the previous academic year. The course aimed to help STs: (a) to gain the knowledge and skills to design, carry out, and report on a small-scale research study; (b) to work collaboratively; (c) to communicate their findings to others at conferences or through other means; and (d) to envision themselves as researchers for lifelong learning. The description of the course can be broken down into six parts to give the reader an idea of the timeline and emphasis in the design of the study.

Intervention 1: Critical analysis of research papers. In the second week of the course, the lecturer gave a presentation on the types of research and research writings. This

presentation was based mainly on the issues discussed in an article by Millar (2003) entitled "*Communicating your research to others.*" This article includes information about different educational research writings from the full research reports (e.g., a PhD thesis) to news reports (e.g., a science-related newspaper report). In addition, the article addresses issues and advises on writing a good journal article such as what to include and where to put it. Millar's article also suggests issues on how journal articles are judged, and common faults to be avoided in writing an article. Since approximately half of the participants were not capable of reading an article written in English, the content of the article was summarised by the lecturer in the classroom. This full text article and a Turkish translation of the guidelines for evaluating research articles suggested by Millar (2003, p.101) were distributed to participants. After this lecture, an empirical research paper was given to participants to read until Week 4. In Week 4, that research paper was analysed in the light of methodological requirements discussed in Millar's (2003) and Sozbilir's (2007) articles. Participants were encouraged to address several questions through this analysis such as: What does the study aim to achieve? Why is this study valuable or important (and to whom)? What is/are research question(s) or hypotheses being tested? What is the research method employed? Are strengths and weaknesses of the employed methods explained? Are sampling procedures explained? How is data analysed? What issues are involved regarding reliability and validity? What are the main findings of the study? Are the research questions answered? What issues are involved in generalising the findings? What implications could be provided for further research and practitioners? Are the references cited correctly? Are the references cited up to date? In the following weeks, each group was asked to find a journal article, read it critically, and prepare a short presentation (10 minutes of presentation followed by 10-20 minutes of discussion). Each week one or two groups presented and all STs were supposed to read the articles before the session so they could understand the presentation. This activity aimed to reinforce the participants' understanding of the presented ideas and provide them with opportunities to consolidate and enhance their knowledge about the content and structure of academic articles. As Mercer (1995, p. 19) pointed out, learners certainly "need to use new knowledge themselves, under different conditions, if they are to make the new knowledge their own." Vygotsky (1978) refers to this step as involving the process of *internalization*.

Intervention 2: Conducting research. In the second week of the course, a number of questions (e.g. ,"What do you think about building a nuclear power plant in Turkey?" "How do seasons occur?" "What do you think experimenting on animals?") were introduced to participants. They were asked to carry out empirical research in a group of 3-5 to investigate one of those questions in a sample of pupils, students, staff, or lay people. In the third week of the course, STs presented their findings (10 minutes of presentation followed by 5 minutes of discussion). The goal of this activity was to engage participants to reflect on the research aims, methodology, research instruments, data analysis, results, and discussions. During their presentation, the strengths and weaknesses of the research were also discussed.

We believe we should start to educate science student teachers as researchers in teacher preparation courses (van Zee, 1998). From the beginning of the course, the participants were asked to choose a research area, formulate investigable research questions, design, and carry out a small-scale research study in a group of 3-5. The topics chosen for the main study depended on the participants, but they were guided by the lecturer. For instance, the lecturer introduced some of the research projects, which were carried out by the previous cohort. In addition, the lecturer encouraged them to discuss their ideas with both university and school staff to ensure they had a viable research project. The topics chosen for the research are presented in Table 1. The choices probably reflected the interests of the STs. We believe this approach offers flexibility and genuine choice to cope with the diversity of the participants' interests and aspirations.

Intervention 3: Supervision meetings. As a result of our experience with the previous cohort, it became obvious that STs needed supervision meetings when they were carrying out their research projects. Those meetings were arranged if a group of STs asked for it or if the lecturer thought the STs needed it. Each supervision meeting lasted approximately 10-20 minutes. In some cases, they preferred e-mails to consult any problem they came across. The purpose of supervision was to give STs theoretical, methodological, or technical guidance and support (e.g., how to use *SPSS* [http://www.spss.com] or *EndNote* [http://www.endnote.com] software and how to search a database such as ERIC [http://www.eric.ed.gov]) related to their projects. If the lecturer was not able to guide them, a lecturer with relevant expertise was found. For instance, in some cases, groups C, E, and G were partly supervised by a chemistry educator, a science educator, and a physics educator respectively.

Intervention 4: Oral presentation. Each group of students presented their work toward the end of the course (10 min. of presentation and 5 min. of discussion). This activity, similar to conference presentations in nature, aimed to engage participants to reflect on the research aims, methodology, research instruments, data analysis, results, and discussions. During their presentations, the strengths and weaknesses of the research were also discussed. This activity (and Intervention 6) enabled participants to exchange or disseminate their knowledge and experience with peers, argue points, answer questions, respond to critique of their work, and question others in a collegial manner.

Table 1
Topics Chosen for a Small-Scale Research Project

Group *(number of student teachers)*	Research Topic	Design & Instruments	Participants
A (5)	A study on changing pupils' views about scientists	A quasi-experimental design A modified version of the Draw-A-Scientist Test in conjunction with follow up individual interviews (n=4)	63 6th grade students (32 experimental, 31 control)
B(5)	Primary school students' misconceptions about mass and weight	Survey A written test consisting of two open ended and three multiple choice questions	6th -7th -8th grade students in two schools (n=111)
C(4)	An investigation of laboratory safety in terms of teachers, laboratory regulations, and textbooks point of views	Case study Observations, semi-structured interviews (12 open-ended questions), textbook analysis	12 primary school science teachers in eight schools
D(4)	Primary school students' level of understanding about the concepts of heat and temperature	Survey Eight two-tier diagnostic questions	6th -7th -8th grade students (n=82)
E(4)	Fourth year science student teachers' views on the 6th grade science and technology textbook	Survey 73 five-point Likert-type items in conjunction with follow up individual interviews	39 fourth year science student teachers
F(4)	Comparing the effects of a traditional and cooperative learning approach on 6th grade students' understanding of the concept of light	A quasi-experimental design 39 multiple choice questions in conjunction with follow up individual interviews (n=10)	56 6th grade students (30 experimental, 26 control)
G(3)	Investigating primary school students' ideas about some fundamental science concepts	Survey 18 written (mostly multiple choice) questions in conjunction with follow up individual interviews (n=9)	6th -7th -8th grade students (n=78)
H(3)	Effect of conceptual change texts on remedying students' misconceptions of the concepts of thunderbolt and flash	A longitudinal study Four open-ended questions	6th -7th -8th grade students (n=135) in four schools
I(3)	Investigating 7th grade students' knowledge about erosion	Survey 16 five-point Likert-type items	7th grade students (n=101) in two schools
J(3)	Investigating 8th grade students' misconceptions about photosynthesis and respiration in plants	Survey 13 two-tier multiple choice questions	8th grade students (n=27)
K(4)	The effect of science fairs on students' science process skills	A longitudinal study 31 multiple choice questions in conjunction with follow up individual interviews (n=9)	6th -7th -8th grade students (n=90) in three schools
L(3)	A study on the investigation of primary school students' science process skills	Survey 10 multiple choice questions	6th grade students (n=50) in three schools
M(5)	Promoting primary school students' views about nature of science	A quasi-experimental design 10 open-ended questions in conjunction with follow up individual interviews (n=6)	67 6th grade students (35 experimental, 32 control)

Intervention 5: Writing reports. After completing their projects, each ST group was required to write a research report. Baker (2004) claims that writing research reports and subsequently drawing on them to make presentations to their peers (Interventions 4, 5, and 6) play key roles in the construction of scientific knowledge, metacognitive knowledge, and understanding nature of science. Indeed, reading, writing, and speaking are closely linked to understanding science and, by extension, to learning science (Mercer, 1995; Baker, 2004; Erduran-Avci, 2008). Accordingly, a Turkish electronic version of Robert A. Day's book called "*How to Write and Publish a Scientific Paper*" (1996) was provided to all of the STs. They found this book quite useful while writing their research reports.

Intervention 6: Poster conference. In addition to the written reports, STs prepared materials to share the findings of their studies with students and staff of the department at a poster conference toward the end of the course. The purpose of the poster conference was to give STs an opportunity to argue points, answer questions, respond to critique of their work, and question others in a collegial manner. Such structured activities (e.g. interventions 4 and 6) would help STs envision themselves as researchers as they form their identities as teachers (van Zee, 1998; Bennett & Campbell, 2002).

Data Collection and Instruments

The present study employed a qualitative methodology to achieve the research aim described earlier. A document analysis of twelve out of thirteen research reports was undertaken to evaluate the quality of the research reports prepared by student teachers. The criteria used for analysis of STs research reports were mainly based on Millar's (2003) and Sozbilir's (2007) studies. Table 2 presents the criteria used for this analysis. An analysis of twelve of thirteen research reports is presented below, because one student group (Group M, see Table 1) extended their research study and could not complete the analysis and writing in due course. Therefore, their research report was excluded from this data analysis. Since this study aimed to evaluate the quality of the research reports by science student teachers as part of a teacher-training course, this group had more advantages than others in terms of time.

Reliability

In order to check reliability, four randomly selected research reports (approximately 33 percent of the research reports) were coded by two independent coders. The inter-coder reliability was found to be 80 percent, which is considered high (Ericsson & Simon, 1993). Inconsistencies found were reconsidered.

Findings and Results

The aim of this study was to evaluate the quality of the research reports prepared by STs in terms of some methodological requirements. The results are presented in Table 2. The results show that the research reports more or less met most of the criteria, but there were places where STs failed to meet the criteria. These criteria are indicated in *italics* in Table 2 and given below. The criteria mentioned below were ignored, or not properly addressed, in at least six of 12 research reports (50 percent).

Research methodology:

- Are strengths and weaknesses of the employed data collection methods explained?
- Explaining and justifying the decision involved in data collection instruments.
- How is data analysed?
- What issues are involved regarding the validity and reliability of data analysis?

Findings:

- Are the findings related to others previously reported?

Conclusions and Implications:

- Reflection on the nature and scope of the data and how these relate to the research aims or question(s)/hypotheses.
- Reflection on the research strategy and/or the data collection instruments used.
- Implications/suggestions for teachers, policy-makers, researchers, etc.
- Identification of areas where further work might be desirable.

References:

- Are there enough references? (at least 10 should be cited)
- Are the references cited correctly?

General Aspects:

- Coherence of the paper as a piece of academic writing.

Most of the research reports had an appropriate title and a well-structured abstract. While most of the research reports had a well-written *introduction*, a few had weak theoretical perspectives and did not address why the present study was important and valuable.

When we, as researchers, make a choice, we are opting to do one thing rather than another. For instance, if we have used questionnaires for a data collection method, we need to explain the reasons for this choice and explain the strengths and weaknesses of questionnaires. Although in the *methodology* section, STs tried to explain what they did, they rarely explained the reasons for their choices. For example, the strengths and weaknesses of the methods implemented, justifications for the decisions involved in the design of data collection instruments, and issues related to the reliability and validity of data analysis were not addressed in several reports. A research report should not only describe an action but also justify and be critical about it. This may be obvious to the researcher, but it may not be so obvious to a reader (Millar, 2003). Such deficiencies deserve more attention during teaching. Another issue for the *methodology* section was that STs usually mentioned the analysis of survey or questionnaire, but ignored the analysis of the qualitative data such as participants' responses to interviews or the data gathered during observations. They usually neither mentioned nor quoted such data in the *findings* section.

Doing research requires presenting a clear statement of what is found. In most cases, STs clearly presented their quantitative data in the *findings* section; however, they often failed to support such data with their qualitative data such as an extract chosen from interviews, or extended written responses to open-ended questions. In addition, many did not relate their findings to others that have previously been reported.

Comparing to other sections, the *conclusions and discussion* section was the weakest section in most of the research reports. Many STs did not reflect on the nature and scope of the data in relation to their research questions/hypotheses, on the research strategy and/or the data collection instruments they used, and on the implications of the study for practitioners and researchers. Sozbilir's (2007) study also indicated that research reports prepared by student teachers had methodological deficiencies about critiquing skills and synthesis of findings of the research. A possible recommendation for restructuring teaching, then, is to support student teachers to be critical and reflective of their studies.

Since many participants were not capable of reading articles written in English, the cited *references* were mainly in Turkish. It is possible this caused many research reports to use too few references. Moreover, references were cited incorrectly in most of the reports. For instance, references cited in the text did not appear at the end of the report or anywhere else. Nevertheless, the participants who used the *EndNote* software seemed to cite references correctly.

One of the most important elements of academic writing includes a format with *unity* and *coherence*. The coherence of six research reports as a piece of academic writing was high. They were well-written rigorous reports that put together a well-balanced piece of research that would confirm that after completing the *STiS-II* course, the STs were capable of designing and conducting a research project and writing a research report. Engaging STs in learning to do research, writing a research report, and communicating the findings to others at conferences seems to be a promising venue to prepare student teachers as researchers. What is encouraging is that some of the STs who took *STiS-II* have presented their research projects at a national conference on science and mathematics education (Tosun et al., 2008) and others were planning to do so in the future.

Table 2
Analysis of Student Teachers' Research Reports (n=12)

Aspects of study	*Acceptable*	*Poor*	*Unacceptable*	*Not mentioned*
1. Appropriateness of the Title	11	1		
2. Abstract	12			
3. Introduction				
Context: Presentation of the focus of the study	12			
Discussion of background ideas and literature relevant to the study	7	5		
What the study aims to achieve	12			
Why is that particular topic valuable or important (and to whom)?	7	5		
Research question(s) or hypothesis being tested	11			1
4. Research methodology				
Description of the research method employed (e.g., experiment, case study, survey, etc.)	8			4
Description of the method(s) of data collection used (interviews, questionnaires, observation, etc.)	12			
*Are strengths and weaknesses of the employed data collection methods explained?**	5	4	1	2
Description of the data collection instruments	12			
Explaining and justifying the decision involved in data collection instruments	4	5	1	2
Validation/pilot testing of data collection instruments	10	1		1
Are sampling procedures explained?	8			4
How is gathered data analysed?	3	6	3	
What issues are involved regarding tbe validity and reliability of data analysis?	3	2	1	6
5. Findings				
Clear statement of what was found, summarised and reported appropriately	7	3	2	
Are the research aims or questions answered?	8	1		3
Are the findings related to others previously reported?	3	1	2	6
6. Conclusions and Implications				
Summary of the main findings	7	2	3	
Reflection on the nature and scope of the data and how these relate to the research aims or question(s)/hypotheses		2	4	6
Reflection on the research strategy and/or the data collection instruments used (limitations of the study)	3	2	2	5
Implications/suggestions for teachers, policy-makers, researchers, etc.	6	2	4	
Identification of areas where further work might be desirable	6	1	1	4
7. References				
Are there enough references? (at least 10 should be cited)	6	6		
Are there different types of references (books, journal papers, conference proceedings?)	7	5		
Are the references cited correctly?	3	7	2	
Are the references cited up to date?	12			
8. General Aspects				
Coherence of the paper as a piece of academic writing	6	3	3	
Other views ……				

Notes: * Statements in *italics* indicates significant methodological deficiencies.

The criteria used for analysis of research reports were adapted from Millar (2003) and Sozbilir (2007).

Conclusions and Educational Implications

In this paper, we have discussed the quality of research reports prepared by STs as part of a teacher-training course. The results suggest that student teachers who were guided by a mentor or other knowledgeable figures were capable of designing and conducting a research project, writing a research paper, and communicating their findings to others at conferences. The research experience of STs in teacher preparation programs and subsequent collaboration with university researchers can encourage teachers to continue to engage in research on science teaching and learning as they begin their teaching careers (van Zee, 1998). One of the purposes of this research was to begin to fill the gap between research and practice. The STs current research experience can encourage them to do research and become active critical consumers of research in future (Gitlin et al., 1999; Sozbilir, 2007). Teacher preparation and professional development programs should, therefore, promote the value of educational research and prepare teachers as researchers. However, it should be pointed out that without sufficient guidance from the lecturer, it is possible for STs to misunderstand key features of theoretical and methodological aspects of the research project they are carrying out. In particular, theoretical aspects of the research and writing tasks would be challenging and demanding for STs. Therefore, STs need considerable support and guidance from the lecturer to search for relevant literature and to construct a theoretical base for their research. In this process, some lecturers would prefer to ask STs to work individually or in a group to undertake a much smaller-scale research study, where STs present an argument to justify a claim based on research evidence and construct warrants between data and the claim. We are not arguing that conducting a small-scale research study and writing about it are not challenging and demanding, rather what we are suggesting here is that STs should conduct a research study (it does not matter how small it is) with support from the lecturer(s) in their undergraduate courses (Henson, 1996; Kempa, 2002; Stremmel, 2002).

We started this paper with a question, "why do we need to educate teachers as researchers?" and a rationale for why we need to educate teachers as researchers is addressed earlier in the paper. Maybe it is time to consider the following argument and its consequences: "what can be done to educate teachers as researchers?" This is important since pre-service teacher training courses in Turkey (YOK, 2008) and in many other countries (van Zee, 1998) do not necessarily include any clear objectives and courses for educating student teachers as researchers and do not offer opportunities for STs to conduct empirical research. The courses offered on research were more theoretical than practical. For instance, there are some courses on research methodology in pre-service teacher education programs in Turkey (YOK, 2008), but there are no courses where STs can put their knowledge and skills about research methodology into practice and carry out a small-scale research study. This current study can be seen as an example for

structuring such a course in teacher education programs. In this paper, we proposed a course (a teaching-sequence) in the context of a teacher education program that attempts to educate student teachers as researchers. This study articulated ways in which a teachers-as-researchers approach (Hammersley, 1993) can be built in the design of a course in pre-service teacher education. The course aimed to help student teachers envision themselves as researchers as they form their identities as teachers. This study simply did not investigate the outcomes of the teaching sequence, but also made explicit the actual design of a teaching sequence. The proposed teaching sequence had six crucial parts (Interventions 1-6). The key issues, which underpin the design of each part, were discussed in the methodology section. This study contributes to the literature by providing an example of teacher research that may be useful to other science educators with similar goals. For instance, the STs in our sample found Millar's paper (2003) and Day's book (Day, 1996) quite helpful while critically analyzing articles and writing a research report. Therefore, the teaching resources and results of the present study might be used to inform the design of these programs in the way Dillon, Sissling, Watson, and Duschl (2002) started to do for science teacher professional development programs. It would be interesting to investigate the impact of such programs on teacher practice and/or student learning at schools. Collaboration of academicians and teachers can move the impact of research into practice (Keating et al., 1998). With the support of a mediator (e.g., a university academic working in a collaborative action research project), such impact can be more beneficial to academicians, teachers, and most importantly to students in schools (Gilbert et al., 2004).

It is important to note that any course on preparing teachers as researchers can be demanding for both participants and the lecturer. It might be more beneficial if participants, while conducting their small-scale research projects, are supervised by a different lecturer with relevant expertise in the investigated field. During this process, both parts can gain academically. "Some parts of these gains might be seen as aspects of 'professional socialization' in which apprentices in any field begin to absorb its norms, practices, as well as the knowledge [and skills] required to be proficient practitioners" (Seymour et al., 2004, p.531). Investigating the nature of such *professional socialization* would be a direction for future research.

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References

Baker, D. R. (2004). Focus on scientific literacy: The role of writing and speaking in the construction of scientific knowledge. *Eurasian Journal of Educational Research, 16*, 1-7.

Bennett, J., & Campbell, B. (2002). First steps in educational research: the experience of student teachers. *School Science Review, 84*(307), 49-59.

Calhoun, E. F. (1993). Action research: Three approaches. *Educational Leadership, 51*(2), 62-65.

Cepni, S., & Akdeniz, A. R. (1996). Fizik ogretmenlerinin yetistirilmesinde yeni bir yaklasim [A new approach on physics teacher education]. *Hacettepe University Journal of Education 12*, 221-226.

Cochran-Smith, M., & Lytle, S. (1999). The teacher research movement: A decade later. *Educational Researcher, 28*, 15-25.

Corey, S. M. (1953). *Action research to improve school practices*. New York: Teachers College Bureau of Publications, Columbia University.

Day, R. A. (1996). *Bilimsel Bir Makale Nasıl Yazılır ve Yayımlanır? [How to Write and Publish a Scientific Paper]* (G. A. Altay, Trans.). Ankara: TUBITAK.

Demircioglu, I. H. (2008). Learning how to conduct educational research in teacher education: A Turkish perspective. *Australian Journal of Teacher Education, 33*(1), 1-17.

Dillon, J., Sissling, S., Watson, R., & Duschl, R. (2002). Science teachers as researchers- a model for professional development. *School Science Review, 84*(307), 43-46.

Ekiz, D. (2006). Sinif ogretmenlerinin egitim arastirmalarina karsi tutumlari [Primary school teachers' attitudes towards educational research]. *Educational Sciences: Theory & Practice, 6*(2), 395-402.

Erduran-Avci, D. (2008) The use of student journals in science and technology education. *Eurasian Journal of Educational Research*, *30*, 17-32.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Verbal Reports as Data*. Cambridge, MA: MIT Press.

Fueyo, V., & Koorland, M. A. (1997). Teacher as researcher: A synonym for professionalism. *Journal of Teacher Education, 48*, 336-344.

Gilbert, J., Justi, R., van Driel, J. H., de Jong, O., & Treagust, D. (2004). Securing a future for chemical education. *Chemistry Education: Research and Practice, 5*(1), 5-14.

Gitlin, A., Barlow, L., Burbank, M. D., Kauchak, D., & Stevens, T. (1999). Pre-service teachers' thinking on research: Implications for inquiry oriented teacher education. *Teaching and Teacher Education, 15*(7), 753-769.

Hammersley, M. (1993). On the teacher as researcher. *Educational Action Research, 1*(3), 425-445.

Henson, K. T. (1996). Teachers as researchers. In J. Sikula, T. J. Buttery & E. Guyton (Eds.), *Handbook of Research on Teacher Education* (2nd ed., pp. 53-64). New York: Simon & Schuster Macmillan.

Keating, J., Diaz-Greenberg, R., Baldwin, M., & Thousand, J. (1998). A collaborative action research model for teacher preparation programs. *Journal of Teacher Education, 49*(5), 381-390.

Kempa, R. (2002). Research and research utilisation in chemical education. *Chemistry Education: Research and Practice in Europe, 3*, 327-343.

Lederman, N. G. (2007). Nature of science: Past, Present and Future. In S. A. Abell & N. G. Lederman (Eds.), *Handbook of Research on Science Education* (pp. 831-879). London: Lawrence Erlbaum Associates.

McInytre, D. (1998). The usefulness of educational research. In J. Rudduck & D. McInytre (Eds.), *Challenges for Educational Research* (pp. 188-206). London: Paul Chapman.

Meier, D. R., & Henderson, B. (2007). *Learning from Young Children in the Classroom: The art and science of teacher research*. New York: Teachers College Press.

Mercer, N. (1995). *The Guided Construction of Knowledge: talk amongst teachers and learners*. Clevedon: Multilingual Matters.

Millar, R. (2003). Communicating your research to others. In D. Krnel (Ed.), *Proceedings of the Sixth ESERA (European Science Education Research Association) Summer-school 2002* (pp. 97-104). Ljubljana: University of Ljubljana.

Pekarek, R., Krockover, G. H., & Shepardson, D. P. (1996). The research-practice gap in science education. *Journal of Research on Science Teaching 33*, 111-114.

Ratcliffe, M., Bartholomew, H., Hames, V., Hind, A., Leach, J., Millar, R., & Osborne, J. (2005). Evidence-based practice in science education: the researcher–user interface. *Research Papers in Education, 20*(2), 169-186.

Rudduck, J. (1985). Teacher research and research-based teacher education. *Journal of Education for Teaching 11*(3), 281-289.

Seymour, E., Hunter, A. B., Laursen, S. L., & Deantoni, T. (2004). Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. *Science Education, 88*(4), 493-534.

Sozbilir, M. (2007). First steps in educational research: The views of Turkish chemistry and biology student teachers. *European Journal of Teacher Education, 30*(1), 41-61.

Stenhouse, L. (1975). *An introduction to curriculum research and development*. London: Heinemann.

Stremmel, A. J. (2002). Teacher research: Nurturing professional and personal growth through inquiry. *Young Children, 57*(5), 62-70.

Tosun, O., Turgut, S., Orenler, S., Sengul, K., Top, G., & Cakmakci, G. (2008). *Ogrencilerin bilim insani ile ilgili algilarini degistirmeye yonelik bir calisma [A study on changing pupils' views about scientists]*. Paper presented at the 8th National Congress of Science and Mathematics Education. 27-29 August, 2008. Bolu, Turkey.

Van Zee, E. H. (1998). Preparing teachers as researchers in course on methods of teaching sciences. *Journal of Research in Science Teaching, 35*(7), 791-809.

Vygotsky, L. S. (1978). *Mind in Society: The development of higher psychological processes*. Cambridge, MA: Harvard.

YOK. (The Council of Higher Education of the Republic of Turkey) (2008). *Egitim Fakultelerinde Uygulanacak Yeni Programlar [New Programmes That Will be Implemented in Educational Faculties]*. Retrieved October 10 2008, from http://www.yok.gov.tr/egitim/ogretmen/yeni_programlar_ve_icerik.htm

Öğretmenleri Araştırmacı Olarak Yetiştirmek: Öğretmen Adayları Tarafından Hazırlanan Araştırma Raporlarının Değerlendirilmesi

(Özet)

Problem Durumu: Öğretmenlerin eğitim araştırma sonuçlarını etkili bir şekilde sınıflarında kullanabilmeleri ve küçük çaplı araştırma projeleri yürütebilmeleri için gerekli olan bilgi ve beceriye sahip olmaları, bir öğretmende bulunması gereken nitelikler arasında kabul edilmektedir. Ancak hizmet öncesi ve hizmet içi öğretmen eğitimi programları incelendiğinde, araştırmacı öğretmen yetiştirme yaklaşımına dayalı bir eğitimin çoğu zaman eksik olduğu dikkat çekmektedir. Özellikle hizmet öncesi programlarda, öğretmen adaylarına araştırmacı kimliği kazandırabilecek derslerin içeriği incelendiğinde uygulamadan ziyade teorik bilgiye dayalı bir yaklaşımın temel alındığı görülmektedir. Mevcut literatür incelendiğinde ise, hizmet öncesi ve hizmet içi dönemlerde öğretmen adaylarına araştırmacı kimliği kazandırabilecek yaklaşımların uygulandığı programların etkinliğini araştıran araştırma sayısının çok az olduğu görülmemektedir.

Araştırmanın Amacı: Bu makale, araştırmacı öğretmen yetiştirme yaklaşımına dayalı bir programın 50 fen ve teknoloji öğretmen adayına uygulanmasını incelemektedir. Çalışmanın amacı, hizmet öncesi öğretmen eğitimi programları kapsamında fen ve teknoloji öğretmen adayları tarafından hazırlanan araştırma raporlarını değerlendirmektir.

Araştırmanın Yöntemi: Bu araştırmanın katılımcılarını, 2007-2008 öğretim yılı Bahar döneminde İlköğretim Bölümü'nde öğrenim gören Fen Bilimlerinde Özel Konular-II dersine katılan 50 fen ve teknoloji öğretmen adayı oluşturmaktadır. Bu ders kapsamında öğrencilere bilimsel makaleleri eleştirel olarak değerlendirme teknikleri örnek araştırma makaleler üzerinden anlatılmıştır. Ayrıca öğrenciler ders sorumlusu danışmanlığında 3 ile 5 kişilik gruplar halinde küçük araştırma projeleri tasarlamış ve yürütmüş, bir akademik makalede bulunulması gereken temel kriterleri baz alarak bir araştırma raporu hazırlanmış ve dönem sonunda araştırma sonuçlarını okudukları bölümdeki diğer öğretmen adayları ve akademisyenlerle poster sunumu yaparak paylaşmışlardır. Bu planlanmış etkinliklerle, öğretmen adaylarına yaparak, yaşayarak öğrenme ortamı oluşturarak bilimsel araştırma yapabilme becerisi kazandırılarak; öğretmen adaylarına araştırmacı bir kimlik kazandırmak amaçlanmıştır. Çalışma kapsamında, öğretmen adayları tarafından 3-5 kişilik gruplar halinde hazırlanan 12 araştırma raporu incelenmiştir. Diğer araştırmacılar tarafından geliştirilen bilimsel makaleleri değerlendirmek için kullanılan formlardan faydalanılarak bir değerlendirme formu hazırlanmış ve bu form yardımıyla araştırma raporları analiz edilmiştir. Çalışmada kullanılan analiz yönteminin güvenirliğini sağlamak için, 4 araştırma raporunun analizi iki farklı araştırmacı tarafından yapılmış ve bu analizler arasındaki uyum %80 olarak bulunmuştur. Tutarsız sonuçlar ise tartışılarak tekrar gözden geçirilmiştir.

Araştırmanın Bulgular: Araştırma sonuçları, bir danışman rehberliğinde öğretmen adaylarının bir araştırma projesi tasarlama, uygulama, bir araştırma raporu yazma ve bulgularını diğer kişiler ile konferanslarda paylaşabilme bilgi ve becerisine sahip olabileceklerini göstermiştir. Araştırma raporları incelendiğinde genel olarak çoğu makalede bir akademik makalede bulunması gereken temel hususlara yer verildiği, fakat bazı makalelerde teorik bilginin yetersiz olduğu, araştırma yöntemlerinin ve özellikle nitel verilerin nasıl analiz edildiği ile ilgili bilgilerin yetersiz olduğu, araştırma bulgularının literatürdeki diğer araştırma bulguları ile desteklenip, mukayese edilmediği, araştırma bulguları ışığında öğretmenlere ve araştırmacılara yönelik yeterince öneri sunulmadığı ve referans yazımında bazı hatalar yapıldığı bulunmuştur.

Araştırmanın Sonuçları ve Öneriler: Bu araştırmada, öğretmenleri araştırmacı olarak yetiştirme yaklaşımına dayalı olarak geliştirilen bir dersin hizmet öncesi öğretmen eğitiminde uygulanması incelenmiştir. Bu araştırmada, ders sonunda öğretmen adayları tarafından grup halinde hazırlanan araştırma raporlarının değerlendirilmesi yanında ders boyunca yapılan etkinliklerin yapılma nedenleri detaylı olarak tartışılmıştır. Böylece, bu araştırma, benzer amaçlara yönelik hazırlanacak programların

geliştirilmesi ve uygulanması konusunda araştırmacı ve eğitmenlere ışık tutacaktır. Öğretmen adaylarına ve öğretmenlere araştırmacı bir kimlik kazandırmak için geliştirilen programların ve bunların etkinliğini araştıran çalışmaların yetersizliği göz önünde bulundurulursa, bu tarz araştırmaların farklı bölümlerdeki öğretmen adayları ile hizmet öncesi eğitim programlarında ve öğretmeler ile hizmet içi eğitim programlarında yapılması önerilebilir. Hizmet içi eğitim programlarında üniversiteler ile işbirliği yapılması bu programların etkinliğini arttırabilir.

***Anahtar Sözcükler*:** Araştırmacı öğretmen, öğretmen araştırması, eylem araştırması, öğretmen eğitimi

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Data-Based Change for Departmental Effectiveness in the English Preparatory Unit: A Longitudinal Case Study

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Abstract

Problem: The major problem was: "What will be the impact of a three-year evidence-based and mission-driven change program (to be launched between 1997-2000) on the proficiency level of English Preparatory Program students (of Gaziantep University) longitudinally, in terms of international compatibility?"

Purpose: The main purpose of this study was to inquire means and ways of assuring accountability as a tool for departmental effectiveness, through measurable performance indicators in the English Preparatory Department of Gaziantep University.

Design and Methodology: This paper presents a longitudinal case study, embracing action research backed by a series of empirical analyses (time-variant and time-invariant) spanning a 9-year period. Statistical applications such as independent samples t-test, linear regression and correlation have constituted the backbone of the analyses.

Findings: The proposed exemption criterion (500 PB-TOEFL) had no scientific base and was not justifiable in terms of minimum proficiency level required for the completion of the English Preparatory Program. Findings showed that the minimum English proficiency level was approximately equivalent to a score of 377 on the paper-based TOEFL, being far from the exemption criterion and international compatibility.

Conclusions/Recommendations: It can be concluded that the average outputs of the English Preparatory Department (of Gaziantep University) were not

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found to be internationally compatible with refrence to TOEFL grades and, in great part, the exemption criterion and the English proficiency level attained at the EPD was/is still not accountable. Outsourcing can be an innovative alternative for improving efficiency at the English preparatory unit in question.
Keywords: Evidence-based change; foreign language teaching, departmental efficiency, Turkey

The key to departmental effectiveness is in the ability and capacity of the managerial system to initiate and maintain change towards a shared vision. "Poor management and inappropriate leadership are common features of ineffective departments" (Harris, 2000, p.85). Research findings on school improvement acknowledge the importance of building the capacity for change within the organizations because "school-level, department-level, and classroom-level change is considered to be essential in effective school improvement programs" (Stoll & Fink, 1997). In furthering overall school performance, the issue of departmental improvement is of particular concern, since a great portion of the variation in effectiveness among schools is created at departmental level (Sammons, Thomas & Mortimore, 1997).

During the past decades, there has been an increasing effort in Turkey towards reforming education and improving the quality of educational (learning) outcomes. The driving force for the reform movements mainly came from the compelling need to change in all facets of education, as the current educational paradigm has failed to meet the challenges. In the field of teaching English as a Foreign Language (EFL), attention has been shifted from inquiring about the best methodologies to reflective teaching and action research (Richards & Lockhart, 1994). Reflective analysis of current processes and products, trying managerial innovations, and assessing their effects in particular cases/schools/academic units has become the focal point in institutional changes and professional development (Bryant, 1996; Day, 2000).

Pressures imposed by European Union full membership criteria have opened some major change avenues in the social, economic and political realms of the full member candidate countries, like Turkey, because poor command of the English language is seen as the major obstacle to student and staff mobility in European Union. Therefore, an increasing number of English-medium courses have been implemented at undergraduate and graduate levels across Europe (Miclea, 2003). However, the debate among Turkish educators about teaching English language has centered around whether English language instruction should be done through content in English-medium schools or via intensive English language classes inserted into the national curricula at all levels (Dogançay-Aktuna & Kızıltepe, 2005, p. 258). In fact, what we really need is to inquire into the quality and international compatibility of English language teaching services and products

through reflective approaches, beginning at the departmental level. Reflective approaches, in the meantime, can be defined as a means through which practitioners can develop an insightful self-awareness by ongoing assessment of their practices, to search for strategies in achieving intended outcomes (Osterman & Kottkamp, 1993).

The idea that the task of foreign language teaching centers cannot be fully accomplished without a research initiative directly related to the services of the center (Vogel, 2001) has fueled the research endeavour. Thus, understanding and implementing organizational change as a vehicle for institutional effectiveness on the bases of both processes and outcomes, has been the core of this study.

The knowledge base on the dynamics of the change process mainly came from the large-scale school improvement projects launched during the mid 1980s (Crandall & Andover, 1982; Hargreaves, 1984; Rosenholtz, 1989). It is now clear from the literature on school improvement that furthering departmental/school-wide change has been the major concern of theorists and practitioners in the field.

As we move from the Industrial to the Information Age, the core of change is also changing enormously, from part to whole, from episodic to continual (Weick & Quinn, 1999). As a generic term, change is widely used to describe almost all forms of organizational change. However, with the same generic word, it is not possible to make an acceptable distinction in the scale, type, source, and structure of any organizational change taking place at a time. Marshak (2002) argues in his scholarly article that organizational change terminology is rather ambiguous and outlines two major change typologies as single variable and multivariable (p. 281) and, furthermore, proposes four change scenarios with two dimensions (episodic and continuous) of organizational change as periodic operational adjustments, periodic systematic (re)arrangements, continuous operational adaptations and continuous systemic alignments (p. 283).

Bateson (1998), on the other hand, suggests epigenetic change (where a new form is derived from the old) as a third way of understanding organizational change beyond the two broad categories, namely incremental and paradigmatic. Incremental change denotes maintaining a smooth interface between the organization and its gradually changing environment, whereas a paradigmatic change is usually imposed from the outside and involves total replacement of the old by a new form (Burt, 2003, p. 382).

Complexity Theories and Change

Complexity theory serves as a generic term representing a number of theories and ideas borrowed from a number of natural sciences (Stacey, 2003). The significance of this theory is that it has brought practitioners and researchers to a common point on how organizations should be structured and changed (Schein,

1996; Schein, 1998; Black, 2000; Stacey, Griffin, & Shaw, 2002). Indeed, complexity theories mainly originate from dynamic non-linear (complex) systems and their chaotic self-organizing behaviors (Thietart & Forgues, 1995, p.28; Lichtenstein, 2000, p. 131) associated with postmodern science, which is emerging as a dominant paradigm. Postmodernism stresses the relativity, instability, chaotic order, diversity and non-linearity (Best, 1991, p.188).

The implications of the postmodern paradigm for organizational change are quite challenging in terms of fixed planning, determination of relations and prediction of future events, assumptions of cause-effect, constant order, stable equilibrium and static structures. Thus, metaphors viewing organizations and change processes, like machines, political systems and organisms, have fallen short against the postmodern views of the organizational change. However, the "flux and transformation" metaphor suggests that order naturally emerges out of the chaos and organizations as a part of the whole environment do have a capacity to self-organize, change and self-renew in a rather turbulent world; tensions and conflicts are driving forces of the emerging new order (Morgan, 1997). The climax of this complex order is called the "edge of chaos." Brown & Eisenhart (1997) define this state as "…complex systems have large numbers of independent yet interacting actors. The most adaptive of these complex systems keep changing continuously by remaining at the …edge of chaos that exists between order and disorder" (p. 29).

The problems leading the researcher to the conduct of this longitudinal study, originated from a debate among the English Preparatory Department (EPD) (where the first researcher was the chairman), the University's Executive Board and the English Language and Literature Department (ELLD). Although there was no scientific evidence, the Executive Board and the ELL Department insisted that "the base line for the exemption from the English Preparatory Program, should be over 500 (PB) TOEFL, otherwise EPD exemptees would not be able to survive in upper grades; in English-medium instruction faculties."

Thus, the study specifically addressed one major and five sub-problems;

Major Problem**:** Is the English Preparatory Program (at Gaziantep University) internationally compatible in terms of the minimum proficiency level required for its successful completion?

Sub-problems:

1. Is there a statistically significant difference between the success of the English Preparatory Program exemptee and the non-exemptee students (of 1999-2000 academic year) based on their first-year, first-term performance in the English Language and Literature Department?

2. Is there a statistically significant difference between the success of English Preparatory Program exemptee and the non-exemptee students (of 1999-2000

academic year) based on their four-year performance (graduation success) in the English Language and Literature Department?

3. Are the English Preparatory exemptee and non-exemptee ELL students' university admission scores (English proficiency) the predictor of their graduation success?

4. Is there a scientific foundation for the minimum proficiency level currently (i.e in 1996-1997 and before) required, both for the exemption from the English Preparatory Program and for its successful completion?

5. What is the terminal impact of the English Preparatory Program in terms of the English proficiency levels of the students in English-medium faculties of the Gaziantep University?

Within the scope of this paper, the change initiative put in effect between 1997-2000, in the EPD of Gaziantep University and a follow-up evaluation of the outcomes until 2006, will be the major foci. However, the managerial shifts that have occurred (four times) in the same department, after 2000-2001 and their managerial disposals will be out of consideration. The major changes introduced (1997-2000) were maintained by these successive managerial teams. The aim of the study is to set an example of how a change program, through reflective approaches, could be implemented by solid facts in an English preparatory unit within a bureaucratic context.

Design and Methodology

The study, by its very nature, has been a longitudinal one: "A longitudinal case study is one in which two or more measures or observations of a comparable form are made of the same individuals or entities over a period of at least one year" (White & Arzi, 2005, p. 138). Case study is defined by interest in individual cases, not by methods of inquiry used and it draws attention to the question of what specifically can be learned from the single case (Stake, 1998). Since the departmental change efforts have been directed to the improvement of services and products at the EPD, the study is simultaneously action research, where theory and practice are combined through change and reflection synergistically (Avison, Lau, Myers, & Nielsen, 1999). This kind of reseach is usually sparked by reflective thinking, which involves looking inward and questioning our current way of doing things (Yıldırım & Simsek, 2006). As for the nature of the problem, the way the research contributed to the professional lives of those who were either participants or recipients of the research or its outcomes, and the group commitment to solving a problem, can be labelled as participatory action research (Taggart, 1997).

The research required time-variant and time-invariant measurements to be made within a nine-year period of two major stages. In the first phase, which took three years, curricular and structural reorganizations were launched to serve as the

foundation for the change movement in the EPD from 1996-1997. Linear Regression Analysis, Independent Samples t-test and Pearson Correlation were used as statistical tools. Standard TOEFL examinations were administered through authorized commercial sources over the corporate rates. Subjects' grades were obtained from the Registars' Office of Gaziantep University.

Reassessment of the existing system by time-invariant measurements; provision of a sound vision and mission, formation of new teams (such as testing and materials development), introduction of clearly defined instructional objectives, alignment of subsystems and tackling non-academic obstacles have been the major tasks of the base processes. In the second round (between 1999-2005) of the study, which is the major focus of this article, time-variant measurements were made and provided as evidence for the alignment of ongoing curricular and structural changes in the EPD. The SPSS 6.0 version was used in the statistical analyses at the early stages (up to 2002), while the 10.0 version became the statistical tool and all the data were transferred and analyzed by this version afterwards.

Baseline (pre-initiation) Assessments

1. Administration of a standard TOEFL test to a randomly selected sample of 40 (15% of the target population) English preparatory students right before the 1998-1999 academic year's regular final examination. Later on, these TOEFL grades were compared with the regular final examination grades for determining the compatibility of the Gaziantep University English Preparatory Program, on an outcome basis, with TOEFL standards. The analysis was carried out by linear regression.

2. Beginning in the 1998-1999 academic year, an internationally recognized and standardized exemption test (Oxford Placement Test 1 by Allen, 1996) was used in the selection of English Preparatory School exemptees and non-exemptees, plus distribution of non-exemptee preparatory students to three English proficiency level-grades as A, B and C. Beginning in the 1999-2000 academic year, standard TOEFL test results were used as the basic criterion in exemption examinations.

Developmental/Formative Assessment/Evaluation

3. The first time-variant measurements, for the comparison of the exemptee and the non-exemptee first grade undergraduate ELL students' success in their major, were recorded to evaluate the efficiency of their English proficiency based on their achievements on the major subjects such as writing, reading, advanced English grammar, oral expression and study skills in their first term of the freshman in the academic year of 1999-2000. The Independent Samples t-test was used in this analysis.

4. Getting feedback from the staff (n=26) and the students (n=259) on their perceptions of the ongoing change in 1999-2000. After publication of the findings of this survey in an academic journal (Ceyhan & Summak, 1999), a progress report was shared with the EPD staff and the university president in 2000.

Summative Evaluation/Assessment

5. TOEFL equivalent of the English preparatory completion grades of the randomly selected 40 subjects (as freshman students) were assessed in 2001-2002 (*three years after the newly implemented system, the EPD had become impactable on the outgoing students*). The subsequent (post-test) assessment, of the same group was made on 33 studens because seven of them were dismissed until graduation (i.e., the 2005-2006 academic year).

6. The English preparatory exemptee and non-exemptee subjects' (ELL students) graduation grades were analyzed (in 2004-2005) to see if there would be any significant difference between the two groups.

7. Subjects' (exemptee and non-exemptee ELLD students) university admission (English) grades were compared to identify whether these could be the predictor of their graduation grades.

8. Overall evaluation of the impact of the English Preparatory Program on students' English proficiency level at the end of their undergraduate study (namely, Engineering (n=28) and English Language and Literature Department (n=5) of the Gaziantep University) in 2005-2006. This assessment has been made with a sample of 33 (approximately 10% of the target population) undergraduate students included in the assessment cycle in 2001-2002 as randomly selected subjects (n=40; seven students were dismissed in the meantime) as the first products of the change program implemented.

Research Population

The subjects of the study differed based on the measurement and type of the data to be obtained at several intervals. All the students, both English Preparatory Program exemptees and non-exemptees, attending classes in the English Language and Literature Department at Gaziantep University during the academic year 1999-2000 constituted the primary group in the research population. In this group, the study began with 61 (29 EPD-exemptee and 32 non-exemptee) first grade English Language and Literature students. At the end of the fourth year, there were 51 students heading for graduation; three of them were transfer students from other universities and were not considered as subjects of the study in hand. While ten of the beginning subjects were dismissed in the course of research (attrition), the final cycle of comparison was carried out on the grades of the remaining 48 subjects, of whom 24 were preparatory exemptees and 24 non-exemptees. Most of the time-variant data were obtained from this group.

The second group was 40 English Preparatory students (15% of the population) who were randomly withdrawn and were administered paper-based TOEFL in 1998-1999. Assessment with this group provided a conversion formula (see Figure

1 and Table 1.) to be used in the prediction of TOEFL scores of the outgoing EPD students.

The third sample was randomly selected (n=40) as pre-test and post-test subjects (who were enrolled in the EPD three years after the implementation of the change program, in 2000-2001). The English Preparatory Program completion grades of this group was used as a criterion, to see to what extent the newly established vision had been realized.

In the post-test step, the very same group of students, from Engineering (n=28) and English Language and Literature (n=5) 33 (seven of them were dismissed) at the end of 2005-2006, were given the paper-based TOEFL to provide data on how English proficiency level acquired in the EPD correlated with the international compatibility of English proficiency level at the time of graduation.

The Case Study Context

The scene for the longitudinal case study was the English Preparatory Department of Gaziantep University, which is now accommodating 12.000 students and 900 academic staff. The medium of instruction is English in the Faculty of Engineering only. The Preparatory English program is mandatory for the students attending the Faculty of Engineering, Faculty of Medicine, English Language and Literature Department, Vocational High School of Toursim and Hotel Management. In total, the English Prepartory Department currently serves 1045 students.

Before setting out for a department-wide change, a vision that would serve as a driving force has been drafted as follows:

"*Within three academic years (in 2000-2001), the English Preparatory Department will enable all incoming students to score at least 500 on the paper-based TOEFL examinations before their admission to the freshman classes.*"

Our mission at the EPD then was stated as: "*To ensure internationally compatible service excellence and English proficiency for all students*." The core values in carrying out this mission would be: "*Caring, Sharing and Changing for the Better." Caring* meant everybody would take responsibility for the implementation of the change. Sharing, came to mean that decisions would be made and objectives would be set through collaborative efforts; involving all the related parties actively, "Because educational reform initiatives require teachers to become management partners in both daily school operations and long-term strategic planning…" (Simsek & Seashore, 2008, p. 95). Caring what we do and accepting responsibility proportionate to the share in the change processes would eventually lead us to an overall change for the better.

Results

Descriptive statistics

Table 1

Linear Regression Analysis for the Predictor Value of the English Preparatory Department Proficiency Level on Paper-based TOEFL.

PB-TOEFL Scores of the English Prep. Sample (n=40) 1998-1999					
Predictor	B	SE	*β*	R^2	Sig. (of *t* values)
English Prep. Proficiency Grades of the sample (n=40)	2, 773	,776	,506	,256	,001
Constant	210,	037	48	,879	,001
Variance explained by the independent variable	25,6%				

This measurement made for the identification of TOEFL compatibility of the English Preparatory proficiency level, revealed that minimum proficiency level required for EPD completion (60 points over 100) would be approximately equivalent to 377 paper-based TOEFL. The equation is then: y (projected TOEFL score) = 210,037 + (2,773 * x) = 377, where x stands for the preparatory English proficiency completion grade. Similarly, the R^2 value of 0,256 (see Table 1.) indicates that a minimum English proficiency level attained in English Preparatory Department, approximately explains 25% of the variance.

This baseline analysis, carried out at the end of academic year 1998-1999, revealed that the minimum English proficiency level required for the completion of the EPD was far from international compatibility in terms of paper-based TOEFL.

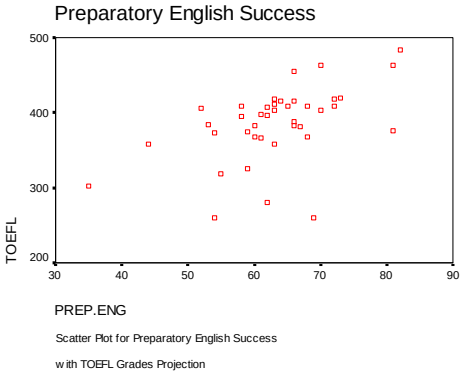

Figure 1. Split-plot of the Regression Analysis on the predictive value of the preparatory English grades (1998-1999) in terms of PB-TOEFL.

Table 2

Independent Samples t-test Analyses of the ELLD First-year First-term English Courses of the Exemptee and Non-exemptee Students

Status	N	ELL First-Year/First-Term Courses	Mean	Standard Deviation	t value	Sig.
EPD-Exemptee ELLD Student	29	Advanced Eng. Gram.	1,6552	0.271	-0,30	0,76
		Oral Expr.	1,8966	0,795	-1,50	0,14
		Study Skills	1,5862	0,536	-0,78	0,43
		Writing	1,6552	0,502	-1,24	0,21
		Reading	1,8276	0,539	-0,97	0,33
EPD non-exemptee ELL Student	32	Advanced Eng. Gram.	1,6875	0,550	-0,30	0,76
		Oral Expr.	2,2031	0,802	-,1,50	0,14
		Study Skills	1,7031	0,620	-0,78	0,43
		Writing	1,8281	0,502	-1,24	0,21
		Reading	2,0000	0,803	-0,97	0,33

P< 0.05

There was no statistically significant difference between the EPD-exemptee and non-exemptee students' success, regarding the Advanced English Grammar, Oral Expression, Study Skills, Writing, and Reading courses, in their first-year first-term at the ELLD (1999-2000). This evidenced that EPD exemptee ELLD students could survive in their major just like their non-exemptee counterparts (who actually attended the EPD), opposing the prejudice that newly introduced exemption test and the criterion would not be fit in sorting out the incoming EPD candidates.

Getting Feedback about the Ongoing Change

Feedback obtained from the instructors (n=27) and students (n=259) at the EPD through a field survey in 1998 revealed that the ongoing change program had a positive impact on them and the majority of the instructors (67%) and students (64%) stated that the change program should be maintained and they considered it worth maintaining (Ceyhan & Summak, 1999). Based on the former assessments and this feedback from the EPD, a comprehensive progress report (20-page) was written in 2000 and submitted both to the EPD staff and the university president.

Table 3

Analysis of the EPD Exemptee and Non-exemptee Students' Graduation Grades (success) at the End of Four-year Under Graduate ELL Program through Independent Samples t-test.

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	,361	,551	-,549	46	,585
Equal variances not assumed			-,549	45,611	,585

P<.05

Analysis carried out by Independent Samples t-test revealed no significant difference between the overall success of the exemptee and non-exemptee subjects' (ELLD students) graduation grades (in 2004-2005). This finding is concordant with the subjects' first-year (freshman), first-term success at the ELL Department, as EPD exemptee and non-exemptee students (see Table 3).

Table 4

Linear Regression Analysis for the Predictor value of the English Preparatory Exemptees' (ELLD students') University Entrance English Proficiency Scores on their Graduation Grades (1999-2004).

	EPD exemptee ELLD Students' Graduation Scores				
Predictor	B	SE	β	R^2	Sig. (of *t* values)
ELLD Students' University Entrance Scores	$9{,}348^{E}$ -02	,034	,506	,256	,012
Constant	-13,373	5,693			,028
Variance explained by the independent variable			25,6%		

Linear Regression Analysis indicated that EPD exemptee ELL students' university admission (English Proficiency) scores could be the predictor of their four-year undergraduate success (Table 4).

Table 5

Linear Regression Analysis for the Predictor Value of the English Preparatory Non-Exemptee Subjects' (ELLD Students') University Entrance English Proficiency Scores on their Graduation Grades (1998-2003).

	EPD Non-exemptee ELLD Students' Graduation Scores				
Predictor	B	SE	β	R^2	Sig. (of *t* values)
EPD Non-exemptee Univ.Entrance Scores.	1, 846	4	,549	,000	,689
Constant	1,042E-03	,010	,022		,918
Variance explained by the independent variable				0%	

The EPD non-exemptee (who actually attended the English Preparatory Program for at least one academic year) ELL students' university entrance scores did not seem to be the predictor of their four-year undergraduate success. As shown in Table 5, there is no correlation between the two variables and the regression model is not fit for the analysis of any predictor value. This finding may come to mean that the newly-introduced English preparatory exemption test (Oxford) has been a valid tool in selecting the students; and those who were exempted from the English Preparatory Program may have come to the university with a stronger English background, or vice versa.

Table 6

Pearson Correlation Coefficient between the EPD Completion Grades and the Measured English Proficiency Level (TOEFL) of Students at the Time of Graduation from English-Medium Departments.

		English Proficiency level (TOEFL) at Graduation
EPD Completion Grade	Pearson Correlation	,985
	Sig. (2-tailed)	,000
	N	33

** Correlation is significant at the 0.01 level (2-tailed).

The correlation between the "general" EPD completion grades, freshman entry, and those at the end of the fourth year (both measured in terms of paper-based TOEFL), was found to be (0,98), highly positive (Table 6). This correlation has been calculated on a randomly selected sample (n=40; in 2001-2002) of the freshman

students, and of the same group in 2005-2006, (n=33; seven students were dismissed) immediately before their graduation from English-medium faculty departments.

When the EPD completion grades and the terminal English proficiency level achieved (in terms of paper-based TOEFL), are examined on the basis of international compatibility of the EPD outputs, in 2000-2001 (three years after the change program implemented), only 10% of them (4 out of 40) seemed to score over the minimum success barrier (500 or over, on the paper-based TOEFL) as declared in the English Preparatory Department's vision statement. However, at the terminal assessment in 2005-2006, 39% (13 out of 33; seven students were dismissed until graduation) of the same group scored over 500 on the (PB) TOEFL examination.

Discussion

One of the limitations of the study could be the managerial shifts that took place between the years 2001-2007 in the EPD. Similarly, the scarcity of case studies, especially change initiatives driven mainly by managerial focus and their outcomes at English as a foreign language teaching centers, in the available literature can be seen as another limitation. This is evident in Chaudron's (2001) review article, which analyzed the progress in language classroom research from 1916 to 2000 by examining topical and methodological trends only. Therefore, on the one hand, findings and implications of this study could best be discussed by referring to some case studies and organizational change efforts in ELF (English as a Foreign Language teaching) centers/units and other educational settings while, on the other hand, the findings could also be discussed on the grounds of organizational change theories in terms of purpose, scale and speed of the change implemented.

One of the few studies, drawing on examples taken from recent experience of ELT projects (by the British Council in Central Europe) reported the benefits of insider-managed baseline, developmental and summative evaluation in educational change processes (Tribble, 2000). Similarly, Kennedy (1998) suggests that ELT project management involves change at various levels and draws attention to the importance of formative and summative project evaluation. These findings justify the general design of the study in hand and the evaluative strategies employed.

In his pioneering study in EFL (English as a Foreign Language) management in Turkey, Göker (2006) stresses the importance of reflective-based managerial practice and assessment for the development of educators and school climate. His suggestions support our findings in that English language teaching units should look inside and create a reflective learning environment.

For the implementation of innovation, which can be the source of organizational change, in ELT, Waters & Vilches (2001) introduce a "needs analysis matrix" framework as the baseline evaluation procedure in identifying the so called "*levels of need*" and the "*areas of need*." Although the procedures are not identical, the matrix approach coincides with the basic logic of the design of our research in that both began with baseline measurements. White (1987) highlights the importance of benefiting from

the commercial world in establishing clear aims in the management of innovation in English Language Teaching (ELT). The change initiative at the EPD, characterized by a newly introduced vision and mission comply with this point of view.

Şimşek and Aytemiz (1998), in their attempt to analyze institutional change at a large Turkish public university, argued that anomalies could be markers for any major change and determinants of the nature, scale and management of change to be implemented in that particular organization. Prior to a change program, identification of institutional anomalies is important because it paves the way to organization-specific and fine-tuned changes/innovations instead of implementation of a generic change model just by borrowing. In our case, the facts gathered by examining the key processes carefully and thoughtfully, the organizational failures, which were believed to be terminal extensions of organizational anomalies, were identified. In this sense, the change model implemented at the EPD of Gaziantep University could be compared to the "anomaly-based" model because the premises driving the change were quite similar.

The findings of the study also resemble the results of Hergüner and Reeve's (2000) longitudinal case study, which inquired into the measurement of cultural change at a University Language Center in Turkey, through TQM implementation. After assessing the relationship between national and the corporate culture, they concluded that maintenance of TQM systems without continued senior managerial commitment would not be secured. A similar managerial commitment, both at the senior and junior levels (the chairman of the English Preparatory Department) was found, based on the staff perceptions, to be closely related with the success and maintenance of the change implemented at the EPD (Ceyhan & Summak, 1999).

Focus of this nine-year longitudinal case study, which embraced pratice and research, has been directed toward improving overall efficiency of the English Preparatory Department whose products are channeled into a number of English-medium undergraduate programs. Findings revealed that the English Preparatory Department has long been suffering from accumulated structural and functional failures, leading to a kind of entropy. The change process, in terms of scale, can be identified as an eclectic one; being paradigmatic at one level, and epigenetic or episodic at another. When the rate of occurrence is considered, it may be categorized as discontinuous, characterized by "periods of incremental change sandwiched between more violent periods of change" (Nelson, 2003, p. 18). In general, the change process is an emergent one (Burnes, 1996; Senior, 2002) and can be labeled as failure-based and remedial.

In sum, the change initiative undertaken at the EPD has been multifaceted and eclectic. The general scope of the change, for example, was paradigmatic-moving from time- and content-based instruction to an outcome-based one. Episodic changes came into existence as the new evidence of organizational failures was obtained, such as student and staff absenteeism and English proficiency level (s) attained at the end of the Preparatory English program and in upper grades in English-medium departments. Changes implemented by the new bylaws, and the modifications made in the physical setting can be of epigenetic.

In fact, as a bureaucratic organization, management's service energy at the EPD has been diverted from meeting students' and stakeholders' (recipient faculties and businesses) instructional needs and mainly applied to system maintenance, without a thorough anaylsis of the processes and outputs. The core of the change effort undertaken, indeed, has been the reorientation of the "mindset" of bureaucratic management towards client and stakeholder satistfaction with tangible results. In this respect, the change program, on the grounds of organizational attitude, can be labeled as paradigmatic.

Kurt Lewin's field theory and three-step change model are still acknowledged as remarkable contributions to organizational change and complexity theories (Kippenberger, 1998; Kreitner & Kinicki, 1992). Lewin's ideas on inter-group dynamics (social psychology) have direct correlation to chaos theory (McClure, 2004, p. 49). Lewin argued that a successful change process bears three major steps: *unfreezing,* where the status quo is challenged and the need for change is recognized; *moving* to a new state where participation and collaboration is needed in decision making and implementation; *refreezing*, where organization is stabilized in a quasi-stationary equilibrium and newly emerging structure is preserved (Dawson, 2002). The change program launched at the EPD seems to have followed these three steps to some extent, questioning the operation of the existing system (unfreezing), developing a new vision to mobilize the department toward a new state (moving), and sustaining the new state by preserving the organizational change capacity (refreezing).

Indeed the "refreezing" step, in the EPD case, appears to be questionable in that it is not clear whether the departmental change capacity has been maintained after the managerial shifts that took place between 2000-2007. Maintanence of this capacity is important because, service quality is assured, usually through individual empowerment, teamwork and customer focus as in the case of Total Quality Management (Gazi, Silman & Birol, 2008).

Conclusions

In conclusion, in light of the findings presented here longitudinally, the English Preparatory Program at Gaziantep University still needs to be upgraded. Whatever the underlying reasons, the learning outcomes of the EPD were/are neither internationally compatible nor acceptable in terms of maintaining functional English-medium instruction. The absence of a fair and scientifically acceptable exemption criterion makes it almost impossible to assess the actual performance and learning outcomes of the EPD. Indeed, the mismatch between the proficiency level gained in the EPD and the exemption criterion seems to be one of the serious obstacles to a sound assessment of the EPD program and overall departmental effectiveness. Furthermore, authorities have to make sure that there will be no single student, remaining in the EPD without adding any value to his/her English proficieny due to misplacement in the exemption. From a managerial innovation standpoint, outsourcing, or purchasing quality service from external entrepreneurs (which simply means "financial risks/costs out and quality in"), can be an alternative in assuring organizational change capacity at the English language

preparatory unit in question. Because, maintaining vision-based long-term change initiatives in academic bureaucracies seems problematic.

Recommendations

It is obvious that outcome-based instruction seems to have not yet found its way to the English Preparatory Department where the case study was conducted. European Union standards (EAQUALS), drafted for quality foreign language services may serve as the ultimate vision and driving force in any improvement attempt in the EPD. As an EU member candidate state, Turkey is expected to comply with the EU legislations and educational standards within a relatively short period of time. Furthermore, an ongoing reflective assessment mechanism should be set up and maintained for gaining insight into the actual performance and outcomes of the EPD. An internationally recognized exemption and proficiency-level-grading device should be used in sorting out EPD candidates. Cause-effect studies of complementary nature are also needed to uncover the underlying reasons for underachievement in the English Preparatory Program.

References

Allen, D. (1996) *Oxford Placement test batteries* (1), Oxford University Press, Oxford.

Avison, D., Lau, F., Myers, M., & Nielsen, P.A. (1999). Action research. *Communications of the ACM*, 42 (1), 94-97.

Bateson, G. (1988). *Mind and nature a necessary unity*. Bantam edition: New York.

Best, S. (1991). Chaos and entropy metaphors in postmodern science and social theory. *Science as Culture*, 2 (11), 188-226.

Black, J.A. (2000). Fermenting change: capitalizing on the inherent change found in dynamic non-linear (or complex) systems, *Journal of Organizational Change Management*, 13 (6), 520-52

Brown, S.L., & Eisenhardt, K.M. (1997). The art of continuous change: linking comlexity theory and time-paced evolution in relentlesly shifting organizations. *Administrative Science Quarterly*, 42, 1-34.

Bryant, I. (1996). Action research and reflective practice. In S. David (Ed.) *Understanding Educational Research (p. 160).* Routledge Florence, KY USA.

Burnes, B. (1996) 'No such thing as . . . a "one best way" to manage organizational change', *Management Decision*, 34 (10),11–18.

Burt, G. (2003). Epigenetic change: new from the seeds of the old. *Strategic Change*, 12, 381-393.

Ceyhan, E., & Summak, M. S. (1999). Haşlanmış kurbağa ve değişim yönetimi [the boiled frog and change management] *Kuram ve Uygulamada Eğitim Yönetimi*, 20, 521-544.

Crandall, D & Andover, M.A. (1982). *People, policies and practice: Examining the chain of school improvement,* (Vols 1– 10), Andover, MA: The Network.

Chaudron, C. (2000). Progress in language classroom research: Evidence from the modern Language Journal, 1916-2000, *The Modern Language Journal*, 85 (1), 57-76.

Day, C. (2000). Effective leadership and reflective practice. *Reflective Practice,1 (1),113-127.*

Dawson, P. (2002). *Understanding organizational change: The contemporary experience of people at work*. London: Sage Publications.

Doğançay-Aktuna, S., & Kızıltepe, Z. (2005). English in Turkey. *World Englishes*, 24, (2), 253-265.

EAQUALS, Retrieved September 26, 2006 from http://www.eaquals.org/news/archives.

Gazi, A., Z., Silman, F., & Birol, C. (2008). TQM implementation in distance education institute: A case of North Cyprus. *Eğitim Araştırmaları- Eurasian Journal of Educational Research,* 31, 35-54.

Göker, S.D. (2006). Leading for learning: reflective management in EFL schools. *Theory into Practice*, 45 (2), 187-196.

Hargreaves, D. H. (1984). *Improving Secondary Schools*, London: ILEA.

Harris, A. (2000). Effective leadership and departmental improvement. *Westminister Studies in Education*, 23, 81-90.

Hergüner, G., & Reeve, N.B.R. (2000). Going against the national cultural grain: a longitudinal case study of organizational culture change in Turkish higher education, *Total Quality Management*, 11 (1), 45-56.

Kennedy, C. (1988). Evaluation of the management of change in ELT projects. *Applied Linguistics*. 9, 329-342.

Kippenberger, T. (1998). Planned change: Kurt Lewin's legacy, *The Anidote*, 3 (4), 10-12.

Kreitner, R., & Kinicki, A. (1992) *Organizational Behaviour*. 2nd Edition Homewood: Irwin.

Lichtenstein, B.B. (2000). Self-organized transitions: A pattern amid the chaos of transformative change. *Academy of Management Executive*. 14 (4),128–141.

Marshak, R.J. (2002). Changing the language of change: how new contexts and concepts are challenging the ways we think and talk about organizational change. *Strategic Change*, 11, 279-286.

McClure, B.A. (2004). *Putting a new spin on groups: The science of chaos*. NJ, Lawrence Erlbaum Associates.

Miclea, M. (2003). Institutional-level reform and the Bologna process: The experience of nine universities in south east Europe. *Higher Education in Europe*, 28 (3), 259-272.

Morgan, G. (1997). *Images of Organization*. 2nd Edition, London: Sage Publications.

Nelson, L. (2003). A case study in organizational change: implications for theory, *The Learning Organization*, 10 (1), 18–30.

Osterman, F.K., & Kottkamp, B.R. (1993). Reflective practice for educators, improving schooling through professional development. Newbury Park, California: Corwin Press, Inc.

Reynolds, D., Charles, T., Hopkins D., & Stringfield, S. (1999). Linking school effectiveness and school improvement. In C.Teddlie (Ed.) *International Handbook of School Effectiveness Research* (pp. 206-231). Routledge Falmer, London.

Richards, J., & Lockhart, C. (1994). *Reflective teaching in second language classrooms*. Cambridge, MA: Cambridge University Press.

Rosenholtz, S. J. (1989). *Teachers' workplace: The social organization of schools*. New York: Longman.

Schein, E. H. (1996). Kurt Lewin's change theory in the field and in the classroom: notes towards a model of management learning, *Systems Practice*, 9 (1), 27-47.

Schein, E.H. (1998). *Organizational culture and leadership*, 2nd edition. San Francisco: Jossey-Bass.

Senior, B. (2002). *Organisational change,* 2nd edition. London: Prentice Hall.

Sammons, P., Thomas, S., & Mortimore, P. (1997). *Forging links: Effective schools and effective departments*. London, Paul Chapman.

Stacey, R.D., Griffin, D., & Shaw, P. (2002). *Complexity and management: Fad or radical challenge to systems thinking,* Routledge London.

Stacey, R.D. (2003). *Strategic management and organizational dynamics: The challenge of complexity*. Prentice-Hall, Harlow.

Stake, R.E. (1998). Case studies. In N.K. Denzin & Y.S. Lincoln (Eds.) *Strategies of qualitative inquiry* (pp. 86-87). Sage Publications.

Stoll, L., & Fink, D. (1997). *Changing our schools*. Buckingham, Open University Press.

Simsek, H., & Aytemiz, D. (1998). Anomaly-based change in higher education: The case of a large Turkish public university. *Higher Education*, 36, 155-179.

Simsek, H.,& Seashore, K. (2008). Teacher unions, new unionism and shifting cultural metaphors. *Eğitim Araştırmaları- Eurasian Journal of Educational Research*, 31, 93-113.

Taggart, R. (1997). Guiding principles for participatory action research. In R. McTaggart (Ed.), *Participatory action research; Intenational contexts and consequences* (pp. 26-28). State University of New York Press.

Thietart, R.A., & Forgues, B. (1995). Chaos in the theory and organization. *Organization Science*, 6 (1), 19–31.

Tribble, C. (2000). Designing evaluation into educational change processes. *ELT Journal,* 54 (4), 319-327.

Vogel, T. (2001). Internationalization, interculturality, and the role of foreign languages in higher education. *Higher Education in Europe*, 26 (3), 381-389.

Waters, A., & Vilches, M.L.C. (2001). Implementing ELT innovations: a needs analysis framework, *ELT Journal*, 55(2), 133-141.

White, R.V. (1987). Managing innovation. *ELT Journal*, 41 (3), 211-218.

White, T.R., & Arzi, J.H. (2005). Longitudinal studies: designs, validity, practicality, and value, *Research in Science Education*. 35, 137-149.

Weick, K.E., & Quinn, R.E. (1999). Organizational change and development. *Annual Review of Psychology*, 50, 361-386.

Yıldırım, A., & Simsek, H. (2006). *Sosyal bilimlerde nitel araştırma yöntemleri*. [qualitative research in social sciences] 5. baskı (fifth edition) Seçkin Yayıncılık, Ankara.

İngilizce Hazırlık Biriminde Veri-Temelli Değişim ve Bölüm Etkililiği İçin Boylamsal Örnek Olay Araştırması

(Özet)

Problem Durumu: Araştırmanın temel problemi: "üç yıllık (1997-2000) veri temelli bir değişim programının, Gaziantep Üniversitesi İngilizce Hazırlık Biriminin sağlayacağı, uluslararası uyumlu İngilizce yeterlilik düzeyine etkisi nedir?

Araştırmanın Amacı: Bu çalışmanın amacı, öğretim yöntemleri ve müfredatın ötesinde vizyon-misyon güdümlü yönetsel bir yaklaşımla, İngilizce hazırlık programındaki eğitim hizmetinin ve çıktılarının, veri temelli bir değişim ve yansıtıcı yönetimi aracılığıyla, uluslararası eşdeğerlik sağlamaya yönelik olarak etkinliklerinin geliştirilmesidir.

Yöntem: Araştırma, geliştirilen vizyon-misyon doğrultusunda boylamsal (9 yılı kapsayan) örnek olay ve katılımcı eylem çalışması olarak tasarlanmıştır. İngilizce Hazırlık Birimindeki değişime kılavuzluk eden veriler ve bunların, bağımsız örneklem t-testi, doğrusal regresyon ve korelasyon çözümlemeleri araştırma desenini oluşturmaktadır. Çalışma 'değişim've 'izleme' olmak kaydıyla iki aşama şeklinde kurgulanmıştır.

Bulgular: Örnek olay olarak alınan İngilizce Hazırlık Biriminde uygulanmakta olan muafiyet ölçütünün ve kullanılan araçların bilimsel temel ve ölçme uygunluğu açısından yeterliliğinin olmadığı gözlenmiştir. Başlangıç değerlendirmeleri, İngilizce Hazırlık alt sınır geçme notunun yaklaşık olarak 377 TOEFL (klasik/kağıt sınav) puanına karşılık geldiğini göstermiştir. Bulgular, İngilizce öğretim yapılan birimlerdeki öğrencilerin büyük bir

çoğunluğunun (% 61) lisans eğitimleri sonunda da kabul edilebilir uluslararası TOEFL puanına erişemediklerini göstermektedir.

Sonuç ve Öneriler: Örnek olaydaki akademik birimin, uygulanan değişim programına rağmen İngilizce yeterlilik geliştirme açısından uluslararası denklikten oldukça uzak olduğu görülmektedir. Benzer şekilde uygulanan muafiyet ölçütlerinin ve çıktılarının, boylamsal süreç sonundaki uluslararası denkliği hâlâ tartışılabilir niteliktedir. İngilizce hazırlık eğitiminin, dışarıdan profesyonel hizmet alımı yoluyla gerçekleştirilmesi, maliyetlerin sistem dışına çıkarılması ve kalitenin arttırılması bakımından değer yaratan yönetsel bir yenilik (innovation) seçeneği olarak düşünülebilir.

Anahtar Sözcükler: Veri-temelli değişim, İngilizce hazırlık, etkili bölüm

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Crawling in the Virtual Environment: Prospective Teachers' Usage of *Google* Search Engine

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Abstract

Problem Statement: The Internet is an important source whereby users attempt to meet their need of information through using one of the popular search engines. Likewise, research studies demonstrate that students and prospective teachers often visit the Internet to locate the information they need. This circumstance brings to mind the question of whether the users are equipped with the required knowledge and skills to use a search engine of their choice. When the literature is analyzed, it is seen that the issue is overly neglected.

Purpose of Study: The purpose of this research is to identify prospective teachers' proficiencies in using a search engine. It first attempts to identify the preferred information sources by prospective teachers. Then it aims to discover whether prospective teachers are aware of the basic *Google* commands and how their awareness changes depending on the year spent in a teacher education program.

Methods: Qualitative survey methodology was used in this study. Participants were 328 prospective teachers from Pamukkale University, Faculty of Education, the Primary School Teaching Program (1–5) in the Department of Elementary Education. The data were gathered through using a questionnaire including open-ended questions formed by the researchers. The gathered qualitative data were analyzed by employing content analysis technique. Findings were visualized through using figures.

Findings and Results: Findings reveal that prospective teachers prefer to use the Internet as their primary information source, which is followed by printed materials, living sources, and personal experience. Despite this, the majority of the participants are either uninformed of *Google* search information or are attempting to use casual methods of searching for

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information. Upon investigating the change based on participants' grade levels, it is seen that the teacher education process has created a very limited impact on prospective teachers' knowledge of *Google* commands.
Recommendations: Findings show the need for teacher education programs to open courses on the Internet and for researchers to have a thorough investigation of prospective teachers' experiences with the Internet and search engines.
***Keywords*:** Information technologies, search engine, teacher education, literacy

Can you imagine yourself driving in a metropolis with rudimentary or insufficient driving skills? How far can you go? Or how easily can you reach your destination? Though it is not as dangerous as the city traffic, the Internet has novice users surfing or searching. Those users might sometimes find what they are actually looking for. Yet, in many cases, they are likely to experience virtual accidents.

Students and prospective teachers often apply to the Internet to meet their need of information. The Internet is not just an information source for students but a source that researchers refer to in their academic inquiries (Kurbanoğlu, 2002). This circumstance not only indicates that the place of the Internet in our lives is getting deeper and deeper but also suggests that the needs of a person to be successful have drastically been changing. Parallel to those changes, the concept of literacy has expanded and yielded many new forms such as information literacy, technological literacy, media literacy, computer literacy, visual literacy, cultural literacy, and functional literacy. For instance, media literacy consists of four major components: locating, analyzing, evaluating, and producing information (Megee, 1997). Similarly, information literacy is reported to have three main constituents: locating, evaluating, and using information (Hector, 2005). As it is seen, one of the most basic items of all kinds of literacy is locating or accessing information.

With its most common meaning, "access" refers to the skills that are necessary to obtain and organize information (Hobbs, 1997). Accessing information consists not only of using different types of technologies (audio, visual, interactive, etc.) to receive information but also of being able to send messages (Megee, 1997). It has recently become necessary to acquire new skills to access information since the Internet sources are accumulating at a rattling rate. When it is thought that the pages indexed by the *Google* search engine are reported in billions (Zengin, 2009; Vine, 2004), the need to learn the skills to locate information becomes evident. Huerta and Sandoval-Almazán (2007), however, found that telecenter users in Mexico are digitally illiterate in navigating through a nonlinear environment to find desired information. It is also known that students often visit the Internet for their homework and projects (Akkoyunlu & Yılmaz, 2005; Kurbanoğlu, 2002). Similarly, Akdağ and Karahan (2004) found that university students use the Internet to obtain information on the subjects they search for and to follow newspaper/magazine news. Moreover, studies demonstrate that students prefer the Internet to libraries and other sources (Yalçınalp & Aşkar, 2003). This situation raises the question of whether prospective teachers have the basic skills to use search engines. In fact, search engine users need to use a

dozen of search commands to pinpoint the sources they need. Such technical information is called "system information" (Yalçınalp & Aşkar, 2003).

Search engines are built upon a *Boolean* model that supports formulization of the inquiry demand that uses the *AND*, *OR*, and *NOT* conjunctions (Sever, Akal & Köse, 2007). The term *Boolean*, which talks about the relationship between the search terms, comes from the Irish mathematician George Boole (Hector, 2005). When an inquiry is sent to a search engine that works in this model, as "*Internet AND education,*" the system will give the intersection classification of the terms *Internet* and *education*. In other words, if a document is available just in the intersection of A and B clusters, which means that it includes both of the terms, it will be brought (Sever *et al*., 2007). When an "*Internet OR education*" inquiry is sent to the search engine, the system will not just yield the A and B intersections clusters but also will bring pages including either of the terms. If an inquiry such as "*mining AND NOT military*" is sent to the search engine, the pages involving the term *military* will be eliminated, while the other pages including the term *mining* will be brought. It is thus important to know a series of search commands and advanced search options to let users make shortcut searches that will yield the sought sources. Though limited, some previous studies touched upon the issue in one way or another.

Akdağ and Karahan (2004) found out that the people who have taken courses on the Internet prior to university education use the Internet more frequently than the ones who have not taken any courses. This result gives the impression that the users who have taken courses have more positive literacy skills than the others. Akkoyunlu and Yılmaz (2005) have analyzed prospective teachers' information literacy level, frequency of Internet usage, and aims in using the Internet. Their findings confirmed that the higher information literacy level the prospective teachers have, the more frequently they use the Internet to access information. These researchers have also stated that nearly all prospective teachers (99%) use the Internet to locate information and that they use it mostly for homework and projects (82%). In a study conducted to compare teachers and prospective teachers in terms of their self-efficacy beliefs for their information literacy skills, Usluel (2006) stated that both groups have high self-efficacy perceptions. However, when it comes to the sub-dimension of "the usage of communication and information technologies to locate information," both groups demonstrate lower perceptions than those in other sub-dimensions. This finding suggests that there are perhaps issues in terms of locating information for both groups. Previous studies also demonstrate that prospective teachers find the courses they have taken related to usage of Internet technologies inadequate or partly adequate (Karahan & İzci, 2001) and that they want to take courses to learn the use of search engines (Aldemir, 2004). Search engine users must be equipped with some knowledge of the subject in order to choose the right search terms (Land & Greene, 2000), and they must be familiar with the system in order to operate an engine effectively (Yalçınalp & Aşkar, 2003). However, in the studies that have been made so far, prospective teachers' proficiencies at using the search engines have been overly neglected. Thus, this study attempts to focus on the following research problems. (1) What are the primary sources that the prospective teachers

use to locate the information they need? (2) Do the prospective teachers have the necessary proficiencies to use search engines effectively? (3) How do the prospective teachers' proficiencies change depending on their year spent in the program?

Method

Research Context and Participants

This qualitative survey study has been carried out at Pamukkale University, Faculty of Education. The Faculty of Education currently has about 4,500 registered students and graduates nearly 1,000 teacher candidates each year. Among the graduates, about 350 are from the Primary School Teaching Program (1–5) in the Department of Elementary Education. Even though the university in which the study has been carried out has rich opportunities in terms of accessing information from national/international databases, it currently presents limited laboratory facilities for students' use. The population of the study consists of 1,340 prospective teachers registered at the Primary School Teaching Program in the Department of Elementary Education in the 2007–2008 academic year, 734 of whom attend a daytime program and 606 of whom attend an evening program. The size of the sample to represent the population—a minimum of 300 or above—was determined by using the ratio offered by Gay (1996, p. 125). There were five daytime and four evening groups in each grade level of the Primary School Teaching Program. From each grade level, one daytime and one evening group were selected randomly to participate in the study. This kind of selection is named "cluster sampling" (Karasar, 1991). From the groups that have been selected, 328 prospective teachers participated in this study. The participants' background characteristics are given in Table 1.

Table 1

Prospective Teachers' Distribution in terms of Personal Characteristics

	Gender		**Program Type**		**Grade Level (Year in the Program)**			
	Female	*Male*	*Daytime*	*Evening*	*I*	*II*	*III*	*IV*
	202	126	155	173	78	86	89	75
Total	328		328		328			

From Table 1, it is seen that 126 (38%) of the participants are male and 202 (62%) of them are female. These gender characteristics seem to be in line with Saban's (2003) findings obtained in a similar context and reflect a common cultural belief associating teaching with "women's work" (Hatch, 1999). Personal information characteristics also reveal that 155 (47%) participants are in a daytime program, and 173 (53%) of them are in an evening program. The characteristics of their grade level (year in the program) demonstrate that 78 (24%) participants are in the first year, 86 (26%) in the second year, 89 (27%) in the third year, and 75 (23%) in the fourth year.

Data Collection Instrument

The data have been collected by a questionnaire form consisting of three main sections. The first section of the questionnaire includes questions to gather the participants' personal information (gender, program type, and grade). Participants were asked to mark the appropriate answer for themselves among the given options. The second section includes an open-ended question to identify their choice of primary information sources. To this end, participants were asked the open-ended question "When you have to conduct a search on a topic (*e.g.*, for a project, presentation, or assignment), what is your primary resource to locate the information needed?" The participants were instructed to write their answer(s) in the given space. In the third section of the questionnaire, 10 problem statements were given to identify whether the participants possess proficiencies to use the *Google* search commands. Before constructing these problem statements, a pilot study was conducted on 60 prospective teachers in order to identify which search engine is used most frequently in their lives. It has been found that all of the participants use the *Google* search engine and that some of them use other search engines such as *Yahoo*, *Arabul,* and *Mynet* besides *Google*. After considering the additional facts that the *Google* search engine offers advanced search options and that its service is available in Turkish, it was thought that the study must be based upon the *Google* search engine.

Next, the researchers constructed 10 problem situations that require participants to use different *Google* commands. For example, the following problem situations were written, with (a) for a phrase search, (b) for a title search, and (c) for a file-type search.

a. "You are conducting a search on "class atmosphere" in teaching. It is important that the two words be side by side because the same words can bring other pages related to other subjects (for example, middle class and political atmosphere). Write how you would conduct a phrase search to bring the pages in which the two words are used consecutively."

b. "In a search you do about desertification, you want the keyword "desertification" to appear in the title of the page. Write how you would conduct a title search in order to find the pages you want."

c. "You are looking for a PowerPoint presentation about the subject of synergy. For this purpose you just want to find PowerPoint files (files with a ppt extension). Write how you would search for the files you need."

Under each question, space involving successive boxes was given. Participants were asked to write the search commands and terms in the given spaces, as if they were typing into the *Google* field, on condition that a character comes in each box. For the participants who might want to use advanced search options, a blank field was given below the boxes so that they could explain the steps they would follow.

In order to prove the structure validity of the questionnaire, expert ideas were taken. Based on the feedback taken from four experts, corrections were made in regard to structure, content, and language. Then a pilot study was conducted on a group of fifty students. The problems that were likely to occur during the

administration of the questionnaire were noted, and in the frame of the collected data no important changes were made on the questionnaire.

Data Collection Procedure

Data were collected in the fall semester of the 2007–2008 academic year. During the data collection procedure, the participants were informed of the condition that they would voluntarily participate in the study and that it is important to give their actual information or thoughts in order to ensure the validity and reliability of the results. They were also told that participating in the study will not affect their grades or graduation and that the data collected would not be given to any person or association. The questionnaire forms were handed out and administered by the researchers themselves in the classrooms.

Data Analysis

The SPSS package program was used to document the participants' personal information. Their background characteristics were presented by frequencies and percentages (Table 1). To identify the codes and themes standing out in the answers to the open-ended question in the second section of the questionnaire, "content analysis" technique was used. Content analysis can be defined as the isolation, counting, and interpretation of the concepts, problems, and subjects repeated in the collected data (Denzin & Lincoln, 1998; Miles & Huberman, 1994). Participants' answers about their primary source of information were transferred into the data sheet and analyzed by two of the researchers in terms of the categories they involve. The data were read, and codes were written on the sides of the pages. By analyzing the repeating codes, themes were formed (Stake, 1995). At the end of this process, four main themes were stated. For the reliability of the results, the third researcher reappointed all the data in the identified themes. The reliability of the study was determined by using the formula *Reliability = Agreement / (Agreement + disagreement)* (Gay, 1996; Miles & Huberman, 1994). This procedure yielded a satisfying rate of 96 percent agreement (Miles & Huberman, 1994). The disagreeing statements were re-evaluated under the integrity of the study, and the agreement rate was increased up to 100 percent. The frequencies of the emerging themes are presented in Figure 1.

Answers given to the problem situations in the third section of the questionnaire were analyzed and evaluated in terms of four different categories (uninformed or not knowing the answer at all→1; attempting to use casual ways→2; using an alternative way such as advanced search options→3; reaching the answer directly→4). Of the four categories, the first two show that the participants do not know the answer to the problem situation, and the last two demonstrate that the participants have the necessary knowledge to make the requested search. The data were coded by the first researcher at first, and then the second researcher independently rated the data. The Pearson interrater reliability between the two raters was found to be 0.88. The reliability code was raised above 0.95 by working on the coding differences. The findings were reported and illustrated by the actual statements of the participants. Direct quotations and illustrations give a clear image of the participants' thoughts and experiences (Yıldırım & Şimşek, 2005). At the end of each direct quotation, the questionnaire form number was presented in parentheses. The reported findings were also interpreted.

Findings and Interpretation

The results reported in this section are derived from the qualitative data obtained to answer each research question. Findings about each research question were presented respectively and interpreted. First, we present the preferred information sources.

Findings about the Preferred Information Sources

Analyzing the answers given to the question asked to understand prospective teachers' primary sources of information, the most repeating theme was found to be the Internet (61%). The second most repeating theme was found to be printed documents (35%). The third most repeating theme was people as the source of information (3%). This was followed by the experiences and observations of the person (1%), the least repeating theme (Figure 1). Some of the participants stated just one source, while the others wrote multiple sources to answer the given question. All the stated sources were taken into evaluation. Thus, the readers should not mix the frequency values and the percent values. For example, 307 of the participants stated the Internet as their primary source of information. This number meets 61 percent of the existing themes, not of the participants.

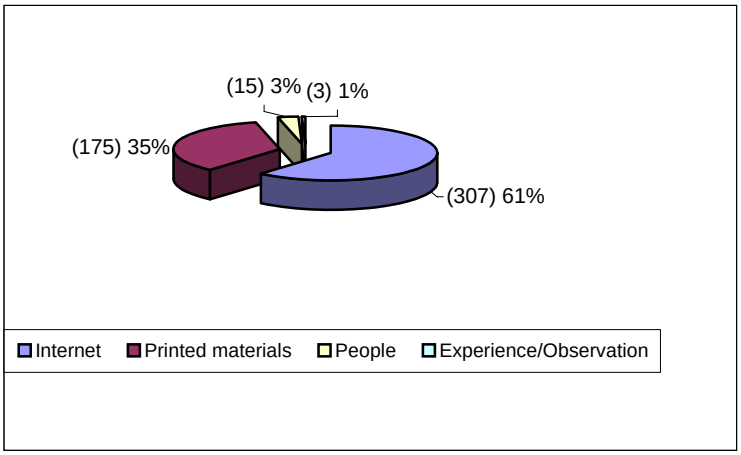

Figure 1. The frequencies and percentages of information sources for the participants

The findings reveal that the prospective teachers prefer the Internet to printed documents and other alternative information sources. This finding supports the sense that the prospective teachers prefer the Internet to libraries and other sources when facilities are offered (Yalçınalp & Aşkar, 2003). The main reason for this situation can be counted as the opportunity of accessing many documents from the Internet owing to the convergence between print and electronic sources. However, the findings in this respect make one wonder if the prospective teachers have the

necessary knowledge and skills to use search engines proficiently. For this reason, the second part of the study aims to display how well the participants can conduct searches using the *Google* search commands.

Prospective Teachers' Proficiencies at Using Google Commands

This part aims to answer the question "Do the prospective teachers have the necessary proficiencies to use search engines effectively?" There are 10 *Google* commands included. The main *Google* commands included in the study and their functions (see Sullivan, 2001) are presented in Table 2.

Table 2

Google Commands Needed for the Searches in the Given Problems and their Functions

(1)	AND + (plus)	Insists that the search engine include given keywords in the results. Example: **Internet AND education AND achievement** or instead **+Internet +education +success**
(2)	OR	Lists pages that have at least some of the keywords. Example: **teaching OR instruction**
(3)	AND NOT **–** (minus)	Insists that the search engine omits pages matching a given keyword in the search results. Example: **mining –military** or **mining AND NOT military**
(4)	"..."	Lists pages in which the keywords appear consecutively in a phrase. Example: **"class atmosphere"**
(5)	intitle	Restricts a search so that the keywords must appear in the title. Example: **intitle:desertification**
(6)	site (uk, tr, au...)	Searches the term just in the asked domain of the country. Example: **"Turkish people" AND site:uk**
(7)	site (edu, mil, com, gov...)	Searches the term just in the asked domain (*e.g.*, edu, com, gov.) Example: **nanotechnology AND site:edu**
(8)	filetype	Restricts a search to a given type of file (*e.g.*, doc, xls, ppt, pdf). For example: **Synergy AND filetype:ppt**
(9)	link	Lists pages that link to a particular page. Example: **link:www.yarisdersanesi.com**
(10)	inurl	Restricts a search so that keywords must appear in the page address. Example: **inurl:aliyesildere**

To be able to answer the second research question, the data were analyzed in terms of frequencies of four types of responses given to each search problem in the questionnaire. Then the results are presented visually (Figure 2). Findings reveal that most of the participants either are oblivious of the most common search commands or tend to search by using casual methods. Instead of using the *Google* commands, which are more likely to lead them to definite results, prospective teachers attempt to use casual methods that will mislead them to indirect routes or irrelevant sources. These kinds of approaches may turn the virtual environment into a maze, as Hector

(2005) states, and cause them to deal with many pages in an attempt to find what they are looking for (Huerta & Sandoval-Almazán, 2007).

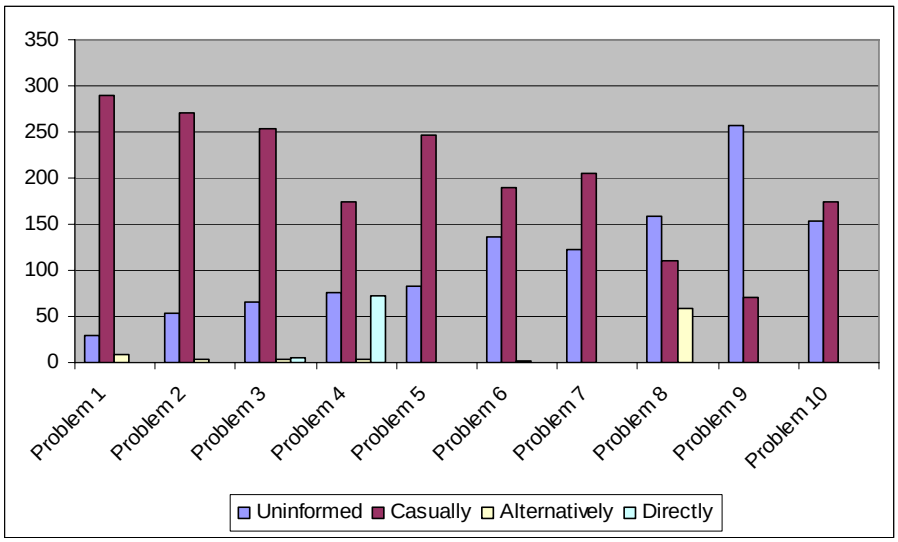

Figure II. The frequencies of the answers given to each question

Presenting some examples of what is meant by casual methods might be beneficial. To conduct a search requiring use of the "AND" conjunction with the key words of *computer, teaching,* and *achievement* (computer AND teaching AND achievement), the participants wrote *computer- teaching- achievement* (42), "*computer teaching achievement*" (120), "*computer, teaching, achievement*" (180), or *achievement with computerized teaching* (212). To conduct a title search about the topic of desertification (intitle:desertification), the participants wrote *desertification title* (253), *desertification title of the page* (287), *desertification in the titles* (303), or "*desertification*" (160). To search for a PowerPoint presentation in the subject of synergy (synergy filetype:ppt), the participants wrote *synergy presentation* (57), *presentation in the subject of synergy, power point presentation synergy* (93), *synergy(ppt)* (193), *presentation related to synergy* (178), or *synergy transparency presentation* (248). To perform a domain search in the education domain on the topic of nanotechnology (nanotechnology site:edu), the participants wrote *nanotechnology edu* (233), *nanotechnology in education* (299), *nanotechnology – edu* (251), or *nanotechnology in educational activities* (172).

The use of casual methods might perhaps be due to their insufficient knowledge of the virtual environment's structure and their unawareness of the search commands. Findings also uncover that most of the participants are not aware of the advanced search options. Only a small number of the participants stated that they would use the advanced search options to do the file type search. Another important finding is that 75 of the participants were able to do a phrase search directly. Other than those mentioned, the participants were not able to demonstrate direct moves to locate the information requested.

Change Depending on the Grade Level of the Participants

This part aims to answer the question "How do the prospective teachers' proficiencies change depending on their year in the program?" The frequencies of the answers given to questions from each grade level were documented. However, the number of people who participated in the study and the frequencies of the given answers should not be mixed. For example, the answers given to the first through the tenth problem situations were taken together for the 78 first-year prospective teachers, who were found to be using casual methods nearly 380 times for all questions. Or when the results from the 86 second-year participants were evaluated, it was seen that they altogether attempted to use casual methods nearly 600 times for all questions. The frequencies of the answers given to the problem situations are presented in Figure 3.

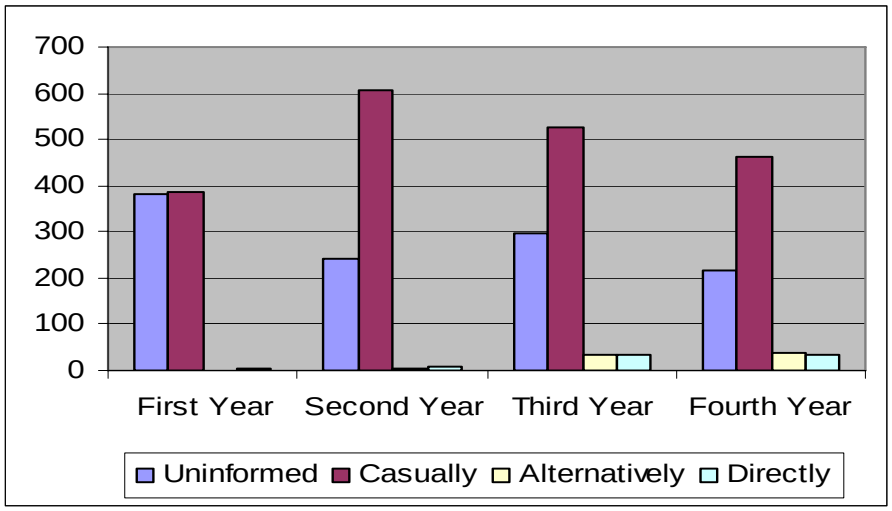

Figure 3. The frequencies of all the answers based on the grade levels

When Figure 3 is analyzed, it is seen that in all grade levels the majority of the prospective teachers appear to be uninformed of the *Google* search commands or tend to use casual methods in searching for information. It is, however, obvious from the findings that the knowledge of the participants seems to be changing positively as their grade level advances. Though it is not true for the first- and second-year prospective teachers, a limited number of those in the third and fourth years are able to locate the information alternatively or directly. It might then be said that prospective teachers become more proficient in locating information as their year in the program and thus experiences with information technologies rise.

Discussion

By using a Turkish urban university context, this study aimed to investigate prospective teachers' preferred information sources for their studies, their search proficiencies to use *Google* search engine, and how their proficiencies change as they approach graduation. The results of the study reveal that prospective teachers primarily tend to use the Internet and search engines in order to meet their need for information. This situation, which shows a great parallelism with earlier studies (*e.g.*, Yalçınalp & Aşkar, 2003), can be interpreted such that the prospective teachers promptly embrace new information technologies. This can also be taken positively for the future of the Turkish education system, since it will contribute to the integration of information technologies into curricula and thus to the transformation of curricula into technology-based ones.

In fact, the prospective teachers who are using these technologies for personal reasons to obtain information will better integrate them in teaching, learning, and curriculum design in the future. That is to say, they will be the ones who implement the technology revolution in schools. Upon evaluating their preferred information sources, however, one might get an impression that prospective teachers underestimate their own power, judgment, and observations in searching for information. In fact, the findings give a sense that the prospective teachers reflect an understanding in which the human factor and judgment fall behind the technology (Postman, 1993). The attitude to look down at their own role might invite the users to become consumers—consumers of information in particular. At this point, taking the concept of literacy as a whole with its other components and inviting the users to generate their own syntheses can make an important contribution to solve the discrepancy.

The findings give an impression that most of the prospective teachers do not possess the knowledge of *Google* search engine commands. It is perhaps due to their insufficient knowledge that they follow what is termed here as casual methods in their search. Taking into account that prospective teachers use the Internet to access information and most of them use the Internet for their homework and projects (Akkoyunlu & Yılmaz, 2005), it might then be concluded that there is an urgent need to introduce search engine commands to prospective teachers. Contrary to the findings in this study that they use the *Google* search engine with casual methods, previous studies (*e.g.*, Usluel, 2006) showed that prospective teachers' self-efficacy perceptions for information literacy are high in every aspect including locating information. There is, however, a detail in Usluel's study (2006) that has to be considered. It is that "the usage of communication and information technologies to locate information self-proficiency" dimension is lower than the other dimensions. This gives the impression that users are facing problems while searching for information. The finding demonstrating the dominant use of casual methods to locate information in our study overlaps with Usluel's (2006) findings. Taking into account that most of the students (90%) acquire information about the Internet by themselves (Börü, 2001) and that they want to take courses on the use of the Internet and search engines (Aldemir, 2004; Karahan & İzci, 2001), there is an urgent need to

introduce a profound literacy education in teacher education programs. Findings in this study pinpoint this need, as well. Based on the findings, it is difficult to claim that the prospective teachers learn how to use search engines proficiently in the teacher education programs. The finding that the prospective teachers at all levels comply with the casual methods in searching for information demonstrates a need for teacher education programs to include courses focusing on search engines, search strategies, the Internet, and important databases.

Teaching *Google* commands and other search skills to students and prospective teachers will undoubtedly help them to take advantage of technological advances. To be literate in this respect will bring many advantages for teachers and students. For instance, teachers and students might locate the information they target easily and swiftly. More importantly, achievements of people in a society depend, to a certain extent, upon how well they are equipped with various literacy skills, and information literacy skills in particular (Doyle, 1994; Ünlü, 2002). If teachers can teach search skills to their students at earlier ages, they can then positively influence the experiences of their students with the virtual environment. Otherwise, the experiences of the users, as Hector states (2005), might resemble an endless journey in a maze where they have no itinerary. It is also important to note that the nature of the Internet is convenient for this mess. The nature of the Internet environment is also convenient to reinforce the habit of having things handed to one on a silver platter. It must then be recognized that being literate not only covers accessing information but also includes analyzing the gained information and eventually synthesizing it to a new form (Megee, 1997). By synthesizing the gained information to a new form, students not only get away from being just the consumer of the information but also become the subjects who can produce information.

In conclusion, the study reveals that prospective teachers prefer the Internet to other information resources. Yet, the findings about their search skills show that they are unsatisfactorily equipped with search knowledge and skills to effectively use the *Google* search engine. Perhaps due to their inadequacy, most of the participants follow casual methods in searching for information. The results also give the impression that the teacher education process has a limited effect on their skills of accessing information by the *Google* search engine. The findings point out that in today's world, where media literacy is an integral part of the curricula at schools, teacher education programs must give a particular emphasis to the skills needed to locate information. Teaching the use of *Google* and other search engines will not only provide the prospective teachers with the ability to locate information proficiently but also make a positive contribution to the process of integrating technology with teaching activities. Unless the search skills are improved, users' experiences will not be different from the experiences of a novice driver in a metropolis. Future researchers might then focus on the subjective experiences of prospective teachers with the search engines and provide a thorough analysis of users' experiences.

References

Akdağ, M. & Karahan, M. (2004). Üniversite öğrencilerinin bilgi okuryazarlık düzeylerinin çeşitli değişkenler açısından incelenmesi. *Eğitim ve Bilim, 29* (134), 19–27.

Akkoyunlu, B., & Yılmaz, M. (2005). Prospective teachers' information literacy level, Internet usage frequencies and purpose of their Internet usage. *Eurasian Journal of Educational Research, 19*, 1–14.

Aldemir A. (2004). Öğretmen adaylarının bilgi okuryazarlığı düzeyleri üzerine bir araştırma: Sakarya Üniversitesi örneği. (Master's Thesis, Hacettepe University, Institute of Social Sciences, Ankara).

Börü, D. (2001). Öğrencilerin bilgisayar ve Internet kullanımına ilişkin bir araştırma. *M. Ü. Sosyal Bilimler Enstitüsü Dergisi, 15*(4), 4–16.

Denzin, N. K., & Lincoln, Y. S. (1998). *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: Sage.

Doyle, C. S. (1994). *Information literacy in an information society: A concept for the information age*. Syracuse University, NY: ERIC Clearinghouse on information resources.

Gay, L. R. (1996). *Educational research competencies for analysis and application*. Englewood Cliffs, NJ: Prentice Hall.

Hatch, J. A. (1999). What preservice teachers can learn from studies of teachers' work? *Teaching and Teacher Education, 15*, 229–242.

Hector, M. (2005). Accessing information: The Internet—a highway or a maze. *Gifted Child Today, 28*(3), 32–37.

Hobbs, R. (1997). Expanding the concept of literacy. R. Kubey (Ed.*), Media literacy in the information age: Current perspectives* (s. 163–186). New Brunswick, NJ: Transaction Publishers.

Huerta, E., & Sandoval-Almazán, R. (2007). Digital literacy: Problems faced by telecenter users in Mexico. *Information Technology for Development, 13*(3), 217–232.

Karahan M., & İzci E. (2001). Üniversite öğrencilerinin İnternet kullanım düzeyleri ve beklentilerinin değerlendirilmesi. *Milli Eğitim Dergisi*, *150*. Retrieved December 20, 2007, from http://yayim.meb.gov.tr/dergiler/150/karahan_izci.htm

Karasar, N. (1991). *Bilimsel araştırma yöntemi*. Ankara: Sanem.

Kurbanoğlu, S. (2002). WWW bilgi kaynaklarının değerlendirilmesi. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi, 19*(1), 11–25.

Land, S. M. & Greene, B. A. (2000). Project-based learning with the World Wide Web: A qualitative study of resource integration. *ETR&D, 48*(1), 45–68.

Megee, M. (1997). Students need media literacy: The new basic. *The Education Digest, 63,* 31–35.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis*. Thousand Oaks, CA: Sage.

Postman, N. (1993). *Technopoly: The surrender of culture to technology*. New York: Vintage Books.

Saban, A. (2003). A Turkish profile of prospective elementary school teachers and their views of teaching. *Teaching and Teacher Education, 19*, 829-846.

Sever, H., Akal, F., & Köse, G. (2007). Concept-based information retrieval approach. *Bilgi Dünyası, 8*(1), 49-75.

Stake, E. R. (1995). *The art of case study research.* Thousand Oak, CA: Sage.

Sullivan, D. (2001). *Power searching for anyone. Search Engine Watch.* Retrieved November 02, 2007 from http://searchenginewatch.com/showPage.html?page=2156031

Usluel, Y. K. (2006). Comparison of prospective teachers' and teachers' information literacy self-efficacy. *Eurasian Journal of Educational Research, 22*, 233–243.

Ünlü, E. (2002). Araştırma Derslerinde İnternet'ten Yararlanma ve İnternet'e Dayalı Uzaktan Araştırma Eğitimi İçin Öneriler. *Açık ve Uzaktan Eğitim Sempozyumu*. Retrieved February 15, 2007, from http://aof20.anadolu.edu.tr/bildiriler/Erden_Unlu.doc

Vine, R. (2004). Going beyond Google for faster and smarter web searching. *Teacher Librarian, 32*(1), 19–22.

Yalçınalp, S. & Aşkar, P. (2003). Öğrencilerin bilgi arama amacıyla İnternet'i kullanım biçimlerinin incelenmesi. *TOJET, 2*(4). Retrieved January 03, 2008, from http://www.tojet.net/articles/2415.htm

Yıldırım, A., & Şimşek, H. (2005). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. Ankara: Seçkin Yayıncılık.

Zengin, B. (2009). Benefit of Google search engine in learning and teaching çollocatons. *Egitim Arastirmalari-Eurasian Journal of Educational Research, 34*, 151–166.

Sanal ortamda emeklemek: Öğretmen adaylarının *Google* arama motorunu kullanımları

(Özet)

Problem Durumu: İçinde bulunduğumuz yirmi birinci yüzyılda bilim ve teknolojide meydana gelen yenilik ve değişimlerin hızı baş döndürücü boyutlara ulaşmıştır. Bu gelişmelerle baş edebilmek ise, günümüz insanının temel ihtiyaçları arasında yer almaktadır. Günümüzde bilginin çokluğu, bilgiye erişimde önemli sorunları beraberinde getirmektedir. Bu sorunlar, bilgiye erişimde başarılı olan ve bu bilgileri etkili kullanarak yeni bilgiler üretebilen bireylere duyulan gereksinimi ortaya çıkarmaktadır. Bireyler hayatın vazgeçilmez bir parçası haline gelen internet ve arama motorlarına bilgi gereksinimlerini karşılamak amacıyla sıklıkla başvurmaktadırlar. Öğrencilerin ve öğretmen adaylarının da yaptıkları çalışmalarda sıklıkla arama motorlarından destek aldıkları bilinmektedir. Bu doğrultuda, gelecek nesilleri yetiştirecek olan öğretmen adaylarının, çağın özellikleri çerçevesinde donanımlı bireyler olmaları önem kazanmaktadır. Bu durum, içerisinde öğretmen adaylarının da yer aldığı internet kullanıcılarının, arama motorlarını etkili kullanabilmek için gerekli bilgi

ve becerilere sahip olup olmadıkları sorusunu akla getirmektedir. Oysa, literatür incelendiğinde konunun ihmal edildiği görülmektedir.

Araştırmanın Amacı: Bu çalışmanın amacı; öğretmen adaylarının başvurduğu öncelikli bilgi kaynaklarını saptamak, *Google* arama motorunu etkili kullanabilmek için gerekli yeterliğe sahip olup olmadıklarını ortaya çıkarmak ve öğretmen yetiştirme sürecinde mevcut yeterliklerinin nasıl bir değişime uğradığını saptamaktır.

Araştırmanın Yöntemi: Araştırmanın verileri nitel yollarla toplanmış ve çözümlenmiştir. Araştırmaya Pamukkale Üniversitesi Eğitim Fakültesi İlköğretim Bölümü Sınıf Öğretmenliği Anabilim Dalı'nda öğrenim gören 328 öğretmen adayı katılmıştır. Veriler, anket formuyla toplanmıştır. Anketin ilk bölümü, katılımcıların kişisel bilgilerini (cinsiyeti, program türü ve sınıfı) belirleme amacı taşıyan sorulardan oluşmaktadır. Anketin ikinci bölümünde ise öncelikle açık uçlu olarak katılımcılara bilgiye erişimde kullandıkları öncelikli yol sorulmuş ve verilen boşluğa sorunun kendileri için doğru olan cevabını yazmaları istenmiştir. Ardından, katılımcıların *Google* arama motorunu kullanabilmeleri için gerekli temel bilgi ve becerilere sahip olup olmadıklarını belirleme amacını taşıyan 10 problem durumu çerçevesinde sorular yöneltilmiştir. Bu sorular oluşturulmadan önce, yapılan bir ön çalışmayla 60 öğretmen adayına hangi arama motorlarını kullandıkları sorulmuş; öğretmen adaylarının tamamı *Google* arama motorunu kullandığı, ancak bazılarının *Google* ile birlikte diğer arama motorlarına (*Yahoo*, *Arabul*, *Mynet* vs.) da başvurdukları tespit edilmiştir. Bu sebeple, araştırmada *Google* arama motoru temele alınmıştır. Daha sonra, *Google* arama motorunu kullanabilmek için gerekli olan temel bilgi ve komutların her birini kullanmayı gerektiren 10 problem durumu yazılmıştır.

Katılımcıların kişisel bilgilerinin dökümünü alabilmek için SPSS paket programına başvurulmuştur. Veriler programa sırasıyla girilmiş ve katılımcıların kişisel bilgilerini belirlemeye yönelik sonuçlar; frekans analizi ve yüzdeler yardımıyla betimlenerek sunulmuştur. Anketin ikinci kısmında yer alan açık uçlu soruya verilen cevaplarda öne çıkan kod ve temaları tespit edebilmek için "içerik analizi" tekniğine başvurulmuştur. Katılımcıların, bilgiye erişimde kullandıkları öncelikli yol ile ilgili soruya verdikleri cevapları veri formuna aktarılmıştır. Veriler, araştırmacılardan ikisi tarafından, içerdiği kategoriler açısından çözümlenmiştir. Veri formuna aktarılan veriler okunarak anlamlı bölümler işaretlenmiş, sayfa kenarına kodlar yazılmıştır. Tekrar eden kodların, tümevarımcı yaklaşımla incelenmesiyle de temalar oluşturulmuştur. Bu süreç sonucunda dört temel tema tespit edilmiştir. Bu temalar; internet, basılı doküman, kaynak kişi, yaşantı/gözlem olarak belirlenmiştir.

Anketin ikinci kısmındaki problem ifadelerine verilen cevapların analizini yapabilmek için, cevaplar dört farklı kategoride (cevabı hiç bilmemek→1; cevaba gelişigüzel yollarla ulaşmaya çalışmak→2; sonuca ulaştıracak alternatif bir yol kullanmak→3; sonuca doğrudan ulaşmak→4) değerlendirilmiştir. Bu kategorilerden ilk ikisi istenilenin katılımcı tarafından bilinmediğini, diğer ikisi ise istenilen aramayı yapacak bilgiye katılımcının sahip olduğunu göstermektedir. Veriler, yukarıda bahsedilen kategoriler bağlamında önce birinci araştırmacı tarafından sonra da bağımsız olarak ikinci araştırmacı tarafından

kodlanmıştır. İki kodlamadan elde edilen puanlar arasındaki uyumun güvenirlik katsayısı (Pearson), SPSS paket programı aracılığıyla 0.88 olarak bulunmuştur. Kodlama farkları üzerinde çalışılarak görüş birliği sağlanan verilerin oranı artırılarak en son güvenirlik katsayısı 0.95 seviyesine çıkarılmıştır.

Bulgular ve Sonuçlar: Bulgular, öğretmen adaylarının interneti basılı dokümanlara ve diğer alternatif bilgi kaynaklarına tercih ettiklerini, diğer bilgi kaynaklarına göre daha öncelikli gördüklerini göstermektedir. Bu durumun başlıca sebepleri arasında, kütüphane kavramının sanal ortamla birleşmesi ve birçok basılı dokümana internet ortamından kolaylıkla ulaşabilme fırsatının olması sayılabilir. Ancak diğer bulgular, katılımcıların çoğunluğunun arama motoru komutlarını bilmediklerini; arama deneyimine yönelenlerin de çoğunluğunun her zaman kesin sonuca götürmeyen gelişigüzel yollar kullandıklarını göstermektedir. Adaylar belli bir aramayı doğrudan yaptıracak yolları kullanmak yerine dolaylı yoldan sonuca götürecek, belki de net sonuçlara götürmeyecek yolları denemektedirler. Öğretmen adaylarının bu gelişigüzel yollara başvurmalarının temel nedeni, sanal ortamın yapısı hakkındaki yetersiz bilgileri ve arama motoruna ait komutları bilmemeleri olabilir. Ayrıca bulgular katılımcıların gelişmiş arama seçeneklerini de bilmediklerini göstermektedir. Adayların sadece küçük bir kısmı, dosya türüne göre yapılan aramada gelişmiş arama yollarını kullanacaklarını ifade etmişlerdir. Ancak bu yollara, diğer sorularda yeterince adayın başvurduğu görülmemiştir. Dikkate değer bir bulgu da, sadece cümlecik (phrase) araştırmasında yaklaşık yetmiş beş adayın doğrudan sonuca götüren hamleler yapabilmiş olmasıdır. Bunun dışındaki soruların çoğunda adaylar doğrudan sonuca götürecek hamleler yapamamışlardır.

Araştırmadaki bulgular, öğretmen adaylarının *Google* arama motoru kullanımına yönelik yeterliklerinin sınıflar düzeyinde de ağırlıklı olarak "bilmeme" ve gelişigüzel yollar kullanma" şeklinde olduğunu göstermektedir. Ancak sözü edilen bu bilgi ve becerilerin sınıf düzeyi ilerledikçe daha olumlu bir yöne doğru değiştiği görülmektedir. Birinci ve ikinci sınıftaki öğretmen adayları için geçerli olmasa da, üçüncü ve dördüncü sınıftaki sınırlı sayıdaki adayın alternatif veya doğrudan yollarla bilgiye ulaştıkları görülmektedir. O halde öğrenim düzeyi ilerledikçe, öğrencilerin artan deneyimlerine bağlı olarak, bilgiye arama motorları aracılığıyla daha kolay ulaştıkları söylenebilir.

Öneriler: Elde edilen sonuçlar, medya okuryazarlığının okullarda ders olarak okutulduğu günümüzde, erişim becerilerine öğretmen yetiştirme programlarında özel bir önem verilmesi ve öğretmen adaylarının arama motorlarıyla olan öznel deneyimlerinin derinlemesine araştırılması gereksinimini işaret etmektedir. *Google* ve diğer arama motorlarının komut ve kullanımlarının öğretilmesi, hem öğretmen adaylarının gelişigüzel yollar yerine doğrudan sonuca giden yolları kullanmalarını sağlayacak hem de eğitim programlarının gelecekte teknolojiyle bütünleşme sürecine olumlu katkı yapacaktır.

Anahtar Sözcükler: Bilgi teknolojileri, arama motoru, öğretmen yetiştirme, okuryazarlık

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Time Management Skills of Pamukkale University Students and their Effects on Academic Achievement

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Abstract

Problem Identification: Time is not a kind of source which people can increase by working hard. The aim of the time management is to increase the quality of the activities performed in a limited time. The university life process is the preparation stage to the period of taking responsibility and working. For this reason, acquiring the skills related to time management during this process plays an important role for students to be successful both during their university education and in real life.

Purpose of Study: The purpose of this study is to determine the time management skill levels of PAU students and the effects of these skills on their academic achievement.

Methods: In this study descriptive survey has been used. The sample of the study consists of 375 students attending five different faculties of Pamukkale University in the 2007-2008 academic year. A Time Management Scale including 25 items adopted from the Time Management Questionnaire developed by Britton and Tesser was administered to the subjects. The data has been analyzed by using such techniques as means, standard deviation, and linear regression.

Findings and Results: According to the findings, the time management skills of PAU students were found at a moderate level (f: 245, 65.33 percent). It was also found that the prediction power of the students' time planning skills for academic achievement level is 4.7 percent, time management attitudes and skills explain 3.8 percent of total variance in academic achievement, and the prediction power of the level of the students to cope with time wasters for academic achievement level is 4.3 percent. Moreover, the findings of this study prove that time management skills are not unidimensional. Finally, positive attitudes of students about time management affects their academic achievements as well as the other dimensions. Having positive attitudes about time management can help students to develop their skills in time management.

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Conclusions and Recommendations: The students should start to acquire time management senses on their own in their primary school years by reading materials on the issue or via the framework of psychological counselling and guidance studies applied in schools, and adopt effective time management attitudes and techniques to determine how and where they spend their time.
Keywords: Time management, academic achievement, university, student

For centuries, philoshophers and scholars made great efforts to define "time," but they could not agree on a common point. Newton said that time absolutely exists whether the universe exists or not. Leibnitz refuted Newton's definition by saying "time is not existent on its own, it is just the order of events." Like Leibnitz, Einstein said, "We can measure the time according to the order of events and it hasn't got an independent existence except for these events," then he developed an idea he called "synchronous events" (Erdul, 2005).

Relativity developed by Einstein caused us to think of the connection between time and place. Time slows down at the time of great "speed." Actually, Einstein contributed to the mystery of time. The moment when time is approached most and understood well is the moment when time can be seen as a dimension. Time is a dimension in which change takes place. The speed and the rate of the change occur at different levels; although it takes millions of years for mountains to take their forms; people are born, grow up, and die within a bit longer than half of a century. Human beings prefer to assess time and the change according to the rate of their lifetime (Adair & Adair, 1999).

Time is "a process which goes on contınuously without the control of people and through which the events occur from the past to the present and follow each other toward the future"(Smith, 1998, p. 24). Time is a source which shouldn't be wasted and should be used wisely. The appropriate use of time is an important variable for people working in different fields to attain their goals.

Time is priceless source. It runs down relentlessly with a certain rhythm; each minute is 60 seconds, each hour is 60 minutes. Time passed can't be returned. It is a source which is shared democratically—everyone has 24 hours for each day and seven days for each week. No matter how rich a person is, he can't buy more time, he can't save, borrow, steal, or change time in any way. The only thing he can do is to evaluate the time he has in the best way possible. Among the sources owned, time is the least comprehensible and worstly used." (Scoot, 1997). Where does this quote start? Add quotation marks at the beginning.

A new concept called "time management" emerged because of the needs of the people on how to effectively and productively control their time. It is an accepted fact that the most important step to using time effectively and productively is to manage time well. It is difficult to mention success for people who are incapable of managing time.

Time management spread from Denmark as an educational tool with the purpose of helping the administrators of organizations to teach their workforce to organize their time better. Now, it has become one of the most important components of success especially in professional working life (Koch, 1998). Time management is "a process in which a person applies such management functions as planning, organizing and controlling into his own activities to attain his goals effectively and productively in his both private life and career"(Erdem, 1999, p. 27). Time is not a kind of source which people can increase by working hard. The aim of time management is to increase the quality of the activities performed in a limited time.

According to Efil, it is very important to control time. It is difficult for people to provide whole control during their daily plans. Such time as school and work hours have been organized beforehand. Time is used for these activities. However, even these duties and activities carried out in definite time have a certain priority. Time passes in schools by attending classes, studying, and learning. For this point of view, time is mostly controlled by certain duties and obligations, but there are some different freedom degrees within the underdetermined time period. The first step to control time better starts by analyzing how it is used (Efil, 1999; Erdul, 2005).

University life takes an important role in creating the consciousness of time assessment. Making the students gain this consciousness, preparing the appropriate conditions to make students to gain this consciousness, and supporting them should be one of the duties of the university. Students experiencing the university life should undertake the most important role and responsibility of improving their time management skills. It is necessary to learn what time assessment means (Fidan, Latif & Uçkun, 2005). The purpose of this study is to reveal how time management skills of university students affect their academic achievement and, thanks to this, lead to more effective time use.

As a result of the observation of recent literature, only a few studies can be found on the time management skills of university students and their effects on academic performance. According to Britton and Tesser (1991), time management attitudes and the skills of university students affect their academic achievement positively. Moreover, a study by Moore (1994) significantly showed that time management skills have a powerful effect on academic achievement, and that students' perceptions and practices for time management are important factors in determining academic achievement.

Method

Research Design

The general purpose of this descriptive survey is to determine the time management attitude and skill levels of PAU students and the effects of these skills on their academic achievement. For this purpose the following research questions have been asked:

1. At which level are the time management skills of PAU students?

2. How do the time management skills of PAU students affect their academic achievement?

3. How do the time planning skills of PAU students affect their academic achievement?

4. How do the time management attitudes and skills of PAU students affect their academic achievement?

5. How does the ability of PAU students to cope with time wasters affect their academic achievement?

Sample

Participants of time management scale. The population for this study is 15,823 students studying in six different faculties of Pamukkale University, during the 2007–2008 academic year. By employing Cochran's formula (1962) proposed for stratified random sampling, 375 students attending Faculty of Education, Faculty of Science and Letters, Faculty of Economic and Administrative Sciences, Faculty of Engineering, Faculty of Medicine, and Faculty of Technical Education have been chosen as a sample of this study.

Table 1

The Distribution of the Sample according to Faculty and Gender Variables

Faculty	Male	%	Female	%	Total
Faculty of Education	81	76	26	24	107
Faculty of Science and Letters	60	59	42	41	102
Faculty of Economic and Administrative Sciences	32	40	48	60	80
Faculty of Engineering	24	35	45	65	69
Faculty of Medicine	2	25	6	75	8
Faculty of Technical Education	2	22	7	78	9
Total	201	54	174	46	375

The table generated by Krejcie & Morgan (1970) and reprinted by Gay (1996) was used to find out an appropriate sample size to represent the population.

Research Instrument

Time management scale. **A** time management scale (TMS) including 25 items adopted from the time management questionnaire developed by Britton and Tesser was administered to the subjects to measure time management skill levels of the students and to determine the capability of these skills to predict students' academic achievements. The first part of the two-part scale is designed to get personal

information about the students and the second part to measure the time management skills of the students. It requires subjects to mark one of the alternatives given for each item as "always–4", "frequently–3", "sometimes–2", and "never–1."

Validity and Reliability

The validity and reliabilityof the research instrument. The instrument was given to a group of experts studying in the field of educational administration to test the content validity of the time management questionnaire. At the end of the evaluation, necessary corrections were carried out and it proved that the instrument has content validity. At the end of the analysis for the construct validity of the questionnaire, the value of Kaiser-Meyer-Olkin for the time management questionnaire was .835. The data of the instrument was proven appropriate for factor analysis.A factor analysis on 37 items was carried out to reveal the basic subscales and factor structure of the questionnaire. In this analysis the scale was subjected to Principal Component Analysis. The following table of "critical values for a correlation coefficient" generated by Stevens (1996) was used to test the significance of a factor load.

Table 2

Critical Values for a Correlation Coefficient

n	C.V.	n	C.V.	n	C.V.
50	.361	180	.192	400	.129
80	.286	200	.182	600	.105
100	.256	250	.163	800	.091
140	.217	300	.149	1000	.081

Source: Stevens, J.(1996). Applied Multivariate Statistics for the Social Sciences. Third. Ed., Mahwah,N.J.: Lawrence Erlbaum Associates, Publishers. p. 371.

Since the factor analysis of the data was run with 375 (nearly 400) subjects, factor loadings >2 (.129)=.258 in absolute value was supposed to be statistically significant as proposed by Stevens (1996). Therefore, 12 items in the factor load under .258 (.129 x 2) were excluded. The three interpretable factors were: Factor I (Time Planning); Factor II (Time Management Attitute and Skills); and Factor III (Time Wasters). As a result of the analysis, the CronBach-Alpha value of the instrument was found as .750 and the scale was proven reliable.

Procedure

The time management scale has been applied to 375 students and their grade point averages as written by them on the first part of the scale forms.

Data Analyses

During the process of data analysis, the SPSS (Statistical Package for Social Sciences) package program was used. In order to find answers to the problems of this

study, such techniques as standard deviation, mean, and linear regression were used. The meaningfulness level of .05 was used during the statistical analysis. Negative items in the questionnaire were reverse scored.

Findings and Results

In order to analyze the time management skill levels of PAU students, how many students drop to each skill level and the total percentage portions of these students are determined by descriptive statistics techniques. The table related to this determination is given below.

Table 3

The Frequency Levels of the Points Related to the Time Management Skill Levels of PAU Students

Points	*Frequency*	*%*	*Level*
75.101 and above	63	16.8	High
59.507 – 75.101	245	65.33	Moderate
59.507 and below	67	17.87	Low
Total	375	100	

According to Table 3, the time management skill level of PAU students is at a moderate level (f: 245, 65.33 percent). At this level, students don't know how to manage their time, they don't know enough about the techniques of time planning, they frequently use time wasters, they revert to wrong habits they got into in the past related to effective time planning, and they may not have heard of the concept of time management.

The effect of time management skills of PAU students on their academic performance has been compared through linear regression analysis. Time management skills are taken as independent and the grade point averages of the students are used as the dependent variable. The grade point averages of the students were written by the students themselves in the first part of the questionnaire. The researcher used the results of the linear regression analysis to reveal how much of the academic performance of students (by stabilizing the other factors affecting the academic performance) is affected by their time management skills. In this sense, the researcher tried to reveal how much of this effect can be predicted by time management skills of the students, although there are several factors affecting academic performance. The findings for the prediction power of time management skills of the students for academic achievement levels are given in Table 4.

Table 4

The Regression Analysis Results Related to the Relationship between the Time Management Skills and the Grade Point Averages

Variables	B	Standard Deviation	β	T	p
Stable	1.278	.213		5.999	.000
Time Management Skills	.018	.003	.280	5.638	.000
R= .280 R^2 =.079 P=.000 F= 31.787					

According to the results of regression analysis in which time management skills are used as an independent variable and academic performance as dependent variable, the level of the explanation of the dependent variable is statistically meaningful (R=.280, R^2 =.079, P<.05). According to these findings, the prediction level of time management skills for academic performance is 7.9 percent. Namely, it can be said that the students' time management skills affect their academic achievement at a significant level and the skills are one of the predictors of academic performance. Therefore, it is expected that when time management skills increase, the students' grade point averages also increase.

The effect of time planning skills of PAU students on their academic performance was compared using linear regression analysis.Time planning skills were the independent variable and the grade point averages of the students was the dependent variable. The grade point averages of the students were written by the students themselves in the first part of the questionnaire. The researcher used the results of linear regression analysis to determine how much of the academic performance of the students (by stabilizing the other factors affecting academic performance) is affected by their time planning skills. Using these results, the researcher tried to reveal how much of this effect can be predicted by the time planning skills of the students, although there are several factors affecting academic performance. The prediction power of the students' time planning skills for academic achievement level is given in Table 5.

Table 5

The Regression Analysis Results Related to the Relationship between the Time Planning Skills and the Grade Point Averages

Variables	B	Standart Deviation	β	T	p
Stable	1.887	.139		13.598	.000
Time Planning Skills	.020	.005	.216	4.274	.000
R= .216 R^2 =.047 P=.000 F= 18.264					

According to the results of regression analysis in which time planning skills are used as independent variable and academic performance as the dependent variable, the level of the explanation of the dependent variable is statistically meaningful (R=.216, R^2 =.047, P<.05). According to the findings, the prediction level of time planning skills for academic performance is 4.7 percent. Therefore, it can be said that the students' time planning skills affect their academic achievement even if it is low and the skills are one of the predictors of academic performance.

The effect of time management attitudes and skills of PAU students on their academic performance was compared through linear regression analysis. Time management attitudes and skills were used as independent variables and the grade point averages of the students were the dependent variable. The grade point averages of the students were written by the students themselves in the first part of the questionnaire. The researcher used the results of linear regression analysis to determine how much of the students' academic performance (by stabilizing the other factors affecting the academic performance) is affected by their time management attitudes and skills. Using these results, the researcher tried to reveal how much of this effect can be predicted by time management attitudes and skills of the students, although there are several factors affecting academic performance. The prediction power of time management attitudes and skills of the students for academic achievement level is given in Table 6.

Table 6

The Regression Analysis Results Related to the Relationship between the Time Management Attitudes and Skills and the Grade Point Averages

Variables	B	Standart Deviation	β	T	p
Stable	1.674	.210		7.976	.000
Time Management Attitudes and Skills	.032	.008	.194	3.823	.000
R= .194 R^2 =.038 P=.000 F= 14.619					

According to the results of regression analysis in which time management attitudes and skills are used as independent variables and academic performance as the dependent variable, the level of the explanation of the dependent variable is statistically meaningful (R=.194, R^2 =.038, P<.05). According to these findings, the prediction level of time management attitudes and skills for academic performance is 3.8 percent. Therefore, it can be said that the students' time management attitudes and skills have an effect, even if it is low, on their academic achievement and the skills are one of the predictors of academic performance.

The ability of PAU students to cope with time wasters and its effect on their academic performance has been compared through linear regression analysis. The level to cope with time wasters was used as the independent variable and the grade point averages of the students were used as the dependent variable. The grade point

averages of the students were written by the students themselves in the first part of the questionnaire. The researcher used the results of linear regression analysis to reveal how much of the students' academic performance (by stabilizing the other factors affecting the academic performance) is affected by the student's ability to cope with time wasters. Using these results, the researcher tried to reveal how much of this effect can be predicted by the student's abiltiy to cope with time wasters, although there are several factors affecting academic performance. The prediction power of the student's ability to cope with time wasters on academic achievement level is given in Table 7.

Table 7

The Regression Analysis Results Related to the Relationship between the Ability to Cope with Time Wasters and the Grade Point Averages

Variables	B	Standart Deviation	β	T	p
Stable	1.849	.153		12.065	.000
Time Wasters	.045	.011	.208	4.110	.000
R= .208 R^2 =.043 P=.000 F= 16.895					

According to the results of regression analysis in which the ability to cope with time wasters is used as an independent variable and academic performance as the dependent variable, the level of the explanation of the dependent variable is statistically meaningful (R=.208, R^2 =.043, P<.05). According to these findings, the prediction of ability to cope with time wasters on academic performance is 4.3 percent. Therefore, it can be said that a student's ability to cope with time wasters has an effect, even if it is low, on his or her academic achievement and the level is one of the predictors of academic performance.

Discussion

The time management skills of PAU students are at moderate level (f: 245, 65.33 percent). Nearly 17 percent (f: 63) of the students have high skills, 17.87 percent (f: 67) of the students have low level time management skills. According to these results, although most of the students attending to Pamukkale University have time management skills at a moderate level, only a few of them have these skills at a high level. However, as discussed earlier, time management skills are among the most important variables of success in professional and academic life. Making students gain effective time management skills seems to be one of the ways for Pamukkale University to reach its goals stated in its vision and mission. Therefore, it would be beneficial to open courses related to time management or hold time management seminars for students from time-to-time in each faculty or even each department of Pamukkale University.

The general time management point was also found at a moderate level in the study by Dikmetaş, Erdem, and Pirinçci (2003). The findings are consistent with those of the study by Dikmetaş et al. On the other hand, the study by Erdul found that time management skills of university students were at a high level. The findings contradict those of Erdul's study. This may result from the time difference between Erdul's study and this one and the different sample scope of Erdul's, including five seperate universities in different cities.

Time management skill level explains 7.9 percent of total variance in academic achievement. A lot of factors affect students' academic achievements, and these findings show that the time management skills of university students have a notable effect on their academic achievement. These results show the importance of a student's effective time management as well as the other factors affecting a student's academic achievements. Therefore, it is important to make the students acquire time management skills beginning in their preschool years in order to provide a successful university education, because some skills and attitudes can be acquired more easily than normal during this period. The findings obtained are consistent with the studies by Alay (2000); Dikmetaş et al.; Demirtaş & Özer (2007); Macan and his friends(1990); Britton & Tesser; Moore (1994), and Wells (1994).

According to the findings obtained, the prediction level of time planning skills for academic performance is 4.7 percent. That is, a positive relationship between a student's time planning skills and his or her academic performance was found, and time productively planned will increase the academic achievement of the students. This result is consistent with that of the study Alay. Also, the findings of this study are consistent with those of obtained related to the short term planning subscale of the study by Britton & Tesser. As in this study, it was determined that the skills obtained in this subscale positively contribute to students' academic achievement.

These findings show the prediction level of time management attitudes and skills for academic performance is 3.8 percent. It has been determined that the time management attitudes and skills affect the academic achievement of students positively, consistent with the study by Britton & Tesser. However, the study by Demirtaş & Özer could not determine a relationship between time attitudes and academic achievement. The contradiction between the findings of the study by Demirtaş and Özer and this study may be due to the fact that the one carried out in 2007 was applied to only the fourth classes of the educational faculty of a different university.

The prediction level of ability to cope with time wasters on academic performance was found at 4.3 percent. A similar relationship has been found between the time wasters subscale of the study by Demirtaş & Özer, including questions related to wasting time and their grade point averages. The findings of this study are consistent with those of the study by Demirtaş & Özer.

It seems that time management skills constitute three dimensions. This result also proves that time management skills are not unidimensional. It has been concluded that the skills of each dimension affect a student's academic achievement at different levels.

The knowledge of different dimensions which constitute general time management is important during a student'sacqusition process of time management skills. To make the students gain these skills may take longer. Therefore, it may be necessary to make the students acquire time management skills step-by-step according to their development levels. Therefore, it is important to analyze time management and determine its dimensions.

According to the results of the study, positive attitudes of students about time management affect their academic achievement as well as the other dimensions. Having positive attitudes about time management can help students develop their time management skills. First, it may be useful to have an effort to develop positive attitudes related to time management within the process of teaching the students time management skills. Then, skills of effective time planning and coping with time wasters can be improved. Based on the results of this study, the following suggestions have been proposed for university students and researchers:

First, students should determine how and where they spend their time by applying time analysis and determine the activities wasting their time and take precautions. Secondly, students should adopt effective time management attitudes and techniques which enable them to use time effectively and put them into practice as frequently as possible. Also, the concept of time management should be introduced to the students in the framework of psychological counselling and guidance studies beginning in primary school. Furthermore, the Internet is a good source for students, and programs including knowledge of how to use time more effectively and productively should be prepared and published through Internet. Finally, the brochures, leaflets, and books written by specialists in the field of educational administration should be distributed and related articles and written pieces should be given to students at the beginning of terms. Such activities as seminars, conferences, and courses should be held by the psychological counselling and guidance departments of related educational institutions.

Different studies may be applied by new researchers. For instance, the students attending five different faculties of PAU constitute the subjects of this study. A new study may be extended by including all students of PAU. Also, this study has been carried out in Denizli, but could be conducted in different cities. Moreover, this study is aimed at university students. This study may be applied from different aspects to students with different ages and education levels and reach a general judgment by comparing the findings of the new study and the results of this one. In addition, this study neglects such variables as where the student lived and the section attended. These variables can be analyzed in similar studies. Finally, the effect of time management skills of university instructors on their academic performance can be determined.

References

Adair, J. & Adair, T. (1999). *Time management*, Translator: Bengi Güngör, Ankara: Öteki Publishing

Alay, S. (2000). *Seçilmiş üniversite öğrencilerinin zaman yönetimi becerileri ile akademik başarıları arasındaki ilişki* [relationship between time management and academic achievement of selected university students] Unpublished dissertation, Ankara: Middle East Technical University Instıtute of Social Sciences.

Britton, B.K. & Tesser, A. (1991). Effects of time management practices on college grades, *Journal of Educational Psychology*, 83 (3), 405–410.

Cochran, W. (1962). *Sampling techniques*. New York: John Wiley Sons Inc.

Demirtaş, H. & Özer, N. (2007) Relationship between time management skills and academic achievement of teacher nominees, *The Journal of Political Analysis* and Strategical Research. *Retrieved* November 11 2007 from http://www.inased.org/epasad/c2s1/demirtasozer.pdf

Dikmetaş, E., Erdem, R. & Pirinçci, E. (2004). The time management attitudes of university students and the relation of these attitudes with the academic performance, *The Journal Of Social Sciences of Manas University. Retrieved* February 24 2008 from http://yordam.manas.kg/ekitap/pdf/Manasdergi

Efil, İ. (1999). Administration and organization in business, In Gökhan Erdul, *Üniversite Öğrencilerinin Zman Yönetimi Becerileri ile Kaygı Düzeyleri Arasındaki İlişki* [the relation between the time management skills of university students and the level of their anxiety] (pp.18–36) Unpublished dissertation, Bursa: Uludağ University Institute of Social Sciences.

Erdem, R. (1999). Yöneticiler için zaman yönetimi [Time management for administrators]. *Modern Hastane Yönetimi*, 3(7), 26–31.

Erdul, G. (2005). *Üniversite öğrencilerinin zaman yönetimi becerileri ile kaygı düzeyleri arasındaki ilişki* [The relation between the time management skills of university students and the level of their anxiety] Unpublished dissertation, Bursa: Uludağ University Institute of Social Sciences.

Fidan, F., Latif, H. & Uçkun, G. (2005) *What are university students doing ? Time assesment or time passing?* (The sample of Sakarya University). *Retrieved* December 12 2007 from http://www.isletme-finans.com

Gay, L.R. (1996). *Educational research: Competencies for analysis and application*. Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Krejcie & Morgan (1970). Determining sample size for research activities, *Educational and Psychological Measurement*, 30 (3), 607–10.

Koch, R. (1998). *The 80/20 principle: the secret of achieving more with less*, New York: Bantam Doubleday Dell Publishing Group.

Macan, T. H., Shahani, C., Dipboye, R. L. & Phillips, A. P. (1990). College student's time management: Correlations with academic performance and stress, *Journal of Educational Psychology*, 82 (4), 760–768.

Moore, P.C. (1994). *The ınfluence of time management practices and perceptions on academic performance.* Unpublished doctoral dissertation. *Retrieved* July 12 2007 from http://proquest.umi.com

Scoot, M. (1997). *Time management*, Translator: Aslı Çıngıl Çevik, İstanbul:Rota Publishing.

Smith, H.W.(1998). *10 natural regulations to manage life and time: proofed strategies to increase productivity and inner peace,* Translator: Adalet Çelbiş, İstanbul: Sistem Publishing.

Stevens, J. (1996). *Applied multivariate statistics for the social sciences*. Mahwah,N.J. Lawrence Erlbaum Associates,Publishers.

Wells, G. D. (1993). *Time–management and academic achievement*. *Retrieved* July 12 2007 from http://proquest.umi.com

Pamukkale Üniversitesi Öğrencilerinin Zaman Yönetimi Becerilerinin Akademik Başarıları Üzerindeki Etkisi

(Özet)

Problem Durumu: Kelime anlamı olarak zaman, olayların geçmişten bugüne gelip, geleceğe doğru birbirini takip ettiği, bireyin kontrolü dışında kesintisiz devam eden bir süreçtir. Zaman israf edilmemesi, akılcı kullanılması gereken önemli bir kaynaktır. Ancak, günümüz toplumlarında, yaşamın hızlı temposu içerisinde bireylerin söz konusu değerli kaynağı etkili bir biçimde kullanma şansları giderek azalmaktadır. Öncelikle insanlardan beklenen ve karşılanması istenen konular, her yıl bir önceki yıla oranla artmakta ve örgütler, çalışanlarından her geçen gün daha fazla konuda talepte bulunmaktadır. Bunun yanı sıra çalışma yaşamı giderek daha karmaşıklaşmakta, iş ortamını etkileyen göstergeler artmaktadır. Tüm bu değişimler belirli bir yere kadar tolere edilebilmektedir, fakat değişim hızının da kendi içinde artıyor olması, belli bir noktada zamanın yetersizliği gerçeğini ortaya çıkarmaktadır. Zaman yönetimi kavramı bu noktada devreye girmektedir. Zaman yönetimi, kişinin özel ve iş yaşamında, amaçlarına etkili ve verimli bir şekilde ulaşabilmesi için planlama, organize etme ve kontrol etme gibi yönetim işlevlerini kendi etkinliklerine uygulama

sürecidir Zaman yönetiminin amacı, sınırlı olan zaman içerisinde yapılacak etkinliklerin niteliğini artırmaktır.

Üniversite dönemi, zaman değerlendirme bilincinin oluşmasında da önemli bir yer tutmaktadır. Üniversitenin görevlerinden biri de, öğrencilerine bu bilinci kazandırmak, öğrencilerin bu bilinci kazanmaları için uygun koşulları hazırlamak ve onları desteklemek olmalıdır. Zaman kullanma yetkinliklerinin geliştirilmesinde en önemli rolü ve sorumluluğu, üniversite sürecini yaşayan öğrenciler üstlenmelidir. Zamanı değerlendirmenin ne anlama geldiğini özellikle öğrenmek gerekir

Bu araştırmadan, üniversite öğrencilerinin zaman yönetimi becerilerinin akademik başarıları üzerindeki etki düzeyini ortaya çıkarması ve bunun ışığında öğrencilere, zamanlarını nasıl daha etkili bir şekilde kullanabileceklerine ilişkin yol göstermesi beklenmektedir.

Araştırmanın Amacı: Bu araştırmadan, üniversite öğrencilerinin zaman yönetimi becerilerinin akademik başarıları üzerindeki etki düzeyini ortaya çıkarması ve bunun ışığında öğrencilere, zamanlarını nasıl daha etkili bir şekilde kullanabileceklerine ilişkin yol göstermesi beklenmektedir.

Araştırmanın Yöntemi: Bu araştırmada, Pamukkale Üniversitesi öğrencilerinin zaman yönetimi beceri düzeyleri ve bu düzeylerinin akademik başarıları üzerindeki etkisi belirlenmeye çalışılmıştır. Araştırma bu yönüyle betimsel bir çalışmadır. Araştırma tarama modeli için uygundur. Bu araştırmanın evrenini, 2007–2008 eğitim-öğretim yılında Pamukkale Üniversitesi Eğitim Fakültesi, Fen–Edebiyat Fakültesi, İktisadi ve İdari Bilimler Fakültesi, Mühendislik Fakültesi, Tıp Fakültesi ve Teknik Eğitim Fakültesi'nde öğrenim gören 15.823 öğrenci oluşturmaktadır. Araştırmanın örneklemini evrende bulunan 15.823 öğrenci arasından "tabakalı tesadüfi örnekleme" ile seçilen 375 öğrenci oluşturmaktadır.

Pamukkale Üniversitesi öğrencilerinin zaman yönetimi beceri düzeylerini ölçmek için konunun kuramsal temeli oluşturulmuş ve literatür taraması yapılmış olup, Britton ve Tesser (1991) tarafından geliştirilen "Zaman Yönetimi Envanteri", araştırmacı tarafından Türkçe'ye çevrilmiş ve uyarlanmıştır. Türkçe'ye uyarlanan ölçek için uzman görüşü alınmış ve eleştiriler değerlendirilerek, ölçek üzerinde yeni düzenlemeler yapılmıştır. Araştırmanın yaz okuluna devam eden 150 kişilik ön deneme grubuna uygulanması sonucunda geçerlilik ve güvenirlik çalışmaları yapılarak bazı maddeler çıkartılmış ve kullanılan anket 25 maddeden oluşmuştur. İki bölümden oluşan anketin birinci bölümü öğrenciler hakkında kişisel bilgi edinmeye, ikinci bölümü ise öğrencilerin zaman yönetimi becerilerini ölçmeye yöneliktir. Ölçme aracı için öğrencilerden her maddenin karşısında bulunan "her zaman–4","sık sık–3", "ara sıra–2", ve "hiçbir zaman–1" seçeneklerinden birini işaretlemeleri istenmektedir.

"Zaman Yönetimi Envanteri"nin kapsam geçerliliğini test etmek amacıyla araç, ilgili alanda çalışan bir uzman grubunun görüşüne sunulmuş, yapılan değerlendirme sonucunda ilgili düzenlemeler yapılmış ve aracın kapsam geçerliliğine sahip olduğu belirlenmiştir.

Ölçme aracının yapı geçerliliği ile ilgili yapılan çalışmada Kaiser-Meyer-Olkin değerinin Zaman Yönetimi Envanteri için .835 olduğu belirlenmiştir. İlgili ölçekteki verilerin faktör analizine uygun olduğu görülmüştür.

Zaman Yönetimi Envanteri'nin temel boyutlarını ve faktör yapısını ortaya koymak amacıyla, 37 madde üzerinden faktör analizi yapılmıştır. Analizde ölçek, Temel Bileşenler Analizi (Principal Component Analysis) ile sınanmış ve faktör yükü .258 (.129x2)'in altında kalan maddeler atılmıştır. Çözümleme sonunda, veri toplama aracının CronBach-Alpha değeri .750 olarak bulunmuş ve aracın güvenilir olduğu saptanmıştır. Verilerin çözümlenmesinde SPSS (Statistical Package for Social Sciences) paket programı kullanılmıştır. Araştırmanın alt problemlerine yanıt bulmak amacıyla standart sapma, ortalama, doğrusal regresyon analizi gibi istatistik tekniklerinden yararlanılmıştır. Yapılan istatiksel çözümlemelerde anlamlılık düzeyi .05 olarak alınmıştır. Ölçekte yer alan olumsuz maddeler ters çevrilerek hesaplamalara dahil edilmiştir.

Araştırmanın Bulguları: Bulgulara göre PAÜ öğrencilerinin zaman yönetimi becerileri "orta" düzeydedir (f:245, %65.33). Zaman yönetimine ilişkin, öğrencilerin % 16.8'i (f: 63) "yüksek", % 17.87'si (f: 67) ise "düşük" düzeyde beceriye sahiptir. Ayrıca PAÜ öğrencilerinin zaman yönetimi beceri düzeyi, akademik başarıdaki toplam varyansın % 7.9' unu açıklamaktadır. Zaman planlama becerilerinin, akademik başarı düzeyini yordama gücü % 4.7 olarak sasptanmıştır.Bir diğer alt boyut olan zaman yönetimi tutum ve becerileri, akademik başarıdaki toplam varyansın % 3,8'ini açıklamaktadır. Zaman düşmanlarını kullanma düzeyinin, akademik başarı düzeyini yordama gücü % 4.3 olduğu belirlenmiştir.

Araştırmanın Sonuçları ve Önerileri: Araştırmanın sonuçlarına göre Pamukkale Üniversitesi öğrencilerinin çoğunluğu orta derecede zaman yönetimi becerilerine sahipken çok az bir bölümü yüksek düzeyde zaman yönetimi becerilerine sahip görünmektedir. Oysa daha önce de belirtildiği gibi, zaman yönetimi becerileri tüm mesleklerde olduğu gibi akademik yaşamda da başarının önemli bir değişkenidir. Bu doğrultuda, üniversitenin tüm fakültelerinde hatta tüm bölümlerinde zaman yönetimi ile ilgili derslerin açılması ya da üniversitenin Rehberlik ve Psikolojik Danışma Birimi tarafından ilgili konuda seminer, konferans ya da kurslar düzenlenmesi ve öğrencilere zaman yönetimi ile ilgili alanda uzman kişiler tarafından hazırlanan broşür, kitapçık ve kitaplar dağıtılması gerekmektedir.

Zaman yönetimi becerilerinin üç boyutu içinde barındırdığı görülmektedir.

Bu boyutlardaki becerilerin de öğrencilerin akademik başarıları üzerinde etkileri olduğu sonucuna varılmıştır. Üniversite öğrencilerinin akademik başarıları üzerinde "zaman planlama becerileri"nin 4.7%, "zaman yönetimi tutum ve becerileri"nin 3.8% ve "zaman düşmanları ile başa çıkma becerileri"nin ise 4.3% etkisi bulunduğu gözlenmiştir. Bu sonuç, zaman yönetimi becerilerinin tek boyutlu olmadığının bir göstergesidir. Öğrencilere zaman yönetimi becerilerinin kazandırılması sırasında, genel zaman yönetimini oluşturan değişik boyutların bilinmesinin önemli olacağı düşünülmektedir. Bu becerilerin kazandırılması uzun bir süreç içerisinde olabilir. Bu nedenle, süreç içerisinde zaman yönetimi becerilerinin öğrencilerin gelişim düzeylerine uygun olarak, birbirini izleyen adımlar biçiminde kazandırılması gerekebilir. Bu nedenle zaman yönetiminin analiz edilmesi ve boyutlarının ortaya çıkartılması önemlidir.

Anahtar Sözcükler: Zaman yönetimi, akademik başarı, üniversite, öğrenci

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Alternative to Traditional Physics Instruction: Effectiveness of Conceptual Physics Approach

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Abstract

Background of Study: It is widely accepted that students' pre-existing conceptions about the scientific phenomena affect their learning of accurate scientific principles. A conceptual approach promotes meaningful learning in students regarding science concepts.

Purpose of Study: The primary purpose of this study was to compare the relative effectiveness of a conceptual approach to physics and traditional teaching for ninth grade, private high school students' understanding of and attitudes toward simple electricity.

Methods: The population of the study consists of all ninth grade private high school students who study science courses in English in the Çankaya district of Ankara in Turkey. There were four high schools, with 33 classes and 660 students, satisfying this condition in the district. We chose one school and four classes, comprising 73 ninth grade students. The students in the sample correspond to approximately 11 % of the students in the population. For a conceptual physics approach, we adapted Paul G. Hewitt's ideas about conceptual physics to high school physics instruction in simple electricity. For the study, various learning materials were prepared with a conceptual physics approach in mind. Two physics teachers and their four classes were enrolled in the study. Each teacher had two classes; one was assigned as an experimental group and the other was assigned as control group. Two groups of students (N_1=34) were instructed with the conceptual physics approach, while the other two groups (N_2=33) were instructed by the traditional method. For the study, two measuring tools were used; the Achievement Test about Simple Electricity (ACT) and the Attitude Scale about Simple Electricity (ATS). The ACT and ATS were administered to both experimental and control group students as pre-tests before the instruction and as post-tests after the instruction. The study

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continued for three weeks; students in both groups completed instruction designed for them.
Findings and Results: The main effects of treatments were analyzed by using MANCOVA and follow up ANCOVA techniques. These analyses denoted that the conceptual physics approach led to a better understanding of simple electricity than did the traditional method. Also, the students instructed with the conceptual physics approach developed more positive attitudes than the students instructed according to the traditional method.
Conclusions and Recommendations: The conceptual physics approach led to intensive teacher–student and student-student interactions and a larger commitment of instructional time to individual exploration. Hence, conceptual physics enabled students to understand the main concepts and encouraged them to think critically. In conclusion, the conceptual physics approach should be used in physics lessons.
Keywords: Physics education, conceptual approach, conceptual physics, conceptual change

Constructivism, one of the contemporary psychological perspectives on learning, underlines the role of prior knowledge in learning (Özkan, Tekkaya, & Geban, 2004). Previous studies indicated that students' pre-existing conceptions about scientific phenomena affect their accurate learning of scientific principles or concepts (Chambers & Andre, 1995; Chambers & Andre, 1996; Sencar & Eryılmaz, 2004; Sungur, Tekkaya, & Geban, 2001). To promote meaningful learning, various instructional methods were suggested. One of them is using the conceptual change approach.

Posner, Strike, Hewson and Gertzog (1982) developed a conceptual change instructional model to help students in transforming preconceptions into accurate scientific explanations. Posner et al. proposed that the conceptual change approach requires four conditions before the conceptual change is likely to occur. These conditions are dissatisfaction, intelligibility, plausibility, and fruitfulness.

Roth (1985) adapted Posner et al.'s (1982) ideas to elementary science instruction for conceptual change text strategy. In her model, students are asked explicitly to make a prediction what would happen in a situation. After making their prediction, the students are presented with common misconceptions, along with the evidence countering these misconceptions. Finally, students are provided with the correct scientific conception. Another conceptual change strategy is using refutational text, developed by Hynd and Alvermann (1986) on the basis of Posner et al.'s conceptual change model. In the refutational text strategy, the text directly tells students that their existing conception is wrong, but without activating students' misconceptions with challenging questions.

Chambers and Andre (1996) claimed that the text-based conceptual change approach is suitable for large-scale lectures. For smaller-scale lectures, the classroom-based conceptual change approaches were suggested. Classroom based conceptual approaches focus on using in-class, teacher-student and student-student interactions to promote conceptual change.

Paul G. Hewitt, who was awarded by Millikan Lecture in 1982, suggested conceptual physics as suitable for smaller-scale lectures. Hewitt (1990) defined conceptual physics as the study of physics through a focus on concepts rather than derivations and emphasizing critical thinking rather than computation. The fundamental idea is to teach the main idea and explore it with equations and real life examples. Hewitt (1983) presented three main goals for conceptual physics. The first one is to teach the main ideas of physics concepts, which he called teaching "hardcore physics", the second is to shape students' critical thinking, and the third goal is to relate the role of physics and technology to the future. In teaching the main ideas of physics concepts, Hewitt (1983) suggested using classroom discussions, making drawings, and giving familiar examples from real life. While shaping students' critical thinking, Hewitt (1990) recommended using mathematical equations as meaningful guides rather than as tools to calculate numerical values. Stressing the relationships between the terms in equations and showing these relations by using relative sizes of symbols enhances students' critical thinking. In regards to the third aim of conceptual physics, Hewitt (1983) warned physics teachers that they should point out relations between technology and science in particular physics in physics classes, because physics and technology are in close relations. Conceptual physics as an instructional strategy aims to teach physics concepts effectively by teaching the main ideas, improving critical thinking and relating the role of physics to technology. As such, conceptual physics is more exhaustive than text-based conceptual change approaches. Conceptual physics requires using more than conceptual change text; it also involves using classroom discussions, drawings, analogies, demonstrations, experiments, role playings, and real life experiences. It involves intensive teacher-student and student-student interaction. Conceptual change sessions could be inserted into various experimental activities or demonstrations.

Various studies exist in the literature which investigate the effectiveness of a conceptual approach on students' conceptual understandings. Wang and Andre (1991) investigated the effect of conceptual change text on learning electricity concepts. They developed conceptual change text about basic electricity circuits. The results of their study indicated that conceptual change text improved the acquisition of qualitative concepts about simple electrical concepts. In the following years, Chambers and Andre (1995; 1996) built upon the text developed by Wang and Andre (1991). Chambers and Andre (1995) investigated relationships among students' gender, interest in and experience with electricity, and conceptual change text manipulations on their learning of basic electricity concepts. They reported on how conceptual change text facilitated the learning of electricity concepts, as compared to traditional text. They have found that only females with high interest in electricity and males with low interest in electricity gained more benefits from a conceptual change text. Chambers and Andre (1996) analyzed the relationship between gender, interest in and experience with electricity, and conceptual change text manipulations on learning direct current concepts. The results of their study showed that when interest level, experience, and prior knowledge were included in the analysis, the conceptual change text led to better understanding of electric concepts than did the traditional text. Both male and females profited from a conceptual change approach. Rosenquist and McDermott (1987) developed a classroom based conceptual

approach to teaching kinematics through the results of research on student understanding of velocity and acceleration. They reported that stress on definition of concepts, making explicit connections among concepts, graphical representations and real world applications resulted in a deeper conceptual understanding than traditionally- oriented instruction.

Several studies have reported the effectiveness of the conceptual approach (text-based or classroom-based) in creating conceptual change and promoting meaningful learning in students regarding science concepts (Chambers & Andre, 1996; Chambers & Andre, 1995; Özkan et al., 2004; Rosenquist & McDermott, 1987; Sungur et al., 2001; Wang & Andre, 1991). Unfortunately, the conceptual approach studies did not investigate the effectiveness of the conceptual approach on students' attitudes. Further, in our literature review, we did not come across any experimental studies about the effectiveness of conceptual physics taught with a conceptual approach on students' physics achievements and physics attitudes. The studies about the conceptual physics generally presented instructional strategies in conceptual physics and reported the experiences of physics teachers using it in their lectures. However, Hewitt (1990) confidently claimed that conceptual physics increased students' physics achievements and developed positive attitudes towards physics.

To create a conceptual physics approach to learning for our current study, we adapted Paul G. Hewitt's ideas about conceptual physics into high school physics instruction in simple electricity. "Simple electricity" covers the flow of charge, electric current, simple circuits, series and parallel circuits, Ohm's law, and the calculation of voltage, current and resistance in single and multiple element circuits. The main reason for choosing simple electricity is that the concepts used in the topic are abstract (Şen & Aykutlu, 2008) and teachers expect students to understand non-observable quantities such as current, voltage, resistance (Taber, Trafford, & Quail, 2006). Hence, we expected that the activities developed for the requirements of conceptual physics could help students to understand the concept and develop positive attitudes towards simple electricity.

Purpose

Research questions of the current study were as follows:

- What is the effect of the Conceptual Physics Approach on ninth grade students' achievements in simple electricity?
- What is the effect of the Conceptual Physics Approach on ninth grade students' attitudes toward simple electricity?

The null hypothesis of the study was stated as:

- There is no significant effect of teaching methods (Conceptual Physics Approach versus Traditional Method) on the population means of collective dependent variables of the students' physics achievement post-test scores (PSTACH) and physics attitude post-test scores (PSTATT) when students' age, physics achievement pre-test scores (PREACH), physics attitude pre-test scores (PREATT), previous cumulative grade point averages (PCGPA), previous physics course grades (PPCG), gender and teacher are controlled for.

The variable age was the student's age at the beginning of the study in years. The PCGPA was the students' cumulative grade point averages at the end of first term. The PPCG was the students' physics grades on their reports at the end of first term.

Method

Population and Sample

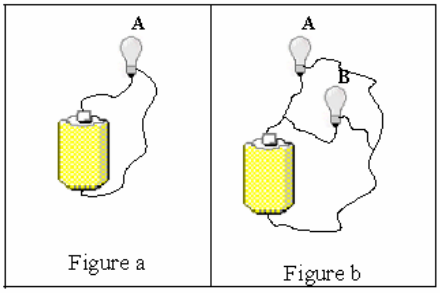
The population of the study consists of all ninth grade private high school students who study science courses in English in the Çankaya district of Ankara in Turkey. There were four high schools, with 33 classes and 660 students, satisfying this condition in the district. One school and four classes, comprising 73 ninth grade students, were chosen for its convenience for the researchers. The students in the sample correspond to approximately 11 % of the students in the population. This percentage could be evidence of the representativeness of the population. The ages of students ranged from 14 to 18 years, and most were 15 years old. Two physics teachers and their four classes were enrolled in the study. Each teacher had two classes; one was assigned as an experimental group and the other was assigned as control group. In total, 37 students were included in the experimental groups and 36 students were included in the control groups.

Measuring Tools

For the study, two measuring tools were used; Achievement Test about Simple Electricity (ACT) and Attitude Scale about Simple Electricity (ATS). The ACT was directly taken from the Hardal study (2002) and the ATS was developed by the researchers. The ACT and ATS were administered to both experimental and control groups as pre-tests before the treatment and as post-tests after the treatment.

Achievement test about simple electricity. Hardal (2002) developed the ACT to assess the students' achievement in simple electricity. The test covers the physics content taught in the ninth grade curriculum in simple electricity and consists of 25 questions. Three of the questions are true-false, three questions are about matching the circuit elements, and 12 questions concern the common misconceptions found in previous studies (Chambers & Andre, 1995; Chambers & Andre, 1996; Sencar & Eryılmaz, 2004) on simple electricity. The misconception items included one correct answer and three distracters that reflect students' misconceptions. The remaining seven questions are related to application of the presented concepts or laws, such as calculating a value (e.g., resistance, current, voltage) for a given circuit or components. These questions include five alternative choices and only one of them is the correct choice. Test scores were determined according to the number of correct answers. Each correct response was counted as 1 point. Figure 1 shows a misconception question and Figure 2 shows a question about calculating a voltage value as a sample.

In Figure a, Bulb A is connected to the battery as shown. Another identical Bulb B is connected to the circuit as in Figure b. How does the brightness of Bulb A change?



a) Decreases, because the equivalent resistance of the circuit is increased by connecting Bulb B. So, this decreases current in the main branch.

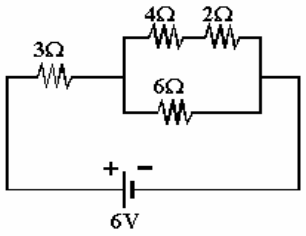
b) Does not change, because, although as Bulb B is connected parallel to Bulb A, the equivalent resistance of the circuit decreases and the main branch current increases. Since main branch current is divided into two parallel branches, same amount of current passes through Bulb A as in previous.

c) Decreases, because in Figure a all the main branch current flows through Bulb A, but in Figure b, the previous same amount of current shared by both bulbs equally and less amount of current flows through Bulb A.

d) Does not change, because battery is a constant current source, it provides same amounts of current to all circuits.

Figure 1. A sample misconception question from the ACT

A circuit is constructed by using resistors and a battery as in the figure. What is the potential difference in volts across 6Ω resistor?



a) 6 **b)** 4 **c)** 3 **d)** 2 **e)** 1

Figure 2. A sample question about calculating the voltage value from the ACT

For the validity of the ACT, an instructional objective list and table of test specifications were prepared. Two college physics teachers, one instructor and one research assistant from the university analyzed the test items to determine whether they were readable, understandable and suitable to instructional objectives. After being given feedback, the relevant changes were completed. The reliability coefficient, computed by Cronbach's alpha that estimates the internal consistency of the test, was calculated as 0.72 for the ACT post-test scores.

Attitude scale about simple electricity. The ATS is a content-based scale and consists of 24 items. It was used to collect data about students' attitudes toward simple electricity in the five sub-categories (Enjoyment, Self-Efficacy, Importance of Physics, Achievement Motivation and Interest Related Behavior). Each category was measured by five questions, except the Achievement Motivation, which was measured by four questions. The questions were designed to be rated on a 5-point likert type response format (Strongly disagree, disagree, neutral, agree, strongly agree). The scores of choices ranged between 1 to 5 points. The choice of "Strongly Disagree" was regarded as 1 point and that of "Strongly Agree" was regarded as 5 points. Figure 3 denotes only five items of the scale, and each item belongs to one of the five dimensions.

Dimensions	Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Enjoyment	I like simple electricity.					
Self efficacy	I am sure that I can learn simple electricity.					
Importance of physics	I am thinking that the learning from simple electricity will make easy my life in future.					
Achievement Motivation	I do my best for being successful in simple electricity.					
Interest Related Behavior	I would like to be a member of physics society.					

Figure 3. Sample items from the ATS

For the validity of the ATS, the followings were performed in sequence. In light of the literature review, a 45-item ATS was initially designed in seven sub-categories (Importance of Physics, Interest in Physics, Motivation, Extra Activities,

Achievement-Motivation, Physics Self-Concept and Self-Efficacy). Then, the ATS was administered to all ninth grade students (eight classes including 160 students) in the selected private high school before the treatment as a pilot study. Students were given twenty-five minutes to complete the scale. Using SPSS, Varimax Rotated factor analysis was performed on the raw data. According to the result of the pilot study, some questions were revised, some were completely discarded, and the dimensions were decreased to five categories with 24-items. Finally, with the guidance of an instructor, the ATS took its final form. Four classes of these eight classes were also participants in the main study. Therefore, these students' scores on these items were taken as their pre-test scores. The reliability coefficient, computed using Cronbach's alpha, which estimates the internal consistency of a test, was found to be 0.94 for the ATS post-test scores.

Teaching/learning materials

Various teaching/learning materials were prepared for the study. The materials were checked for content validity by two private college physics teachers, one instructor, and one research assistant from the University. After their feedback, relevant changes were completed by the researchers.

We searched and found nine student misconceptions (Sink Model, Clashing Current Model, Weakening Current Model, Shared Current Model, Empirical Rule, Power Supply as a Constant Current Source, Local and Sequential Reasoning, Short Circuit Misconception and Parallel Circuit Misconception) on the topic of simple electricity. To verify that each misconception is covered by the materials, we prepared a Misconception-Activity table. It presents the misconception names and the activities to remediate the misconceptions. To guide teachers and ensure consistency among teachers' individual uses of the resources, we prepared a six hour lesson plan. The lesson plan was developed by making use of sources (Cunningham & Herr, 1994; Hewitt, 1999; 1998; 1990; Robinson, 1999) and developed according to the requirements of conceptual physics. In addition, a treatment application guide was prepared to help the teachers easily follow the lesson plan. The treatment application guide included the directions that the teachers should follow before, during, and after each lesson. For the students, a conceptual approach-based physics text was prepared. In the text, the concepts were explored using conceptual analogies, explanations, adjunct questions, home assignments, link to technology parts, and real life applications of simple electricity. Demonstrations and procedures of the experiments were also placed within this text. During the study, students followed the lessons within this text. We prepared various demonstrations and experiments. The conceptual change sessions were inserted into the procedures of demonstrations and experiments.

Treatment

This study was conducted over a three-week period. The topics related to simple electricity were covered as part of a regular classroom curriculum in physics. Students in both experimental and control groups were exposed to the same content for the same length of time. The duration of the lessons was two 45-minutes periods per week.

The control groups received traditional instruction, involving lessons using lecture method, to learn the corresponding concepts. The traditional instruction

relied on the teacher's explanations with no consideration of the students' misconceptions, and students followed traditional textbooks. The teacher wrote notes on the chalkboard about the definitions of the concepts, explained the facts, and solved the questions, while students took notes throughout the lessons. The teachers did not use any of the activities developed for the conceptual physics approach group.

Students in the experimental groups studied their lessons according to the criteria of conceptual physics. The main focus was on teaching the main ideas in simple electricity, shaping students' critical thinking and relating the role of physics and technology in a positive manner. The conceptual physics classrooms were enriched by the conceptual approach-based texts, including conceptual change sessions, carefully designed demonstrations, experiments, games, in-class discussions, analogies, and real life applications. The teachers frequently stressed the definitions of concepts, developed the ideas with various activities, and made explicit connections among concepts. Mathematical equations were regarded first as meaningful ideas denoting the relationships between terms, rather than tools to calculate numerical values. The relative sizes of the symbols in the equations were presented in order to show the relations between the terms and encourage critical thinking. Computational problem solving was introduced only after students demonstrated a solid understanding of the underlying concept. For example, Ohms' law states that the current in a circuit is directly proportional to the voltage impressed across the circuit, and is inversely proportional to the resistance of the circuit. This fact was formalized by stating the equation as:

Current (I) = Voltage (V) / Resistance (R)

Teachers simplified the law by stating it in a simple and intelligible way, such as: for a given circuit of constant resistance, current and voltage are proportional. It means that you get twice the current for twice the voltage. As the voltage across a conductor is decreased, the amount of current flowing through it decreases. To show students how this was true, the teacher constructed a simple circuit, including a resistor, a power supply, an ammeter and voltmeter. Students observed the direct relationship between voltage and current for a range of 3–12 volts. Then, the teacher developed the idea by presenting symbols such as:

$I = (V/R)$

$2I = (2V/R)$ and so on…

Teachers frequently used analogies: for example, the resistance of a conducting wire was explained as resembling a traffic road (assuming that traffic is flowing only in one direction) to the conducting wire and the cars were likened to the electric charges flowing. Sometimes, students learned through role-playing; they came together and formed themselves into a conducting wire, resistor, electric charges and power supply. They animated the flow of current in a simple circuit by explaining the functions of circuit elements.

During the lessons, teachers used conceptual change strategies within demonstrations and experimental activities. The goal was to remediate the common students' misconceptions about simple electricity with the help of these activities. First the students' preconceptions were activated by a situation, and then they were

encouraged to predict the possible results by discussing it with their friends. Then, teacher conducted the demonstration and students observed what actually happened. When they were satisfied that the evidence actually contradicted their beliefs, the teacher then explained the correct scientific explanations. For example, a bulb with its bulb holder is connected to the terminals of the power supply by conducting wires. When the power supply was on, the bulb lit up. The teacher asked students what would happen if they connected the terminals of the bulb holder with a wire. The students discussed and announced their predictions; some said that nothing would change, some said that the brightness of bulb would decrease and so on… After their predictions, the teacher connected the terminals of the bulb holder for a short time interval. When the connection was established, the bulb turned off. The teacher then asked students to explain why the bulb turned off. Students discussed with their friends and expressed their ideas. The teacher finally made relevant explanations related to the short circuit concept.

Throughout the study, teachers conducted three experiments (simple circuit, series circuit and parallel circuit). Each experiment had a series of steps and was followed with the follow-up questions. Figure 4 shows three steps and follow-up questions included in the series circuit experiment.

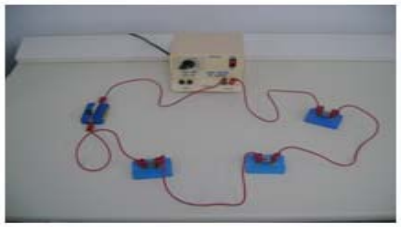


Figure A. The experimental set up for series circuit

Step 1- Construct the circuit shown in Figure A. by using identical bulbs and bulb holders.

Open power supply and apply 6 - 8 volts voltage by closing the switch.

Question 1- Did the bulbs light on at the same time? Repeat Step 1 and discuss it with your friends.

.....

Step 2- Unscrew one of the bulbs from the bulb holder when the switch is closed (Be careful that the bulb would be hot).

Question 2- What happened to the other bulbs?

.....

Step 3- Screw the bulb again when the switch is closed.

Question 3- What happened? Compare the brightness of each bulb in the circuit.

.....

Figure 4. A part of the procedure for series circuit experiment

We also inserted adjunct application questions to the ends of the sections in the conceptual approach-based text to show the applications of concepts to the new examples. Sometimes, to increase curiosity, interesting reading selections from the text were assigned to the students, such as: how can a bird stand harmlessly on one wire of high potential? Or, what are the effects of various electric currents on human body? Frequently, relationships between physics and technology were presented. For example, the function of fuses in home electricity, electrolysis, and how a fuel gauge demonstrates the level of the fuel in the gasoline tank were all discussed in classrooms.

Procedure

A quasi-experimental design was used in the study. Three weeks before the study, all teaching/learning materials were distributed to the teachers. Just before the study, the researcher trained the teachers and informed them about conceptual physics, teaching learning materials and their usages. They were strongly warned not to use any of the activities developed for the experimental group while teaching in the control group. The teachers promised to standardize the administration procedures and apply treatments relevant to the lesson plan. They allowed one of the researchers to observe their classes. The observer verified the application of the treatment in the experimental groups.

The study began with the administration of the ACT and ATS to all study groups. When students finished their tests, the booklets were collected and the conceptual approach-based physics texts were distributed to the experimental group students. During the treatment period, the researchers and the teachers held periodical meetings and evaluated the trends of the study.

After the three-week treatment period, the ACT and ATS were administered as post-tests to whole students again. Before the application of the tests, students were told that the grades of the tests would not affect their course grades. One class hour was given to students to complete the both tests, during pre- and post-administration. The testing time was adequate.

Results

The first step in analyzing data was conducting a missing data analysis on the raw data, since some of the students were absent on the date of the post-test application. Then, the data was analyzed both descriptively and inferentially.

Students' achievement in and attitudes about simple electricity

Students' ACT scores could range from 0 to 25 points, a range in which a higher score denotes greater physics achievement and a lower score denotes lower physics achievement in simple electricity. Table 1 indicates that the experimental group gained a mean increase of 5.39 points from the pre-test to the post-test. On the other hand, the control group gained a mean increase of 1.15 points from the pre-test to the post-test.

Students' ATS scores could range from 24 to 120 points, in which a higher score means a more positive attitude and a lower score means a less positive attitude toward simple electricity. As seen from Table 1, for the experimental group students, the mean of the ATS increased about 6.68 points from the pre-test to the post-test. On the other hand, for the control group, the mean decreased about 5.17 points.

Table 1

Basic Descriptive Statistics Related to ACT and ATS Scores

	Experimental Group		Control group	
	Pre-test	Post-test	Pre-test	Post-test
Scores on the ACT				
N	37	37	36	36
Mean	9.45	14.84	10.07	11.22
Standard Deviation	3.13	4.34	2.48	2.99
Skewness	0.58	0.24	-0.56	0.63
Kurtosis	1.49	-0.65	0.72	-0.63
Scores on the ATS				
Mean	76.94	83.62	73.42	68.25
Standard Deviation	16.32	17.04	15.54	14.97
Skewness	0.23	0.11	-0.33	-0.31
Kurtosis	-0.73	-1.21	-0.06	-0.39

Correlations

As seen in Table 2, five of the independent variables – the PCGPA, PPCG, PREACH, PREATT, and the teacher – have significant correlations with at least one of the dependent variables. But gender and age did not have significant correlation with any of the dependent variables. Hence, the PPCG, PCGPA, PREACH, PREATT, and teacher were determined to be covariates for the inferential analyses. We also found significant correlations between gender and the PREACH (-0.244) and between gender and the PREATT (-0.385).

Table 2

Correlations Between Dependent Variables and Covariates

Variables	Correlation Coefficients	
	PSTACH	PSTATT
PPCG	.401*	.298*
PCGPA	.542*	.226
Teacher	-.294*	-.056
PREACH	.282*	.166
PREATT	.271*	.596*
Age	-.227	-.118
Gender	.059	-.142

*Correlation is significant at least 0.05 level (2-tailed)

In order to test the hypothesis, we conducted MANCOVA, because it can both equate groups on one or more independent variables and be used for multiple

dependent variables. During analyses, the probability of rejecting the true null hypothesis (probability of making Type 1-error) was set to 0.05 as a priori to hypothesis testing, because it is a commonly-used value in educational studies. Then the effect size was set to large (0.8 for mean difference and 0.33 for variance).

The MANCOVA has five assumptions: normality, homogeneity of regression, equality of variances, multicollinearity, and independency of observations. These assumptions were tested and verified. According to the MANCOVA results, the null hypothesis was rejected (λ= 0.63, F (2, 65) =18.9, p = .000) for the two dependent variables. In order to test the effects of methods of teaching (MOT) on each dependent variable, we conducted ANCOVA as a follow-up test. Table 3 shows that students instructed with the conceptual physics approach gained significantly greater physics achievement than the students instructed by the traditional method (F (1, 66) = 28, p= .000). Similarly, the conceptual physics approach also altered student's attitudes towards simple electricity in a positive manner (F (1, 66) = 22.6, p= .000).

Table 3

ANCOVA Results for the Two Dependent Variables

Source	DV	Type III Sum of Squares	Df	Mean Square	F	Sig	Eta Squared	Observed Power
MOT	PSTATT	3407.0	1	3407.0	22.6	.000	.26	1.0
	PSTACH	223.1	1	223.1	28.0	.000	.30	1.0

Discussion

The current study investigated the effectiveness of a conceptual approach accompanied by conceptual physics on ninth grade students' achievement in and attitudes towards simple electricity by providing quantitative data. The previous conceptual approach studies generally investigated the effect of a conceptual change approach (conceptual change text or refutation text) on students' achievement, but did not analyze the effect of this approach on students' attitudes by providing quantitative data. Hence, the current study makes new contributions to the literature in these aspects.

The statistical results of this study indicated that a conceptual physics approach led to a better understanding of simple electricity, and developed more positive attitudes towards simple electricity, compared to traditional teaching. Before the study, the effect size was preset to a large value (0.33 for using variance values). The SPSS calculated it as 0.30 (Eta Squared) for the PSTACH and 0.26 (Eta Squared) for the PSTATT. These values approximately correspond to large values (Cohen & Cohen, 1983). The observed statistical power for the PSTACH and PSTATT is 1.00.

These results denote that the current study has practical significance as well as statistical significance.

The findings of this study support the findings of studies conducted by Wang and Andre (1991), and Chambers and Andre (1995; 1996). The main differences between their studies and this one are based in the fact that they all used a text-based conceptual change approach in a large college classroom. On the other hand, this study investigated the effectiveness of conceptual physics approach in small college classrooms. Wang and Andre, Chambers and Andre all reported that conceptual change text, as compared to traditional text, improved students' learning of the qualitative concepts of simple electricity. The results of the current study supported the results of a study conducted by Rosenquist and McDermott (1987), showing that stressing the definition of concepts, making explicit connections among concepts, and demonstrating graphical representations and real world applications resulted in a deeper conceptual understanding than did traditionally oriented instruction. Generally, the conceptual approach studies all reported similar findings; whether a text-based conceptual approach or a classroom-based conceptual approach, all led to better conceptual understanding among students and increased students' achievement compared to traditional didactic texts or classical teaching methods (Chambers & Andre, 1995; Chambers & Andre, 1996; Özkan et al., 2004; Sungur et al, 2001; Wang & Andre, 1991).

It is widely accepted that students' prior knowledge is important for the integration and construction of new knowledge into their existing cognitive structure (Sungur et al., 2001). The statistical analysis indicated that students' prior knowledge has significant effects on students' post-test performance, as shown in the studies of Chamber and Andre (1996). We also analyzed how a conceptual physics approach affected females' and males' achievement and attitudes. The comparison of the correlations between students' gender pre-achievement with gender post-achievement indicated that the females benefited more from the conceptual physics approach, again, as shown in the studies of Wang and Andre (1991), and Chambers and Andre (1995). The possible explanation for this result was expressed by Wang and Andre. According to them, the instructional manipulations may have had different effects for the males and females because of differential motivation. The females are substantially less interested in simple electricity than the males. If the learners are highly interested in the topics, the conceptual instructions, which are designed to help learners to develop conceptual understanding, can not be facilitative. Chambers and Andre also reported the same findings; they showed that for highly interested learners, conceptual change text has smaller effects than for learners with a moderate interest level. Beyond these interrelated factors we investigated the interaction of the conceptual physics approach and student' age, but no significant interaction was found. Although the ages of the participants were 14 to 18 years, all students profited equally from the conceptual physics approach.

Brouwer (1984) claimed that the conceptual approach in science lessons affects students' attitudes positively. Unfortunately, conceptual approach studies generally did not present quantitative data about the effectiveness of such approaches on students' attitudes. The evidence is generally dependent on the experiences of physics teachers (Hewitt, 1990) and the observations of the researchers. However, the current study showed the effectiveness of a conceptual physics approach in the classroom by providing quantitative data. The experimental group students gained more positive attitudes towards physics in comparison to the traditional group students. The development of positive attitudes in the experimental group can be explained as follows; students learning in a conceptual physics approach were both physically and mentally active; they discussed their ideas, listened to the analogies, played games, and observed demonstrations. Interesting drawings on boards and figures on the acetates helped them learn simple electricity concepts easily. Sessions discussing links between the material and technology sessions, interesting reading assignments and their discussions evoked a common curiosity towards physics. As the relationships between physics and technology were established, students perceived physics as a stepping stones for technological developments and as ubiquitous; consciously or unconsciously, we are using physics all the time. On the other hand, traditional instruction was not as successful as conceptual physics. The possible reasons for this would be that the study was conducted in the last three weeks of the second semester, and the classical teaching—without demonstrations, analogies and various activities—might have discouraged students from giving their attention to the lesson. They were just passive listeners. Students could have been bored, and this may have affected their attitudes negatively.

Implications

According to the findings of this study and previous studies on the same topic, we can make following suggestions;

1. Students instructed by the conceptual physics approach were aware of their surroundings. The real life examples and discussions relating physics and technology changed students' attitudes in a positive manner. Hence, physics teachers should emphasize the role of physics on technology in their lessons by giving examples from daily life.

2. Conceptual physics resulted in greater student satisfaction, and enabled students to learn physics through practice. Hence, physics lessons should be supplied with various activities that encourage students to be active both physically and mentally.

3. Physics textbook authors should integrate conceptual physics approach in physics textbooks. These textbooks should be widely used in physics classes by the physics teachers

4. By widely using conceptual physics approach, the effect of pre-existing gender stereotyping can be remediated in physics classes.

References

Brouwer, W. (1984). Problem-posing physics: A conceptual approach. *American Journal of Physics,* 52(7), 602-607.

Chambers, S. K. & Andre, T. (1996). Gender, prior knowledge, interest, and experience in electricity and conceptual change text manipulations in learning about direct current. *Journal of Research in Science Teaching,* 34(2), 107-123.

Chambers, S. K. & Andre, T. (1995). Are conceptual change approaches to learning science effective for everyone? Gender, prior subject matter interest, and learning about electricity. *Contemporary Educational Psychology,* 20, 377-391.

Cohen, J. & Cohen, P. (1983). *Applied multiple regression / correlation analysis to the analysis of behavioral Science*. New Jersey: Lawrence Erlbaum Associates.

Cunningham, J. & Herr, N. (1994). *Hands-on physics activities with real-life applications.* United States of America.

Hardal, Ö. (2002). *The effects of hands-on activities on high school students' achievement in physics.* Unpublished master thesis, Middle East Technical University.

Hewitt, P. G. (1999). *Conceptual physics* (Third edition with expanded technology, the high school physic program teachers' edition). California: Addison Wesley Longman, Inc.

Hewitt, P. G. (1998). *Conceptual physics* (Eight edition). One Jacob Way, Reading, MA 01867, USA: Addison Wesley Longman, Inc.

Hewitt, P. G. (1990). Conceptually speaking: teaching the physics concepts before introducing the formulas. *Science Teacher*, 55-57.

Hewitt, P. G. (1983) Millikan lecture 1982: The missing essential- a conceptual understanding of physics. *American Association of Physics Teachers,* 51(4), 305-311.

Hynd, C. & Alvermann, D. E (1986). The role of refutation text in overcoming difficulty with science concepts. *Journal of Reading*, 29, 440-446.

Özkan, Ö., Tekkaya, C., & Geban., Ö. (2004). Facilitating conceptual change in students' understanding of ecological concepts. *Journal of Science Education and Technology,* 13(1), 95–105.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. *Science Education*, 66, 211 – 227.

Robinson, P. (1999). *Conceptual physic laboratory manual* (Third edition). California: Addison Wesley Longman, Inc.

Rosenquist, M. L. & McDermott, L. C. (1987). A conceptual approach to teaching kinematics. *American Association of Physics Teachers*, 55(5), 407-415.

Roth, K. J. (1985). *Conceptual Change Learning and student processing of science texts.* Paper presented at the annual meeting of American Research Association, Chicago, Illinois. April.

Sencar, S. & Eryilmaz, A. (2004). Factors mediating the effect of gender on ninth-grade Turkish students' misconceptions concerning electric circuit, *Journal of Research in Science Teaching*, 41(6), 603–616.

Sungur, S., Tekkaya, C., & Geban, Ö. (2001). The contribution of conceptual change texts accompanied by concept mapping to students' understanding of the human circulatory system. *School Science and Mathematics*, 101: 91-101.

Şen, A. I., & Aykutlu, I. (2008). Using concept maps as an alternative evaluation tool for students' conceptions of electric current. *Eğitim Araştırmaları-Eurasion Journal of Educational Research,* 31, 75-92.

Taber, S. K., Trafford, T., & Quail, T. (2006). Conceptual resources for constructing the concepts of electricity: the role of models, analogies and imagination. *Physics Education*, 41(2), 155 – 160.

Wang, T. & Andre, T. (1991) Conceptual change text versus traditional text and application questions versus no questions in Learning about Electricity. *Contemporary Educational Psychology*, 16, 103-116.

Geleneksel Fizik Öğretimine Alternatif Yaklaşım: Kavramsal Fizik Yaklaşımı'nın Etkililiği

(Özet)

Araştırmanın Alt Yapısı: Yapılandırmacı eğitim, öğrencilerin sahip olduğu ön bilgilerin kendi öğrenmeleri üzerindeki önemini vurgulamaktadır. Sınıf ortamına getirilen bilimsel konulardaki ön bilgiler, yeni bilimsel kavram ve prensiplerin doğru bir şekilde öğrenilmesini etkilemektedir. Öğrencilerin sahip olduğu kavram yanılgılarını ortadan kaldırmak ve anlamlı öğrenmeyi gerçekleştirmek için çeşitli öğretim stratejileri geliştirilmiştir. Bunlardan bir tanesi kavramsal değişim yaklaşımıdır.

Kavramsal değişim yaklaşımı ilk defa Posner, Strike, Hewson ve Gertzog tarafından ortaya atılmıştır. Roth, kavramsal değişim metnini, Hynd ve Alvermann ise çürütme metnini geliştirmişlerdir. Yapılan çalışmalar, ilköğretim, ortaöğretim veya kolej gibi az öğrenci sayısına sahip sınıflar için, sınıf odaklı kavramsal yaklaşımının etkili olduğunu belirtmektedir. Sınıf odaklı kavramsal yaklaşım, sınıf içerisinde öğretmen-öğrenci ve öğrenci-öğrenci etkileşimini ön plana çıkartarak kavramsal değişimi sağlamaktadır.

1982'de Millikan Lecture Ödülü'nü alan Paul G. Hewitt, sınıf odaklı kavramsal yaklaşım için Kavramsal Fizik Yaklaşımı'nı önermiştir. Kavramsal Fizik;

• Kavramların üzerine vurgular yaparak, gündelik hayattan örnekler vererek temel fikrin anlatılmasını,

• Matematiksel eşitliklerin öncelikle kavramlar arasındaki ilişkileri ön plana çıkaracak şekilde kullanılmasını, öğrencilerin kritik düşünme becerilerinin geliştirilmesini, sayısal uygulamaların ise en son aşamada gerçekleştirilmesini,

• Yerleri geldikçe fizik konularının teknolojideki uygulamalarından bahsedilmesini, böylelikle toplumun bilim ve teknolojiye karşı olumlu tutumlar geliştirmesini sağlamayı hedeflemektedir.

Araştırmanın Amacı: Çalışmada Paul G. Hewitt'in Kavramsal Fizik hakkındaki düşünceleri ön plana çıkarılarak, kavramsal fizik dersi geliştirildi. Çalışmanın amacı, Kavramsal Fizik Yaklaşımı'nın Ankara'nın Çankaya ilçesinde bulunan 9. sınıf özel okul öğrencilerinin basit elektrik devreleri konusundaki başarılarına ve tutumlarına etkisini incelemektir.

Araştırmanın Yöntemi: Çalışmanın evrenini Ankara'nın Çankaya ilçesinde bulunan ve fizik dersini İngilizce olarak öğrenen tüm 9. sınıf özel okul öğrencileri oluşturmaktadır. Bölgede bu şartları taşıyan dört özel okul, 33 sınıf ve yaklaşık 660 öğrenci bulunmaktadır. Çalışmadaki örneklem, araştırmacılara uygunluklara göre bu okullardan bir tanesinde bulunan dört sınıftaki 73 öğrenci olarak belirlendi. Örneklem evrenin yaklaşık % 11'ini oluşturmaktadır. Çalışma iki fizik öğretmeni ve her öğretmenin birer adet deney ve kontrol grubu olmak üzere toplam dört sınıfta gerçekleştirildi. Öğrencilerin basit elektrik devreleri konusundaki başarılarını ölçmek için Fizik Başarı Testi (ACT) ve basit elektrik devreleri konusuna karşı olan tutumlarını belirlemek için Fizik Tutum Ölçeği (ATS) kullanıldı. Kavramsal fizik hedefleri doğrultusunda çeşitli öğretim materyalleri (Hedefler, test belirtke tablosu, kavram yanılgısı-aktivite tablosu, kavramsal fizik-hedefler tablosu, kavramsal fizik ders notları, gösterimler, öğretmenler için metot-uygulama rehberi) geliştirildi. Ölçüm araçları ve materyallerin geçerlilik ve güvenilirlikleri kontrol edildi. Tüm materyaller bir öğretim görevlisi, bir araştırma görevlisi ve iki fizik öğretmeni tarafından incelendi. Uygulayıcı öğretmenler metotlar konusunda eğitildi. Cronbach alfa değerlerleri, başarı son-testi için 0.72, tutum son-testi için ise 0.94 olarak bulundu.

Çalışma ACT ve ATS'lerin ön-test olarak uygulanması ile başladı. İki sınıfta basit elektrik devreleri konusu, Kavramsal Fizik Yaklaşımı ile diğer iki sınıfta ise aynı konu Geleneksel Öğretim Yöntemi ile anlatıldı. Deney gruplarında kavramsal fiziğin öğretim amaçları dikkate alınarak kavramlar üzerinde duruldu; asetat çizimleri, gösteriler, deneyler, analojiler, sınıf içi tartışmalar yaptırılarak gündelik hayattan örnekler verildi. Formüller öncelikle kavramlar arasındaki ilişkileri açığa çıkarmak için anlamlı birer rehber olarak ele alındı. Matematiksel uygulamalar ise en son aşamada gerçekleştirildi. Yeri ve zamanı geldikçe basit elektrik devreleri konusunun

teknolojideki uygulamalarından bahsedildi. Kontrol gruplarında ise öğretim tamamen öğretmene bırakıldı. Öğretmenler kavramların tanımlarını tahtaya yazarak konuyu anlattılar ve daha sonra örnek soruların çözümlerini tahta üzerinde gerçekleştirdiler. Kontrol gruplarında, deney grupları için hazırlanılan aktivitelerin hiçbir tanesi kullanılmadı. Üç haftalık bir uygulama sonunda, ACT ve ATS tekrar son-test olarak uygulandı. Eksik veri analizinden sonra betimsel istatistik değerleri hesaplandı. Yordamsal istatistik sayıtlıları doğrulandıktan sonra da MANCOVA analizi yapıldı.

Araştırmanın Bulgu ve Sonuçları: Betimsel istatistik sonuçlarına göre Kavramsal Fizik Yaklaşımı öğrencilerin ACT başarı ortalamalarını, toplam 25 puan üzerinden 5.39 puan arttırırken, Geleneksel Öğretim Yöntemi yalnızca 1.15 puan arttırdı. Aynı şekilde Kavramsal Fizik Yaklaşımı deney grubu öğrencilerinin ATS ortalamalarını toplam 120 puan üzerinden, 6.68 puan arttırırken, Geleneksel Öğretim Yöntemi kontrol grubu öğrencilerinin ATS ortalamalarının 5.17 puan düşmesine neden oldu.

Değişkenler arasında ilişki analizi yapıldığında, öğrencilerin basit elektrik devreleri konusundaki ön bilgilerinin, son-test başarı puanlarını etkilediği tespit edildi. Öğrencilerin cinsiyet ve ön-test puanları arasındaki ilişki ile cinsiyet ve son-test puanları arasındaki ilişki incelendiğinde, Kavramsal Fizik Yaklaşımı'nın kız öğrencilerin başarılarını arttırmada daha etkili bir yaklaşım olduğu sonucuna ulaşıldı.

MANCOVA ve devamında gerçekleştirilen ANCOVA analizlerinin sonuçları Kavramsal Fizik Yaklaşımı'nın öğrencilerin basit elektrik devreleri konusundaki başarı ve tutumlarını, Geleneksel Öğretim Yöntemi'ne göre anlamlı bir şekilde arttırdığını gösterdi.

Araştırmanın Yargı ve Önerileri: Yapılan alan taramalarında şu ana kadar Kavramsal Fizik Yaklaşımı'nın öğrencilerin başarı ve tutumlarına etkisini sayısal veriler ile ele alan herhangi bir çalışma ile karşılaşılamamıştır. Çalışma bu yönüyle fizik eğitimi alanına yeni bir katkı sağlamaktadır. Çalışmaya başlamadan önce, etki büyüklüğü varyans değerleri cinsinden 0.33 (büyük) olarak belirlenmiş olup, SPSS bu değeri ACT son-testi için 0.30 (eta kare) ve ATS son-testi için 0.26 (eta kare) olarak hesaplamıştır. ACT ve ATS son-testleri için istatistiksel güç değerleri ise 1.00 olarak bulunmuştur. Bu sayısal değerler çalışmanın istatistiksel anlamlılığının yanında, pratiksel anlamlılığını da göstermektedir.

Deney grubundaki öğrencilerin başarılarının yüksek çıkmasının ve konuya karşı olumlu tutum geliştirmelerini şu şekilde açıklayabiliriz; Kavramsal Fizik Yaklaşımı kapsamında gerçekleştirilen anlatım etkinlikleri, analojiler, çizimler, gösteriler, sınıf içi tartışmalar, öğrencilerin üstlendikleri roller ve deneyler ile öğrencilerin fiziksel ve beyinsel olarak aktif olmaları sağlanıldı. Yapılan tartışmalar ile ön bilgiler açığa çıkarılarak var olan kavram yanılgıları ortadan kaldırılmaya çalışıldı. Matematiksel formüller

yalnızca sayısal soru çözmek için değil, kavramlar arasındaki ilişkileri ortaya çıkartıp, öğrencilerin kritik düşünme becerilerinin geliştirilmesi için de kullanıldı. Basit elektrik devreleri konusunun gündelik hayattaki uygulamalarından bahsedilerek, fizik dersinin teknoloji için ne kadar önemli bir alan olduğu düşüncesi verildi. Kontrol grubunda ise herhangi bir etkinlik olmadan, tekdüze klasik yöntem ile anlatılan ders öğrenciler için verimli olmadı. Bu durumun öğrencilerin konuya olan ilgilerini olumsuz yönde etkilediği düşünülmektedir.

Kavramsal Fizik Yaklaşımı, öğretmen-öğrenci ve öğrenci-öğrenci ilişkilerini geliştirerek, öğrencilerin kişisel gelişimine katkı sağlamaktadır. Bu nedenle, Kavramsal Fizik Yaklaşımı'nın fizik derslerinde kullanılması ile öğrencilerin başarı ve tutumlarını olumlu yönde değiştirmeleri sağlanabilir.

Anahtar Sözcükler: Fizik eğitimi, kavramsal yaklaşım, kavramsal fizik, kavramsal değişim.

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Students' Perceptions of Teachers' Behaviors of Social-Emotional Support and Students' Satisfaction with the Classroom Atmosphere

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Abstract

Problem Statement: Teaching demands both academic and relational responsibilities. Teachers' support in one dimension without the other may lead to failure in both attempts. Research indicates that students' affective characteristics explain a considerable amount of variance in classroom learning. Therefore, teachers are advised to boost their students' morale while instructing. Good teachers are to consider their students' affective needs and plan their lessons accordingly.

Purpose of the Study: This study aimed to identify how teachers' behaviors of social-emotional support interact with their students' perceptions about the classroom atmosphere. It is hypothesized that students enjoy their time when they are socially and emotionally supported in class and that teachers' different patterns of social-emotional support lead to varying levels of student satisfaction with the classroom atmosphere.

Methods: A questionnaire was used to measure teachers' behaviors of social-emotional support and students' levels of satisfaction with the classroom atmosphere. The data gathered from over 1200 students of 58 teachers' behaviors of social-emotional support were analyzed.

Findings: Factor analysis and tests of reliability indicated that the 12-item questionnaire could be used as a one-factor scale to measure students' perceptions of teachers' social-emotional support. Regression analysis indicated that teachers' behaviors of support strongly predict students' satisfaction with the classroom atmosphere. It was also found that teachers differ in terms of their behaviors of social-emotional support; some teachers exercise certain behaviors of social-emotional support more often

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than others. Finally, teachers whose students have differing levels of satisfaction exert statistically different behaviors of social-emotional support.

Conclusions and Recommendations: It can be concluded that certain teacher behaviors can be used to predict students' satisfaction with the learning environment and that when teachers support their students socially and emotionally, students feel more satisfied with the classroom atmosphere. Therefore, teachers can be advised to provide social and emotional support to their students in class. It is advised to study in an experimental or quasi-experimental design whether teachers' behaviors of social-emotional support interact with actual learning.

Keywords: Teacher behavior; social-emotional support; student satisfaction; classroom atmosphere

Teaching is a moral act (Sockett, 1993) covering the personal, social, and moral development of students (Täte, 2006). This is to say, the practice of teaching includes both academic and relational responsibilities (Oser, 1994; Oser, Dick, & Patry, 1992). Although intellectual capital (the subject matter, pedagogical knowledge and skills) is an important source of power which makes the teacher more than an ordinary respected adult, the caring relationship between the teacher and her students is another important source of responsibility for the teacher (Täte, 2006). In other words, the teacher is responsible for the whole enterprise of teaching (Banner & Cannon, 1997) and for stimulating both the intellectual and emotional essences of students, since "intellect works in concert with feeling" (Palmer, 1998).

The related research presents evidence on effective teacher behaviors and shows that teaching is not a unidimensional enterprise; good teachers contribute to their students' intellectual, moral, and physical growth. Yet, because academic and relational knowledge and/or skills in teaching are not sufficient for good teaching despite their practical importance (Palmer, 1998), they need to be integrated and internalized with other teaching skills. In this case, teaching can be defined as an integrated practice that combines many virtues such as "honesty, courage, care, fairness, and practical wisdom in both thoughts and actions" (Sockett, 1993). Telli, den Brok and Cakiroglu (2008) maintain that according to students and teachers, ideal teachers guide, motivate, and encourage students; and, they also build a more positive relationship and try to earn respect from students.

Affective-motivational characteristics play an important role on students' achievement (Bloom, 1976). A great amount of research supports Bloom's conclusions (Wang, Haertel & Wahlberg, 1993) indicating that non-cognitive, social-emotional characteristics are predictive of learning. A good teacher cares for her students (Noddings, 1984), which requires feeling responsible for them (Täte, 2006). Nevertheless, Täte asserts that compassionate teachers work harder for their students' success and effective teachers are skilful in setting the classroom atmosphere in which their students can learn. In other words, they care about their students not only for academic reasons but also for affective reasons. Yıldırım (2008)

states that according to preservice teachers, it is the teacher's and students' shared responsibility to plan and instruct better and stimulating lessons and to create confidence in students.

To students, caring teachers are approachable and ready to listen when students have difficulty understanding the material, and teachers' qualities such as enthusiasm and a sense of humor make learning enjoyable (Csikszentmihalyi & McCormack, 1986). In other words, the relationship between a teacher and her students is very important for the educational process (Lickona, 1991; Noddings, 1984) and the quality of human relations is vital to good teaching (Clark & Jensen, 1992). Good teachers generally understand developmental psychology (Täte, 2001), know students' concerns, and can also build personal connections with them both in academic and personal life (Mendes, 2003).

For the positive relationships to maintain and develop, the teacher and students need to be receptive, related, and responsive (Täte, 2006). The relations between a teacher and the students are reciprocal (Hirst & Peters, 1971); therefore, good teachers regard their students as important individuals (Banner & Cannon, 1997; Hirst & Peters, 1971). The social-emotional aspects of teaching are closely related to the care the teacher gives to her students (Alder & Moulton, 1998).

Since socially and emotionally competent classrooms lead to effective learning (Kress, Norris, Schoenholz, Elias, & Seigle, 2004) and emotions affect attention, learning, and memory (LeDoux, 2000), the teacher must create a 'caring' classroom atmosphere. Social and emotional context contributes to students' enthusiasm for learning (Elias, 2003; Zins, Weissberg, Wang & Walberg, 2004). In addition, being a caring and supportive teacher also means providing the students with the support they need to accomplish tasks and holding them accountable for their duties (Stipek, 2006). The teacher does not have to be a friend to students; she is expected to be warm and caring but firm (Protheroe, 2005). The caring teacher contributes a lot to the environment by building good relationships with students (Banner & Cannon, 1997; Lickona, 1991).

By successfully managing the social, emotional, and moral environments of their classrooms, teachers can develop the trust, confidence, and enthusiasm necessary for good learning. Eldeleklioğlu (2008) suggests that perceived social support from friends significantly predicts loneliness. The teacher's concern for students encourages students in return to meet her expectations just because she 'cares about' them (Davidson, 1999). Students share more with an affectionate and nurturing teacher, which, in turn, leads to higher levels of student engagement and achievement (Pianta, 1999). Also, adolescents study harder for a teacher who treats them as individuals (Davidson & Phelan, 1999) than those who ignore human relations.

In conclusion, in a classroom where students feel respected and valued, they are encouraged to do better and to take risks. This behavioral pattern, in turn, contributes to better learning outcomes (Ryan & Deci, 2000). Learning is also asserted to be strongly connected to students' social and emotional needs and the context of the classroom atmosphere (Brandt, 2003). The atmosphere dominating the classroom

makes a difference in the teacher's instructional performance. Differences in contexts lead to variations in perceptions. This intertwined and overlapping nature of interaction between the managerial and instructional behaviors requires in-depth explorations on how they interact with each other. The complexity of the classroom atmosphere requires exploring both the teacher's and the students' perspectives. However, most research on effective teaching has dealt with the teacher's viewpoint, and the assertions derived from the teacher's reasoning may be deceptive. Therefore, further studies exploring students' perspective will provide fruitful insights of good teaching and classroom atmosphere. In line with this need, this study hypothesized the following: a) students' perceptions of teacher behaviors of social-emotional support interacted with students' satisfaction of the classroom atmosphere; and, b) these perceptions can be used to predict the level of satisfaction, and consequently that the teachers of students with varying levels of satisfaction have differing behavioral patterns in their classrooms.

Methods

This is a descriptive study. A questionnaire was used to gather data from students learning English as a foreign language.

Participants

This study was carried out at the School of Foreign Languages at Erciyes University, Turkey, where over 1200 students of full beginners to pre-intermediate students in terms of their levels of English were homogeneously placed in 55 groups of 21 to 23 students, and they were being taught English up to upper-intermediate level by 58 teachers. Each group was being team-taught by at least two teachers and each teacher was teaching at least two groups of students. The participants had enrolled in various departments at Erciyes University after a nation-wide university entrance examination and they were obliged to complete a one-year basic English course as preparation for their majors in the following academic years.

Instrumentation and Piloting

Each year, the school authorities administered the students a 'teacher evaluation questionnaire (TEQ)' (already prepared by the school staff) in order to gather data about their perceptions related to the teachers' performance. The results were just shared with the teacher himself/herself for formative purposes to inform them how their students perceived their behavior in class. The original TEQ included 25 items that were depicted in the literature, 13 of which had already been sorted as instructional (task-oriented) behaviors and 12 of which were socially-emotionally supportive (human-oriented) behaviors in nature. Having been used before at the school for formative purposes, the Cronbach Alpha reliability of the instrument (including both dimensions) had already been calculated by the school staff to be 0.93 with 820 students in the previous academic year. This study specifically focused on the teachers' supportive behaviors in the TEQ, excluding the instructional ones because this study merely aimed to focus on supportive behaviors. Therefore, a

piloting study was needed to calculate its reliability. The 12-item dimension of TEQ (supportive behaviors) was administered to five of the 55 groups (N=109) who completed the questionnaire for eleven teachers, so a total number of 297 questionnaires were analyzed for piloting purposes. The students were asked to respond on a 5-point Likert scale (from "1 = never" to "5 = always") how often they perceived their teachers to display the behaviors of social-emotional support in the questionnaire. This piloting indicated that the 12-item version of the TEQ was reliable (r=0.97; see Table 1 for individual items) and could be separately used to identify teachers' behaviors of social-emotional support. One more item was appended to the questionnaire in order to identify the level of students' satisfaction with the classroom atmosphere. Students were asked to state how happy they were in the class of the given teacher on a 9-point Likert scale (from "1 = very unsatisfied" to "9 = very satisfied").

The findings provided evidence for the validity of the 12-item version of instrument; the study aimed at identifying the relationship between teachers' behaviors of social-emotional support and students' satisfaction. Hence, the existence of significant differences among groups of students with varying satisfaction in favor of the teachers who execute such behaviors more frequently indicate the validity of the instrument. In other words, the study indicated that students' satisfaction of the classroom climate differed by the support that teachers were perceived to give; this finding can be noted as evidence of validity.

Data Gathering and Analysis

The piloting and the pre-analysis data processing indicated that a large number of teachers had highly different means of student satisfaction when they taught in different classes, indicating that the issue at hand had to be contextually studied (which was supported by Turanlı, 1999). In this study at the same school with a similar group of participants, the researcher found out that teachers tended to behave differently in different classes and teachers had clear reasons for behaving differently. Each teacher was instructing more than a group, and each group was being taught by more than one teacher. So, each group of students was administered the questionnaire for all the teachers who were teaching them, and consequently, a total of 3275 'individual questionnaires' were gathered from over the 1200 students in 55 groups responded for 58 teachers. In other words, the school was conveniently sampled and all the students studying English, aged mostly as late teenagers (the expected age for university entrance in Turkey) and a few at the age of 20 were included in the study. The participants were asked to fill in the questionnaire in a computer laboratory in the presence of the technical personnel ready to help the participants with likely problems. The data from the questionnaire were coded and entered into the Statistical Package for Social Sciences (SPSS). Various statistical techniques were used to identify the relationships between some teacher behaviors of social-emotional support and the level of students' satisfaction with the classroom atmosphere. First, the reliability of the 12-item questionnaire was tested. Second, a factor analysis was carried out to ensure the uni-dimensionality of the questionnaire and to support the findings from the reliability analysis. Third, a regression analysis

aimed to build a model to help predict students' satisfaction levels from the teacher's behaviors of social-emotional support (factor scores). Finally, the teachers' patterns of behaviors were depicted according to their students' satisfaction levels with the classroom atmosphere, using the one-way analysis of variance (F test) as a statistical procedure.

Findings

Validity, Reliability and Factor Analysis

Since TQE had originally been used for formative purposes for a long time in the school, it had been revised and improved for the concerns of validity. The researcher also reviewed the literature and found that the selected 12 items would represent teachers' behavioral patterns in the dimension of social-emotional support. In order to calculate the Cronbach alpha coefficient of the questionnaire (12 behaviors of social-emotional support), the responses to the negatively-worded items (Item 2 and Item 10) were reversed as 1 to 5, … and 5 to 1. The reliability of the questionnaire was found 0.97. The corrected item-total correlations are also shown in Table 1; and as might be expected, the values of the corrected item-total correlations and of the factor scores for the individual items are very close in size.

Table 1

Component Matrix and Corrected Item-Total Correlations

Teacher Behaviors of Social-Emotional Support	**CITC***
1. The teacher tries to attract students' attention while teaching.	.88
2. The teacher seems to be unwilling to teach.	.80
3. The teacher provides students with opportunity to participate in the activities.	.78
4. The teacher is ready to help when we are in need.	.90
5. The teacher deliberately monitors students' work in class.	.81
6. The teacher considers individual differences while teaching.	.86
7. I can comfortably ask the teacher about anything I have not understood.	.83
8. The teacher encourages us to participate and to speak English more.	.83
9. The teacher cares about students' comments about the lessons/course.	.92
10. I am afraid of making mistakes in the classes of the teacher.	.65
11. The teacher speaks understandably and presents the topics appropriately.	.91
12. The teacher-student relationships are based on respect and love.	.87

* Corrected item-total correlations (CITC); the correlation between the item and the rest of the questionnaire

For further evidence of uni-dimensionality, the 12 items in the questionnaire, which were used to identify the teachers' social-emotional behaviors, were processed in a factor analysis to determine if they formed an only factor, and how much of the variance in the students' perceptions was explained by the factor(s). Principal component analysis was used as the extraction method. Kaiser Meyer-Olkim Measure of Sampling (KMO) was calculated to be 0.95, which was interpreted to be perfect in order to extract factors. Barlett's Test of Sphericity, (χ^2= 2378.0; $p<0.01$)

showed that the correlations in the R matrix were different from those in the unit matrix, which indicates that a factor or factors can be extracted from the data. The analysis indicated that the items constituted only one factor with an eigenvalue of 8.99 while the other likely factors had smaller eigenvalues than 1. This only factor explained 75.9% of the variance in the students' perceptions related to their teachers' behaviors, and this percentage is found to be satisfactory for a one-factor solution. To sum up, the conclusions from the factor and the reliability analyses indicate that the 12 items (statements) in the questionnaire constitute a scale to represent the teacher's behaviors of social-emotional support in class although all human related constructs may depend on the context where they are built; that is why cautious generalizations are inevitable.

Predicting Students' Satisfaction

Another aim of the study was to build a model to predict students' satisfaction with the classroom atmosphere. Therefore, a regression analysis was carried out in order to see how well the model could predict students' satisfaction level. However, due to the collinearity among teacher behaviors included in the questionnaire instead of using them in the regression analysis, the factor score obtained through the factor analysis based on the students' responses about their teachers' behaviors of social-emotional support were used as the independent variable and their satisfaction with the environment was entered as the dependent variable. The model was found statistically significant in predicting the values of students' satisfaction levels ($F=809.0$; $p<0.01$). R was found to be 0.91 and adjusted R square to be 0.83. In other words, it was found that the factor scores obtained from the teachers' behaviors of social-emotional support explained 83 percent of the variance in the students' satisfaction levels with the classroom atmosphere.

Comparing Teachers' Behavioral Pattern

This study also aimed to gain further insights about the behavioral patterns of teachers which make students satisfied with the classroom atmosphere. For this purpose, by making use of the students' responses related to their satisfaction levels, a composite mean of satisfaction was calculated for any group to indicate how satisfied the group was in the classes of the teacher and each teacher had as many composite scores as the number of the groups they were teaching. Thus, a composite mean of satisfaction was unique to that group to indicate how satisfied that group was in the class of that teacher. Since all the teachers were teaching more than one group and each group was being taught by more than one teacher, 167 composite scores of satisfaction were calculated. Consequently, along with a high (or low) composite score for one group, the same teacher might have differing composite scores for the other groups that they were teaching.

The composite scores representing the groups' satisfaction levels were listed in ascending order (from the lowest to the highest), and in order to allow for further analysis and to statistically compare the behavioral patterns of the teachers, the range of the scores (not the number of the teachers) was divided *arbitrarily* into three to sort them out (Teachers A, Teachers B, and Teachers C). It was observed that some of the

58 teachers had composite scores which were grouped under different labels. For instance, one of the composite scores for a teacher was, say, in Teachers A while the other one or two of his/her composite scores happened to be in Teachers B.

Table 2

Distribution of the teachers according to their students' satisfaction level

Teachers	N	%	$\overline{X}$ *
Teachers A	47	28.14	4.53
Teachers B	59	35.33	5.84
Teachers C	61	36.53	6.72
Total	167	100	5.79

1 = very unsatisfied … 9 = very satisfied

* shows the satisfaction mean of students in the classes of teachers grouped as A, B, and C.

Teachers C constituted the teachers whose students had the highest means of satisfaction levels ($\overline{X}$ =6.72); and, Teachers A had the lowest scores ($\overline{X}$ =4.53). Meanwhile, the students of the Teachers B had a moderate satisfaction level ($\overline{X}$ =5.84), while the overall mean including all the teachers was calculated to be 5.79. This dummy variable (formed for statistical purposes) was used as the independent variable in the analysis of variance to determine whether the teachers in these three groups differed in terms of their behaviors of social-emotional support. The composite means for all the behaviors were calculated for each group of the teachers and the groups were thereby compared. The findings are displayed in Table 3.

Not all students are intrinsically motivated to do well in class or to take part in the activities. Therefore, teachers may need to push their students to work harder by planning and implementing interesting activities. The respondents stated that the teachers often ($\overline{X}$ =4.03) tried to attract their attention. However, there turned out to be differences among the groups of teachers in terms of the frequency of the behavior ($F=106.6$; $p<0.01$). The students in the classes of Teachers C claimed that their teachers very often ($\overline{X}$ =4.45) tried to attract students' attention while teaching whereas the students of Teachers A responded that their teachers less often ($\overline{X}$ =3.30) tried to raise attention. This indicates that the teachers of students with a higher level of satisfaction care about their students' attention to the lesson linearly more than the others.

Table 3

*Teachers' Behaviors of Social-Emotional Support (in Composite Means)**

Teachers A $\bar{x}$	Teachers B $\bar{x}$	Teachers C $\bar{x}$	Overall $\bar{x}$	F
1. The teacher tries to attract students' attention while teaching.				
3.30	4.03	4.45	4.03	106.6**
2. The teacher seems to be unwilling to teach.				
2.62	1.93	1.57	1.94	84.3**
3. The teacher provides students with opportunity to participate in the activities.				
3.72	4.24	4.47	4.21	92.4**
4. The teacher is ready to help when we are in need.				
3.76	4.36	4.66	4.34	167.6**
5. The teacher deliberately monitors students' work in class.				
3.46	4.00	4.32	4.01	66.3**
6. The teacher considers individual differences while teaching.				
3.10	3.65	4.04	3.68	89.0**
7. I can comfortably ask the teacher about anything I have not understood.				
3.35	4.05	4.49	4.07	145.5**
8. The teacher encourages us to participate and to speak English more.				
3.62	4.09	4.43	4.12	69.7**
9. The teacher cares about students' comments about the lessons/course.				
3.28	3.93	4.35	3.96	149.3**
10. I am afraid of making mistakes in the classes of the teacher.				
2.39	1.91	1.58	1.89	50.1**
11. The teacher speaks understandably and presents the topics appropriately.				
3.43	4.04	4.49	4.08	134.8**
12. The teacher-student relationships are based on respect and love.				
3.26	3.97	4.41	3.99	155.4**

* 1 = never ... 5 = always

** $p<0.001$ and each subgroup is significantly different from the other two

Teachers' enthusiasm for teaching interacts with students' reaction. In case of the teacher's high enthusiasm, students try harder to pay for the teacher's efforts. The respondents thought that the teachers rarely seemed to be unwilling to teach ($\overline{X}$ =1.94), whereas there turned out to be significant differences among the groups (F=84.3; p<0.01). According to the students, Teachers C hardly ever ($\overline{X}$ =1.57) displayed unwilling behaviors in their presentations and Teachers A were believed to be unwilling to teach much more often ($\overline{X}$ =2.62). This means that teachers of the students with least satisfaction seem to be less willing to teach than the others, meaning that teachers' enthusiasm influence students' perceptions of the environment.

Within limited classroom time, students lack opportunities to show themselves; they often have to keep silent. Even though students do not tend to take part in activities very willingly, when pushed to say a word, they are often delighted to be noticed, which implies that teachers may need to slightly force students for participation. With this importance in mind, the students observed that the teachers provided them with opportunities to participate in classroom activities more than often ($\overline{X}$ =4.21). However, there were significant differences (F=92.4; p<0.01) among the groups according to the students' satisfaction levels. While the students of Teachers A stated that their teachers helped them take part in activities less than often ($\overline{X}$ =3.72), Teachers C were stated to do so, much more often ($\overline{X}$ =4.47). The analysis indicated that the three groups were different from each other in terms of encouraging behaviors. This finding also maintains that teachers of the students with more satisfaction try harder to create an environment conducive to participation.

Like any student, students in ELT classes often have difficulties overcoming obstacles on their way. Teachers are usually expected to be around and ready to provide help. As expected, the respondents stated that their teachers were ready very often ($\overline{X}$ =4.34) to help them, though with significant differences. The analyses indicated that all the groups statistically differed (F=167.6; p<0.01) and Teachers C had the highest mean score, implying that they were perceived to be ready most often to help the students. On the other hand, Teachers A were stated to be ready least often ($\overline{X}$ =3.76) to help students in need. In other words, the relationship between students' satisfaction level and the teacher's willingness to help students in need is linear and the teachers of the students with comparatively higher satisfaction seem more willing to help slow learners than those in the other groups.

For managerial and instructional purposes, teachers are advised to monitor students and their seatwork, which requires that they should walk around and be 'with it'. Again, analyses pointed to differences among the groups according to students' satisfaction levels (F=66.3; p<0.01). While Teachers C were perceived most often ($\overline{X}$ =4.32) to monitor students' seatwork, the students replied that Teachers A monitored the students' work least often ($\overline{X}$ =3.46). This also indicates that teachers whose students are relatively less happy with the atmosphere monitor students'

work less often than those in the other groups. This linearity in the relationship points to the need for monitoring.

Students learn at their own speed and this individuality makes it challenging for a teacher to teach in class. Nevertheless, such awareness of differentiality helps the teacher adjust their presentations to their students' individual needs. An overall mean of 3.68 indicates teachers lack of awareness of differences in learning styles; or they do not behave as if they are aware of the differences among the groups ($F=89.0$; $p<0.01$). The students responded that Teachers C considered students' individual differences more often ($\overline{X}=4.07$) than the others, and that Teachers A only sometimes ($\overline{X}=3.10$) displayed this behavior. This finding shows that the teachers of the students with higher satisfaction tend to consider their students' individual needs more often than the others.

Students' psychological comfort in class is related to their perceptions of classroom atmosphere; students free of stress in class may ask questions more easily. The analyses indicated that the teachers differed in terms of the atmosphere the students feel they are in ($F=145.5$; $p<0.01$); in classes where students were happier, they could ask the teacher questions more easily. While the mean score for the students of Teachers A was the lowest ($\overline{X}=3.55$), the one for Teachers C was the highest ($\overline{X}=4.49$). In other words, there is a linear correlation between students' satisfaction level and their attitude of asking for help.

Language learning requires a great deal of student participation, whereas gaining self-efficacy takes a long time since students avoid participating and risk-taking; therefore, teachers are expected to have students participate. In line with this expectation, the teachers included in the study were found to encourage their students for participation. However, the three groups differed significantly in terms of students' satisfaction ($F=69.7$; $p<0.01$); while Teachers C encouraged their students more often ($\overline{X}=4.43$) to speak English than Teachers A ($\overline{X}=3.62$). This indicates that teachers of students with higher satisfaction tend to encourage their students more frequently for participation than others, and they more often hearten students to speak in class.

Belongingness increases sense of safety, and students expect to be considered by their peers and teachers. Likewise, teachers cannot be expected to "survive" in class without students' contribution. This necessitates teachers to consider students' opinions and tailor the programs accordingly. The respondents stated that their teachers very often acknowledged their comments about the course ($\overline{X}=3.96$). But again, the teachers' attitude in this sense showed significant differences among groups ($F=149.3$; $p<0.01$). Teachers A cared about their students' comments less ($\overline{X}=3.28$) than Teachers C ($\overline{X}=4.35$), meaning that teachers of students with higher levels of satisfaction care about their students' comments comparatively more frequently than the others.

Classroom life is often complicated and many students are too weak to cope with the obstacles properly. For instance, some students laugh at their classmates' mistakes in class, and a teacher may allow mockery and may especially discourage introvert or weak students. Although the students responded that they were rarely ($\overline{X}$ =1.89) afraid of making mistakes in class, significant differences were observed among the teachers in different groups (F=50.1; p<0.01). The students of Teachers C were less afraid ($\overline{X}$ =1.58) of making mistakes than those of Teachers A ($\overline{X}$ =2.39). This shows that the teachers of the students with lower levels of satisfaction tend to be more patient and tolerant toward students' mistakes because students comparatively more often feel afraid to make mistakes than the others.

Another important aspect which determines the quality of classroom life is how well students get through classroom activities and tasks. Teachers' instructions and presentations provide quite a lot of guidance for students. High quality guidance will help them overcome most prospective problems. The analysis indicates that the teachers differed in their attitudes in terms of the quality of lesson presentation (F=134.8; p<0.01). Meanwhile, Teachers C were stated to have better presentations ($\overline{X}$ =4.49) than Teachers A ($\overline{X}$ =3.43). Analysis of variance shows that all three groups differ from one another, indicating that they have different patterns of behavior in presentations.

As for relationships in class, a business-like atmosphere contributes to management and learning. Although many teachers may ignore some aspects of classroom life, successful teachers know that too strict or motherly behaviors may be problematic. Supporting this claim, while the students of Teachers C responded that love and respect dominated the lessons ($\overline{X}$ =4.41), in the classes of Teachers A, this atmosphere was observed less often ($\overline{X}$ =3.26). This finding points out that the students with higher level of satisfaction with the classroom atmosphere experience more respect and love from peers and their classmates.

Finally, the students who were more satisfied with the environment were found to be experiencing teachers' overall social-emotional behaviors comparatively more frequently. As clearly seen from Table 3, the students' satisfaction levels are closely related to their teachers' behavioral patterns of social-emotional support, and the correlations are found to be linear. Teachers who support their students socially and emotionally more often have students with higher levels of satisfaction with the classroom atmosphere, and the students with lower levels of satisfaction experience these behaviors less frequently.

Conclusions and Recommendations

The study aimed to identify the relationships between teachers' social-emotional behaviors and students' satisfaction with the classroom atmosphere. A questionnaire was used to gather data in order to identify the contribution of teachers' support to

the students' satisfaction with the environment. The reliability analyses indicated that the 12-item questionnaire can be used as a valid instrument to measure teachers' social-emotional behaviors for further research and for practical purposes.

It was also found that teacher behaviors of social-emotional support make a difference in how students feel in class, as Elias (2003) claimed. The analysis showed that teachers' behaviors of support are significantly correlated and therefore, the teacher's behaviors at hand might be used as an indicator of one another. On the other hand, regression analysis maintained that the behaviors in the questionnaire, when considered as a whole, contributed significantly to the students' satisfaction and can be used as predictors of student satisfaction with the classroom atmosphere. However, the high correlations among the items in the questionnaire make it difficult to tell one from the other in terms of the amount of their individual contributions to students' satisfaction.

Students in different classes very often have their own agendas and the teacher often behaves in accordance with the classroom dynamics specific to the group, which is in line with what Turanlı (1999) maintained. Therefore, their behaviors in a group should be contextually investigated, because the reasons they (need to) behave differently have not been thoroughly explored yet. In other words, it might be an overgeneralization to assume that they behave in the same way in all their classes. This suggests that further studies should be carried out in order to make out the reasons some teachers can adapt more easily to different contexts while the others cannot.

Bearing this in mind, students' satisfaction with the classroom atmosphere can be predicted when behavioral pattern of the teacher in class is considered as a whole. Accordingly, this study showed, in line with Ryan & Deci (2000), that teachers who behave more supportively are favored more by their students. In other words, students favor the teachers more who provide social-emotional support and encourage them more often. The results from this study might also provide a quick way of identifying the teacher's social-emotional behaviors in class, might be used for formative evaluation such as curriculum improvement, and for scientific purposes such as suggesting a model to increase students' satisfaction with the learning environment. The findings from the study can be conversely interpreted that students' satisfaction levels with the classroom atmosphere may help to identify how often or how much the teacher supports his/her students socially and emotionally. The literature points out that students' satisfaction with the classroom atmosphere and their academic achievement are positively correlated. Now that there is a close relationship between teachers' behaviors of social-emotional support and students' satisfaction with the classroom atmosphere, experimental or quasi experimental follow-up studies controlling some external factors need to be designed to identify whether teachers' behaviors of social-emotional support are related to students' academic achievements.

References

Alder, N. L., & Moulton, M. R. (1998). The eye of the beholder: Middle schoolers talk about caring, *Schools in the Middle, 7(3)*, 6-7.

Banner, J. M. Jr., & Cannon, H. C. (1997). *The elements of teaching*. New Haven, CT: Yale University Press.

Bloom, B. S. (1976). *Human characteristics and school learning*. New York: McGraw-Hill.

Brandt, R. (2003). How new knowledge about the brain applies to social and emotional learning. In M. J. Elias, H. A. Arnold & C. S. Hussey (Eds.), *EQ + IQ = Best leadership practices for caring and successful schools* (pp. 57-70). Thousand Oaks, CA: Corwin Press.

Clark, C. M., & Jensen, K. I. (1992). Toward relational responsibility. In F .K. Oser, A. Dick, and J. L. Patry (Eds.), *Effective and responsible teaching: The new synthesis* (pp. 431-440). San Francisco, CA: Jossey-Bass.

Csikszentmihalyi, M., & McCormack, J. (1986). The influence of teachers. *Phi Delta Kappan, 67*, 415-419.

Davidson, A. (1999). Negotiating social differences: Youths' assessments of educators' strategies. *Urban Education, 34*, 338-369.

Davidson, A., & Phelan, P. (1999). Students' multiple worlds. In *Advances in motivation and achievement: Role of context. Vol. 2.* 233-283. Stamford, CT: JAI Press.

Eldeleklioğlu, J. (2008). Gender, romantic relationships, ınternet use, perceived social support and social skills as the predictors of loneliness. *Egitim Arastirmalari - Eurasian Journal of Educational Research*, 33, 127-140.

Elias, M. (2003) *Academic and social-emotional learning*. Brussels, Belgium: International Academy of Education (IAE). Retrieved on January 10, 2007, from http://www.ibe.enesco.org.

Hirst, P. H., & Peters, R. S. (1971). *The logic of education*. New York: Humanities Press.

Kress, J. S., Norris, J. A., Schoenholz, D. A., Elias, M. J., & Seigle, P. (2004). Bringing together educational standards and social and emotional learning: Making the case for educators. *American Journal of Education, 111*, 68-89.

LeDoux, J. E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*, 155-184.

Lickona, T. (1991). *Educating for character: How our schools can teach respect and responsibility*. New York: Bantam Books.

Mendes, F. (2003). "What empathy can do". *Educational Leadership (September), 56-59*.

Noddings, N. (1984). *Caring: A feminine approach to ethics and moral education*. Berkeley, CA: University of California Press.

Oser, F. K. (1994). Moral perspectives on teaching. *Review of Research in Education, 20*, 57-127.

Oser, F. K., Dick, A., & Patry, J. L. (1992). Responsibility, effectiveness, and the domains of educational research. In F. K. Oser, A. Dick, and J. L. Patry (Eds.), *Effective and responsible teaching: The new synthesis.* (pp. 3-13), San Francisco, CA: Jossey-Bass.

Palmer, P. J. (1998). *The courage to teach: Exploring the inner landscape of a teacher's life*. San Francisco, CA: Jossey-Bass.

Pianta, R. (1999). *Enhancing relationships between children and teachers*. Washington, DC: American Psychological Association.

Protheroe, N. (2005). Learning and the teacher-student connection. *Principal, October/ September*, 50-52.

Ryan, R. & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well being. *American Psychologist, 55*, 68-78.

Sockett, H. (1993). *The moral base for teacher professionalism*. New York: Teachers College Press.

Stipek, D. (2006). Relationships matter. *Educational Leadership, 64 (1)*, 46-49.

Täte, P. M. (2001). Excellence in teaching: Myths and legends. In T. Arnold (Ed.), *Facing change: Proceedings of the AIESEP World Sport Science Congress.* (pp. 1.45-1.51), Rockhampton, Queensland, Australia: Association Internationale des Escoles Superieures d'Education Physique and School of Health and Human Performance, Central Queensland University.

Täte, P. M. (2006). Academic and relational responsibilities of teaching. *Journal of Education, 187 (3)*, 1-20.

Telli, S., den Brok, P. & Cakiroglu, J. (2008). Teachers' and students' perceptions of the ideal teacher. *Egitim ve Bilim-Education and Science*, 33 (149), 118-129.

Turanlı, A. S. (1999) "Influence of teachers' orientations to classroom management on their classroom behaviors, students' responses to these behaviors, and learning environment in ELT classrooms". Unpublished Dissertation, Orta Doğu Teknik Üniversitesi.

Wang, M. C., Haertal, G. D., & Wahberg, H. J. (1993). Toward a knowledge base for school learning, *Review of Educational Research, 63*, 249-294.

Yıldırım, Ö. (2008). Pre-service English teachers' views of teacher and student responsibilities in the foreign language classroom. *Egitim Arastirmalari – Eurasian Journal of Educational Research*, 33, 211-226.

Zins, J. E., Weissberg, R. P., Wang, M. C., & Walberg, H. J. (2004). *Building school success through social and emotional learning*. New York: Teachers College Press.

Öğretmenlerin Sosyal-Duygusal Destek Davranışlarına İlişkin Öğrenci Algıları ve Sınıf Ortamına İlişkin Öğrenci Memnuniyeti

(Özet)

Problem Durumu: Öğretmenlik, tek boyutlu olmayıp birçok becerinin bir arada bulundurulmasını gerektirir. Akademik sorumluluklarının yanında öğretmenin, örneğin sınıf içerisindeki ilişkileri düzenlemek ve öğrencilerin sınıf içinde yaşadığı duygusal sorunlarda yanında olmak gibi sorumlulukları da vardır. Ayrı konularmış gibi görünse de, bu iki alandaki yeterlikler yakın etkileşim içerisindedir ve öğretmenin her ikisinde de becerili olması gerekir. Bu alanlardan birindeki beceriler, diğerinin desteği olmadan genellikle başarısızlıkla sonuçlanır. Öğrencilerin sınıf içerisindeki duygusal yaşantılarının, öğrenmeleriyle ilişkili olduğunu göstermektedir. Hatta birçok araştırma; sınıf içinde gerçekleşen öğrenmelerin önemli bir kısmının, öğrencilerin duygusal özellikleriyle açıklanabileceğine işaret etmektedir. Fakat bu alandaki öğretmen davranışlarının işlevsel olarak tanımlanması ve öğrencilerin öğrenmeleriyle olan etkileşiminin belirlenmesi, zordur. Bu noktada önemli olan, öğrencilerin öğretmen davranışlarını nasıl algıladığıdır. Öğrencilerin duygusal yaşantıları ile akademik başarıları arasında bir ilişkinin var olma olasılığı, algılarının önemini göstermektedir; çünkü algılarındaki farklılıklar, öğrenmelerdeki farklılaşmaların önemli bir kısmını açıklabilir. Öğrencileri duygusal olarak destekleme çabaları, önemli kazanımlar sağlayabilir. Bu nedenle, öğretmenlerin öğretim etkinlikleri sırasında, öğrencilerinin morallerini yükseltecek tedbirler almaları önerilmektedir. Zaten uygulamadan gelen bir yönelimle, deneyimli ve/veya iyi öğretmenler derslerini öğrencilerinin sosyal-duygusal ihtiyaçlarını dikkate alarak planlar. Böyle bir yaklaşımla karşılaşan öğrencilerin de bulundukları ortamlardan daha fazla memnun oldukları gözlenmektedir.

Araştırmanın Amacı: Bu çalışma; öğretmenlerin sosyal-duygusal destek davranışları ile öğrencilerin öğrenme ortamına ilişkin algıları arasındaki ilişkileri irdelemeyi hedeflemiştir. Bu ilişkiyi belirleyebilmek için kullanılabilecek bir ölçeğin geliştirilmesi de, bu araştırmanın amaçları arasında düşünülmüştür. Araştırmanın temel denenceleri ise aşağıdaki şekilde belirlenmiştir: a) Öğretmenleri tarafından sosyal ve duygusal olarak desteklenen öğrenciler sınıfta bulunmaktan memnun kalırlar ve b) öğretmenlerin sosyal-duygusal destek davranışları öğrencide farklı düzeylerde memnuniyet duygusu oluşturur.

Yöntem: Betimsel nitelikteki bu çalışmada analizler; yüzde, aritmetik ortalama ve F testi kullanılarak yapılmıştır. Denencelere paralel olarak; a) öğretmenlerin sosyal-duygusal davranışlarına ilişkin öğrencilerin algılarını ve ayrıca b) öğrencilerin öğrenme ortamına yönelik hissettikleri memnuniyet düzeylerini belirlemek amacıyla Likert tipinde bir anket

kullanılmıştır. Öğrencilere; öğretmenlerden sıkça beklenen 12 adet sosyal-duygusal davranışı, sınıflarında ne sıklıkta gözledikleri sorulmuş ve beşli bir ölçekte ("1=hiçbir zaman' … '5=her zaman') cevaplamaları istenmiştir. Veriler, 1200 öğrencinin 58 öğretmen hakkında doldurduğu toplam 3275 anketlerden elde edilmiş ve gerekli istatistiksel teknikler kullanılarak çözümlenmiştir.

Bulgular ve Sonuçlar: Öncelikle, araştırmanın yürütüldüğü kurumda zaten kullanılmakta olan bir anket olan 25 maddelik 'Öğretmen Değerlendirme Anketi'nin 12 tanesinin sosyal-duygusal açıdan öğrenciyi destekleyici nitelikle olduğu alanyazına dayalı olarak belirlenmiştir. 12 maddelik anketin güvenirliğini tespit etmek için okulda öğrenim görmekte olan beş gruptaki 109 öğrencinin, 11 öğretmen için doldurmuş olduğu 297 anket kullanılmıştır. Sonuç olarak anketin Alpha güvenirlik katsayısının 0.97 olduğu ve her bir maddenin 'düzeltilmiş madde korelasyon değerlerinin (corrected item total correlation)' oldukça yüksek olduğu belirlenmiştir. Bu uygulamadan elde edilen veriler, anketteki maddelerin tek boyutlu olup olmadığını ve tek boyutlu değilse boyut sayısını ve faktör yüklerini belirlemek amacıyla faktör analizine tabi tutulmuştur. Sonuçlar sadece bir faktörün, 1'in üzerinde özdeğere (eigenvalue) sahip olduğunu ve bu faktörün de 12 maddedeki değişkenliğin yüzde 75.9'unu açıkladığını göstermiştir. Bu tespitler sonunda, alanyazından da yararlanılarak seçilmiş olan 12 maddelik anketin; 'öğretmenlerin, sınıflarında ne tür sosyal-duygusal destek davranışları' sergilediğini belirlemek için kullanılabileceği yargısına varılmıştır.

Ayrıca öğretmenlerin sosyal-duygusal destek davranışlarının, öğrencilerin bulundukları sınıftaki memnuniyet düzeylerini ne oranda öngörebildiğini belirlemek üzere, genel uygulamadan elde edilen veriler kullanılarak (3275 anket) regresyon analizi yapılmıştır. Hesaplanan faktör değerlerinin bağımsız değişken olarak girildiği analizde, öğrencilerin öğrenme ortamından memnuniyetleri bağımlı değişken olarak girilmiştir. Yapılan analiz; öğretmenlerin söz konusu davranışlarına ilişkin öğrenci algılarının, sınıfta bulunmaktan memnun olma düzeylerini çok yüksek oranda (%83) öngörebildiğine ve modelin de istatistiksel açıdan anlamlı olduğuna işaret etmiştir.

Diğer yandan, öğretmenlerin sosyal-duygusal davranışları itibariyle birbirinden farklılık gösterdikleri de bilinmektedir. Sınıfta bulunmaktan memnun olan ve olmayan öğrencilerin öğretmenlerinin göstermekte oldukları sosyal-duygusal destek davranışları arasında anlamlı farklılıkların olduğu belirlenmiştir; bazı öğretmenlerin, bir takım sosyal-duygusal destek davranışlarını diğer öğretmenlere oranla daha sık sergiledikleri tespit edilmiştir. Sebep-sonuç ilişkisi içinde düşünülmese de; öğretmenlerin söz konusu davranışları gösterme sıklığıyla öğrencilerin öğrenme ortamına hakkındaki memnuniyet düzeyleri arasındaki anlamlı ilişki dikkate değer bir konudur.

Sonuç ve öneriler: Öğretmenlerin, akademik sorumluluklarının yanında kişisel ilişkilerdeki sorumluluklarının da üzerinde önemle durmak gerekir. Öğretmenlerin sınıf içindeki sergiledikleri sosyal-duygusal destek davranışları, öğrencilerin öğrenme ortamında bulunmaktan hissettikleri memnuniyeti önemli düzeyde etkileyebilmektedir. Bu ilişkiyi belirlemek amacıyla tasarlanan bu çalışmanın elde edilen bulgularından; bazı öğretmen davranışlarının, öğrencinin memnuniyet düzeyini belirlemek amacıyla yararlanılabileceği sonucuna ulaşılmıştır. Bunun yanında, bu çalışma kapsamında kullanılan ve pilot uygulaması yapılarak güvenirliği ölçülen anketin, öğretmenlerin sosyal-duygusal davranışlarını belirlemede güvenilir bir ölçek olarak kullanılabileceği sonucuna ulaşılmıştır.

Araştırmanın ulaştığı bir diğer sonuç şudur: Öğretmen öğrencilerine, sınıf içindeki sosyal-duygusal ihtiyaçlarının karşılanması için destek sağlayabildiği zaman, öğrenciler kendilerini daha iyi hissetmekteler ve öğrenme ortamından daha fazla hoşnut kalmaktadırlar. Bu anlayışa paralel olarak, hangi davranışların öğrenme ortamına ilişkin öğrenci memnuniyetini arttırdığına dair öğretmenlerin bilgilendirilmesi ve öğretmenlerin de buna koşut olarak gerekli çabayı göstermeleri önemli bir ihtiyaçtır.

Anahtar sözcükler: öğretmen davranışları; sosyal-duygusal destek; öğrenci memnuniyeti, sınıf ortamı

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Effect of Dynamic Geometry Environment on Immediate and Retention Level Achievements of Seventh Grade Students

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Abstract

Problem Statement: International studies, such as the repeat of *Trends in International Mathematics and Science Study* and *Programme for International Student Assessment,* have shown that the mathematics achievements of Turkish students are lower than the international average. Geometry is an area of particular weakness. The use of dynamic computer environments has been advocated as a means to improve student understanding and problem–solving skills in geometry. Although a number of research studies have utilized dynamic geometry software as a tool for investigating students' learning of geometrical concepts, most are case studies with very small samples of students. Therefore, there is a need for experimental studies about the effects of dynamic geometry environments on students' learning of various geometrical concepts.

Purpose of Study: The purpose of this study was to compare the effects of instruction utilizing a dynamic geometry environment (i.e., *Geometer's Sketchpad*) to traditional lecture-based instruction on seventh grade students' learning of line, angle, and polygon concepts.

Methods: A pre-test, post-test and delayed-post-test experimental-control group design was utilized. One of the two seventh grade classes in an elementary school was randomly assigned as the experimental group and the other as the control group. There were 15 girls and 16 boys in the experimental group and 17 girls and 15 boys in the control group with ages

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ranging from 12 to 14 years. A geometry achievement test covering seventh grade geometry topics was prepared to investigate students' achievement in geometry. The pre-test was given prior to the intervention and two post-tests after the intervention.
Findings and Results: After controlling for initial differences, comparison of pre-test and post-test scores indicated that the students in the experimental group significantly outperformed those instructed in the traditional environment. However, delayed post-test scores indicated that the achievement difference between the groups was not enduring. Furthermore, although female students retained their knowledge better than male students, no significant *treatment*×*gender* interaction was found.
Conclusions and Recommendations: This study has shown that, if used appropriately, dynamic geometry environments can serve as an important vehicle to improve student achievement in geometry and achieve a classroom culture where conjecturing, analysing, exploring, and reasoning are daily routines. However, long-term professional development activities focusing on how to use technology effectively in the classroom are needed to change what and how teachers are teaching in geometry.
Keywords: Technology integration, mathematics education, dynamic geometry environments, Geometer's Sketchpad, student achievement, elementary geometry education

Geometry is one of the fundamental components of school mathematics. It provides experiences that help students develop understanding of shapes and their properties, enabling them to apply geometric properties to real-world situations, and providing a context for solving relevant problems in mathematics and other disciplines (Kilpatrick, Swafford, & Findell, 2001; National Council of Teachers of Mathematics [NCTM], 2000). Evidence from numerous studies, however, documents that many students fail to adequately grasp the content (e.g., Battissa, 2007; Burger & Shaugnessy, 1986; Clements & Battissa, 1992; NCTM, 2000; Usiskin, 1982; van Hiele, 1986). International studies, such as the repeat of *Trends in International Mathematics and Science Study* (TIMSS-R) and *Programme for International Student Assessment* (PISA), have shown that the mathematics achievement levels of Turkish students are lower than the international average (Mullis et al., 2000; Organization for Economic Cooperation and Development [OECD], 2004). This situation is more serious in geometry than in other mathematical content areas. For example, of the 38 participating countries in TIMSS-R, Turkey ranked 31st in terms of general mathematics achievement and 34th in terms of geometry achievement (Mullis et al., 2000). In PISA 2003, although only about 45 percent of all 15-year-olds from thirty OECD countries completed space and shape (geometry) tasks at Level 2 or below, over 75 percent of the Turkish students performed at these low levels (OECD, 2004).

Computer-based approaches have long been considered an ideal medium for teaching and learning geometry (Battissa, 2007; Clements & Battissa, 1992; Fey, 1984; Kantowski, 1981; Noss, 1987). When used appropriately, technology can provide rich environments in which students' geometric understanding and intuition can be

developed through investigating, conjecturing and verifying (Battissa, 2007; Clements & Battissa, 1992; Laborde, Kynigos, Hollebrands, & Strässer, 2006; NCTM, 2000). In particular, various authors advocate the use of dynamic geometry environments (DGEs) to study geometry, as students can easily check their intuitions and conjectures in the process of looking for patterns and general properties with the "continuous variation of geometric figures" (Marrades & Gutierrez, 2000). DGEs support the teaching and learning of geometry by creating dynamic and productive three-way interactions between teacher, students (either as individuals, whole classes or small groups), and computers (Battista, 2001; Hativa, 1984; Hoffer, 1983). As visualisation is perceived as a core part of geometry and mathematics (Bishop, 1989; Hershkowitz, 1989), research has documented that visualisation and spatial skills can be improved through the use of DGEs (Battista, 2001; Laborde et al., 2006; NCTM, 2000). DGEs are entirely defined by a set of primitive objects (point, line, segment, etc.) and of elementary actions (draw parallel line, etc). The drawings produced at the surface of the screen can be manipulated by "dragging-and-dropping any point or primitive object having sufficient degrees of freedom" (Laborde, 1992). By dragging and otherwise manipulating a construction done in a DGE, students can explore countless variants of a shape given a certain set of construction constraints (Boero, 1992; Chanan, 2000; Laborde, 1992). As a result, the software encourages students to look beyond prototypes when generalizing shape properties and when constructing proofs (Clements & Battista, 1992). Thus, DGEs are crucial to helping students attain Van Hiele levels higher than Level 2 (i.e., abstraction, deduction, and rigor) (Gawlick, 2005).

The prototype is a result of visual-perceptual limitations that affect the identification ability of individuals. Students, particularly those operating at low Van Hiele levels, have a tendency to rely wholly on prototypical examples when constructing geometric arguments and forming judgments of other instances. Existence of "prototypical examples" inhibits proper generalization and is a major cause of student misconceptions in geometry (e.g., Hershkowitz, 1989, 1990; Hershkowitz, Vinner & Bruckheimer, 1987; Hoffer, 1983; Prevost, 1985; Schwarz & Hershkowitz, 1999; Ubuz & Üstün, 2004; Wilson, 1983). In a classroom, when a teacher draws a figure, as in Figure 1, on the board and informs students that the quadrilateral ABCD is a parallelogram, the teacher is actually trying to tell the students that "quadrilateral ABCD represents a parallelogram, and let all the properties inherent in a parallelogram be attributed to the quadrilateral ABCD. From such a statement, students are expected to understand that this parallelogram is a "generic" parallelogram; it will remain a parallelogram no matter its orientation or scale. Seeing Figure 1, most of students do not accept right-angled figures (e.g., rectangle, square) as parallelograms because the such shapes do not conform to their prototypical notions of the shape. Students often use prototypical figures exclusively and their definitions include noncritical attributes of the concepts as well as their critical attributes (Ubuz & Üstün, 2004). In this regard, dynamic geometry software is helpful because the software allows students to create, explore and manipulate prototypical parallelograms, transforming them into rectangles, squares, and other

"non-prototypical" parallelograms by dragging and dropping. While doing this, students made their own judgements and develop their own conclusions.

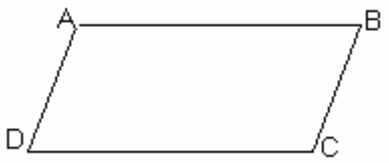

Figure 1. A prototypical parallelogram

A number of case studies have provided evidence supporting the utility of DGEs in enhancing teaching and learning of geometry in the following areas: Problem solving (Healy & Hoyles, 2001); solutions for construction tasks (Noss, Hoyles, Healy & Hoelzl, 1994); the notion of dependency and functional relationship in geometrical constructions (Pratt & Ainley, 1996); various uses of dragging features in DGEs (Erez & Yerushalmy, 2006; Falcade, Laborde & Mariotti, 2007; Leung, 2008); students' conjecturing, proving and justifying (Christou, Mousoulides, Pittalis, & Pitta-Pantazi, 2004; Marrades & Gutiérrez, 2000; Laborde, 2000; Olivero & Robutti, 2007). Experimental studies have also explored the effects of DGEs on students' achievement in various geometry subjects (e.g., Dixon, 1997; Hull & Brovey, 2004). Dixon (1997) explored the effects of a DGE (based on the use of GSP in a computer lab) and visualization on eight-grade students' conceptual understanding of reflection and rotation. She found that students taught using DGE performed significantly better than those taught in a traditional environment on test items dealing with reflection and rotation, as well as on measures of two-dimensional visualization; however, they did not perform as well on measures of three-dimensional visualization. Similarly, Hull & Brovey (2004) investigated the effects of dynamic geometry use on 68 ninth-grade students' achievement in circles and attitudes towards geometry. They found no significant difference in student assessment scores when compared to results from the previous year, although male students outperformed female students. Furthermore, they have also found that using the software did not significantly change students' attitudes towards geometry.

In his review about the development of geometric and spatial thinking, Battista (2007) points out that the qualitative research results have already revealed that superior geometry learning can occur with the use of dynamic geometry environments; however, quantitative research results are needed in order to generalize these results and determine whether using DGE is "better" than using traditional paper-and-pencil methods (p. 884). Thus, the purpose of this study was to compare the effects of student-centered dynamic geometry instruction with traditional direct teaching-based instruction on seventh grade students' understanding of line, angle, triangle and quadrilateral concepts. An additional aim of the study was to explore the nature of students' concept images, particularly the status of the prototypical examples, as expressed in the justifications they produced in DGS and traditional instructional settings.

Method

Sample

The participants of this quasi-experimental study were 63 seventh grade students (32 girls and 31 boys) in a public elementary school. There were two seveth grade classes in the school. One of these classes was randomly assigned as the experimental group (EG) and the other as the control group (CG). There were 15 girls and 16 boys in the EG and 17 girls and 15 boys in the CG. In both groups, students' ages ranged from 12 to 14 years.

Instrument

A geometry achievement test (GAT) was developed by the first two researchers to measure students' understanding of geometry taught to seventh grade students: Lines and planes, angles and types of angles, and polygons (i.e., triangles and types of triangles, parallelograms, rhombi, squares, and rectangles). A literature review revealed that students have various misconceptions related to lines and planes, angles and types of angles, and polygons (e.g., Hershkowitz, Vinner & Bruckheimer, 1987; Hershkowitz, 1989; Hoffer, 1983; Prevost, 1985; Ubuz, 1999; Ubuz & Ustun, 2004; Wilson, 1983). Findings from these studies guided the development of all 82 GAT tasks (contained as sub-tasks in a total of 22 questions). GAT was piloted by using face to face interviews with three eigth grade students, identified by their mathematics teacher as being 'above average,' 'average,' and 'below average' according to their grades in mathematics. The purpose of the pilot study was to examine students' difficulties in understanding the test questions and tasks, to identify their misconceptions, and to use these results to prepare open-ended explorations for GSP.

The 22 questions focused on (a) identifying lines, angles, polygons, rectangles, squares, parallelograms, and triangles; (b) finding angles in the given figures; (c) classifying triangles according their angle and side properties; (c) drawing right, equilateral and isosceles triangles on dotted paper; (d) knowing the properties of rectangles, squares, and parallelograms; (e) knowing the positions of lines and of lines and plane with respect to one another.

The test was administered to the subjects as a pre-test, post-test, and delayed post-test. Students were allowed 50 minutes to complete the test. Each task in GAT was analyzed by giving one point for each correct answer and zero points for each incorrect answer. No partial credit was awarded. Post-GAT results yielded a split-half reliability coefficient of internal consistency of 0.74.

Procedures

The aim of this study was to investigate the effects of a dynamic instructional environment on seventh grade students' immediate and long-term retention of line, angle, and polygon concepts. The study was conducted in a mathematics course designed to teach regular geometry topics covered in the seventh grade as made obligatory by the national mathematics curriculum (Milli Eğitim Bakanlığı [Ministry of

National Education], 1998). In this quasi-experimental study, two different learning environments, traditional and dynamic instructional environments, were compared.

The treatment in the dynamic instructional environment included exploring and manipulating geometric concepts (lines, angles, and polygons) based on productive three-way interactions among teacher, students, and computers through subsequent open-ended exploration activities, called *sketchsheets*. Students worked on these activities at computers provided at the computer lab. The traditional instructional environment was based on the chapters related to lines, angles, and polygons from the textbook (Yıldırım, 2001) used by the seventh graders at the study site. The students in both groups were taught the same content at the same pace for five weeks. Students met four times each week in four separate 40-minute sessions. Table 1 summarizes the treatment and data collection timeline.

Table 1

Data Collection and Treatment Timeline

Timeline	EG	CG
Week 0	GAT as pre-test	GAT as pre-test
Weeks 1-5	Instruction with dynamic geometry	Traditional paper-and-pencil instruction
Week 6	GAT as post-test	GAT as post-test
Week 25*	GAT as delayed-post-test	GAT as delayed-post-test

* Five months upon the completion of the treatment

After calculating descriptive statistics for pre, post, and delayed post-GAT, a 2×2 analysis of variance (ANOVA) was conducted to ascertain the effects of two groups and gender on the students' prior achievement levels in geometry. Furthermore, by using pre-test scores as covariants, two 2×2 analyses of covariance (ANCOVA) were conducted to ascertain the effects of two treatments and gender on the students' immediate and retention level achievements in GAT. In all inferential statistics, gender was included as a moderator variable as a number of studies have reported that female students have less computer interests, more computer anxiety and less self-confidence in their ability to use computers compared to male students (e.g., Chen, 1986; Levin & Gordon, 1989; Massoud, 1991; Shashaani, 1993). Thus, it is generally suggested that gender be taken into consideration when studying student achievement in technology-rich learning environments. Furthermore, some researchers (e.g., Battista, 1990) point out gender differences in learning geometry. All statistical inferences were based on a significance level of .05. All analyses were carried out using the Statistical Package for Social Sciences 15.

Treatments for the Experimental and Control Groups

Except for those enrolled in geometry courses in the present study, all students at the school received instruction on topics in their regular mathematics classes with traditional learning methods. The same mathematics textbook (Yıldırım, 2001) was used to assign homework to both groups.

Treatment for the EG. Prior to the treatment, hands-on instruction and practice were given at the computer lab to familiarize the EG students and their mathematics teacher with GSP and its uses. A two-hour training session was adequate for the students as they had been taking the *Computer Literacy* course since the sixth grade. At the end of this training, all students were proficient at constructing points, lines, angles and polygons with GSP. The teacher, however, did not have as much computer experience. At the end of the training, the teacher was not yet proficient with Sketchpad, requiring additional GSP support during the study period. Thus, the EG students were co-taught by the second researcher and the classroom teacher. To control the implementation threat, the role of the researcher was limited to only providing technical assistance and guidance for the things that students wanted to do with GSP but were unable to do without additional assistance. No extra information or material was given to students by the researcher in the labs. This was crosschecked by the teacher, who was present at all of the computer labs. Students spent approximately four hours each week working with Geometer's Sketchpad, working for approximately three class hours in a computer lab and one hour in the classroom. Students worked in pairs at the computer lab where there were 18 computers arranged in a U-shape.

Eighteen *sketchsheets* were developed by the first two researchers to be used in conjunction with GSP. The materials were designed to allow students to develop their own understandings of various geometric concepts through active exploration, manipulation and transformation of geometric shapes. The majority of the *sketchsheets* required students to work in an investigative manner, employing inquiry and guided-discovery techniques to uncover specific geometric relationships or small sets of properties. For example, *Sketchsheet 9* (See Figure 2) guides students to make conjectures about the sum of the interior angles of an arbitrary triangle. After constructing a triangle in GSP, students measured and manipulated their construction to see what relationships exist among its angles and which relationships could be generalized for all triangles.

Subject: Triangles

Sketchsheet 9

1) Join up three points that are not collinear and write the name of the figure formed.
2) Show the angles in your figure and measure them.
3) What is the sum of the angles in the figure?
4) Find the sum of the measures of the angles in a triangle while changing the triangle by dragging-and-dropping its vertices.

Conclusion: What can you say about the sum of the measures of angles in a triangle?

Figure 2. Sketchsheet 9 used in the study

S*ketchsheets* were distributed to the students in each computer lab session. Students were asked to complete the sketchsheets with GSP, writing their findings directly on the sheets. After students completed their investigations, the researcher asked students to comment on their mathematics findings and conclusions. All alternative findings were written on the board so that the students could discuss and interpret classmates' results. This cycle was repeated for all *sketchsheets*. Following the class at the computer lab, the students and their teacher discussed findings from the computer-based activities. Afterwards, the teacher typically introduced new topics in the regular classroom.

Treatment for the CG. The general method of instruction used in the CG was traditional lecturing with the aid of the textbook (i.e., Yildirim, 2001). In general, the teacher explained the concepts by writing them on the board, then allowed students to copy them in their notebooks. At the beginning of each lesson, the classroom teacher always reviewed the previous lesson by writing the important rules, formulas, or procedures on the board. Then, the lesson continued with students completing exercises from a previous lesson or writing a new rule or a new definition. The teacher typically used a ruler to draw lines and a protractor to measure angles. Students mimicked these sketches, drawing them in their notebooks using the same instruments. For some exercises, student volunteers were called up to the board to show their solutions. This was typically followed by teacher-led discussions of student-generated solutions. The teacher assigned homework from the textbook each time a topic was completed.

Results

A comparison of the pre, post and delayed-post GAT means of the students indicates that the treatment resulted in a marked improvement in student achievement in geometry in the EG, with both the CG and the EG demonstrating significant improvement over the course of the five-week study period (See Table 2). The improvement was more marked in the EG. These findings are evident from the data in Table 2.

Table 2

Descriptive Statistics for Pre, Post and Delayed GAT Scores

	Pre-GAT		Post-GAT		Delayed-Post-GAT	
Statistics	EG	CG	EG	CG	EG	CG
n	31	32	31	32	31	30
M	42.9	43.25	59.8	48.4	55.06	47.4
SD	9.25	7.07	8.41	6.27	11.08	9.3

Note. Maximum score obtainable from the GAT was 82.

The ANOVA conducted on pre-GAT scores to examine the effects of groups and gender on the students' prior knowledge in geometry indicated no statistically significant difference between the groups, $F(1, 61) = 0.35$, $p = .852$, $\eta^2 = .001$; and genders, $F(1, 61) = 0.337$, $p = .564$, $\eta^2 = .006$ (see Table 3). Furthermore, no statistically significant interaction was found between group and gender, $F(1, 61) = 3.804$, $p = .056$, $\eta^2 = .061$. In other words, both the EG and the CG were statistically equivalent in terms of students' geometrical achievements prior to the treatment.

Table 3

ANOVA on Prior Knowledge in Geometry Attributable to Group and Gender

Source of variation	*df*	*F*	η^2	*p*
		Main effects		
Group	1	0.35	.001	.852
Gender	1	0.337	.006	.564
		Two-way interaction		
Group × Gender	1	3.804	.061	.056
Error	59	(65.243)		

Note. Values enclosed in parentheses represent mean square errors.

The ANCOVA that was conducted on the post-GAT score to seek out the effects of treatment and gender on the students' achievements in geometry revealed that (a) a statistically significant difference in achievement was due to the treatment in favour of the EG, $F(1, 61) = 43.054$, $p < .001$, $\eta^2 = .426$; (b) no statistically significant mean difference in achievement was due to gender, $F(1, 61) = 1.831$, $p = .031$, $\eta^2 = .031$; and (c) the interaction between treatment and student gender was not significant, $F(1, 61) = .721$, $p = .399$, $\eta^2 = .012$) (see Table 4). Even though there was no significant correlation between pre and post-GAT scores ($r = .239$, $p = .06$), the pre-test score was used as a covariate to remove extraneous variations from the gain scores, thereby increasing measurement precision (Hendrix, Carter, & Hintze, 1979).

Table 4

ANCOVA on Post-GAT Scores in Geometry Attributable to Treatment and Gender

Source of variation	*df*	*F*	η^2	*p*
		Main effects		
Group	1	43.054**	.426	.0001
Gender	1	1.831	.031	.181
		Two-way interaction		
Group × Gender	1	.721	.012	.399
Error	58	(49.508)		

Note. Values enclosed in parentheses represent mean square errors.

To ascertain the likely effects of treatment and gender on students' retention level of achievements in geometry, an ANCOVA was conducted using pre and post-GAT scores as covariates since their correlations with the delayed post-GAT score were significant (r = .266, p = .038 and r = .518, p < .001 respectively). The tabulated data indicated that (a) no statistically significant difference in achievement was due to the main effects of treatment, F(1, 59) = 1.384, p = .244, η^2 = .025; (b) a statistically significant mean difference in achievement was due to gender, F(1, 59) = 5.353, p = .024, η^2 = .089; and (c) the interaction between treatments and student gender was not significant, F(1, 59) = 0.208, p = .65, η^2 = .004 (see Table 5). No significant interaction effects between treatment and gender on student retention level indicate that gender differences are significant across groups regardless of the different treatments.

Table 5

ANCOVA on Delayed Post-GAT Scores in Geometry Attributable to Treatment and Gender

Source of variation	*df*	*F*	η^2	*p*
		Main effects		
Group	1	1.384	.025	.244
Gender	1	5.353	.089	.024
		Two-way interaction		
Group × Gender	1	0.208	.004	.65
Error	55	(82.211)		

Note. Values enclosed in parentheses represent mean square errors.

To further investigate the effects of gender on students' achievement in geometry, we calculated their means and standard deviations on pre, post, and delayed-post-GAT. The results displayed in Table 6 suggest that, although the mean post-test scores of girls and boys in CG were almost equal, girls did better in delayed post while boys performed at higher levels on the pre-test. On the other hand, girls in EG out-performed boys on all tests, with the gap between male and female performance increasing steadily during the treatment period.

Table 6

Means and Standard Deviations of Pre-, Post- and Delayed-Post-GAT Scores on Gender

	EG		CG		Total	
	Female	Male	Female	Male	Female	Male
Pre-GAT						
M	45.53	40.37	41.94	44.73	43.63	42.48
SD	10.22	7.74	7.37	6.65	8.86	7.45
Post-GAT						
M	62.60	57.31	48.47	48.33	55.09	52.96
SD	9.75	6.20	6.52	6.20	10.77	7.61
Delayed-Post-GAT						
M	60.13	50.31	49.53	45.27	54.83	47.87
SD	11.50	8.50	6.93	11.02	10.78	9.97

The detailed analyses of students solutions in pre- and post-GAT tests revealed that the CG students used prototypical examples to model their judgement of other instances more than those in the EG in both tests. For example, 18 CG students (11 female and seven male) did not accept square as rectangle in both tests by providing the following explanation: "the lengths of short side are equal and the lengths of long sides are equal." Only two female students in the CG accepted square as rectangle in the post-GAT but not in the pre-GAT. Only six EG students (five male and one female), however, continued to reject square as rectangle in both tests. Two of those students suggested the same explanation stated above, one stating that "opposite side lengths are equal and the angles are 90 degrees." While twelve EG (seven female and five male) students did not accept square as rectangle in the pre-GAT, they accepted it in the post-GAT. Two of those female students gave similar explanations (i.e., "opposite sides are equal and angles are 90 degrees"), while identifying rectangle in both pre- and post-GAT. This revealed that the EG students' choice of examples was based more on their own prototypes and less on their own definitions in the pre-GAT but not in the post-GAT. Three female and two male students gave similar explanations in the post-GAT but not in the pre-GAT. One male and one female student changed their explanations from "lengths of the short sides are equal and lengths of the long sides are equal" to "opposite sides are equal and angles are 90 degrees." One male and one female student even showed improvement from pre- to post-test, but they did not give any explanation. Similar results were observed in both groups when the rectangle was given in oriented (or rotated) form. This detailed analysis suggests that exploring various forms of rectangles (or quadrilaterals) with certain construction constraints and then measuring side lengths and angles results in deeper understanding of the related shapes and properties.

Conclusions and Recommendations

A comparison of the pre- and post-GAT means suggests that the treatment resulted in marked improvement in student achievement on items dealing with lines, angles, and polygons. Similarly, the significant difference in the results of the post-GAT indicates that, overall, the students in the EG performed better than the students in the CG**.** The students in the EG appear to have conceptualized lines, angles, and polygons better than the CG students. Dynamic instruction appears to foster stronger student understanding of geometric concepts than traditional instruction alone. Working with DGS appears to help students build increasingly sophisticated mental models for thinking about geometric shapes. Such work also encouraged and supported students' development and understanding of the property-based conceptual system used in geometry to analyse shapes (Battista, 2002, 2007). It encouraged students to move to higher levels of geometric thinking rather than memorizing extensive lists of shape properties. The dynamic instructional environment involved students as conceptualising participants, rather than spectators in the geometry classroom. These findings support the findings of previous studies (e.g., Battista, 2002, 2007; Chazan, 1988; Choi-Koh, 1999; Dixon, 1997; Hull & Brovey, 2004). Furthermore, analyses of the students' explanations given in some of the questions indicated that EG students' understanding was deeper in content than CG students. One of the important results of this study is that students in the EG began to look beyond prototypes when solving problems (Clements & Battista, 1992).

From the written responses of the EG students in the pre- and post-GAT, it was clear that there was a crucial difference in students' definitions and explanations. Although the definitions given in the pre-GAT included non-critical attributes of shapes, most of the EG students' definitions in the post-test included critical attributes of concepts. This difference can be explained by the clear distinction between drawing and constructing in GSP. Before the treatment, students in the EG had difficulties in identifying geometric shapes when the orientation of the shapes changed. The students tended to refer to prototypical shapes when solving problems or constructing geometric arguments. However, during the treatment, students in the EG experienced numerous non-prototypical instances of shapes as they dragged and dropped objects within the DGS. By modifying the objects of the constructions, the students developed more mature understandings of connections between the figures and their properties while forming hierarchical relationships between different classes of shapes. This result supports the literature (e.g., Battista, 2007; Christou, Mousoulides, Pittalis, & Pitta-Pantazi, 2004; Clements & Battista, 1992; Healy & Hoyles, 2001; Marrades & Gutiérrez, 2000; Laborde, 2000; Olivero & Robutti, 2007) claiming that geometry software packages contribute to enhancing student understanding of geometric concepts and more robust conjecturing skills. Furthermore, delayed-post-test results showed that the dynamic instructional environment had a significant effect on students' short and long-term retention levels. DGS raised scores on follow-up examinations administered after five months upon the completion of instruction, but the retention effects were not as clear as the

immediate effects of the dynamic instructional environment. This finding is also consistent with earlier studies (e.g., Kulik, Bangert, & Williams, 1983). In conclusion, seventh-grade students instructed with the dynamic instructional environment had a higher achievement level in learning geometric concepts, and a better retention level.

On the other hand, one of the main purposes of teaching geometry is to develop pupils' visual awareness and spatial ability through figures and provide insight into the properties and interactions among them. As Schoenfeld (1989) pointed out, "classroom culture" plays an important role in how students perceive and learn geometry. If we want students to see that learning geometry is a "sense-making activity," then conjecturing, analysing, exploring, and reasoning should be daily routines in a geometry lessons. Using technology, particularly the dynamic geometry environments such as GSP, is a potentially important vehicle to achieve such a classroom culture if used appropriately. However, teachers do not see themselves as competent in using technology in the mathematics classroom even after they are given short-term training. Thus, long-term professional development activities focusing on how to use technology effectively in the classroom are needed to change what and how teachers are teaching in geometry.

References

Battista, M. T. (1990). Spatial visualization and gender differences in high school geometry. *Journal of Research in Mathematics Education*, *21*, 47-60.

Battista, M. T. (2001). A research–based perspective on teaching school geometry. In J. Brophy (Ed.), *Subject-specific instructional methods and activities* (pp. 145-185). New York: Elsevier.

Battista, M. T. (2002). Learning geometry in a dynamic computer environment. *Teaching Children Mathematics*, *8*, 333-339.

Battista, M. T. (2007). The development of geometric and spatial thinking. In Lester, F. (Ed.), *Second Handbook of Research on Mathematics Teaching and Learning* (pp. 843-908). Reston, VA: NCTM.

Bishop, A. J. (1989). Review of research on visualization in mathematics education. *Focus on Learning Problems in Mathematics, 11*, 7-16.

Boero, P. (1992). The crucial role of semantic field in the development of problem solving skills in the school environment. In J. P. Ponte, J. F. Matos, & D. Fernandes (Eds.), *Mathematical problem solving and new information technologies* (pp. 77-91). Berlin: Springer Verlag.

Burger, W. F., & Shaughnessy, J. M. (1986). Characterizing the van Hiele levels of development in geometry. *Journal for Research in Mathematics Education*, *17*, 31-48.

Chanan, S. (2000). *Geometer's Sketchpad: Learning guide*. Berkeley, CA: Key Curriculum Press.

Chazan, D. (1988). *Similarity: Exploring the Understanding of a geometric concept* (Technical Report no. 88-15). Cambridge, MA: Educational Technology Center.

Chen, M. (1986). Gender and computers: The beneficial effects of experience on attitudes. *Journal of Educational Computing Research, 2*, 265-282.

Choi-Koh, S. S. (1999). A student's learning of geometry using computer. *Journal of Educational Research, 92*, 301-311.

Christou, C. Mousoulides, N., Pittalis, M., & Pitta-Pantazi, D. (2004). Proofs through exploration in dynamic geometry environments. *International Journal of Science and Mathematics Education, 2*, 339-352.

Clements, D. H., & Battista, M. T. (1992). Geometry and spatial reasoning. In D. A. Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (pp. 420–464). New York: Macmillan.

Dixon, J. K. (1997). Computer use and visualization in students' construction of reflection and rotation concepts. *School Science and Mathematics, 97*, 352-358.

Erez, M., & Yerushalmy, M. (2006). "If you can turn a rectangle into a square, you can turn a square into a rectangle": Young students' experience the dragging tool. *International Journal of Computers for Mathematical Learning, 11*(3), 271-299.

Falcade R., Laborde C., & Mariotti, M. A. (2007), Approaching functions: Cabri tools as instruments of semiotic mediation. *Educational Studies in Mathematics, 66*, 317-333.

Fey, J. (1984). *Computing and mathematics: The impact of secondary school curricula*. Reston, VA: NCTM.

Gawlick, T. (2005). Connecting arguments to actions: Dynamic geometry as means for the attainment of higher Van Hiele levels. *Zentralblatt fuer Didaktik der Mathematik, 37*(5), 361-370.

Hativa, N. (1984). Teach-student-computer interaction: An application that enhances teacher effectiveness. In V. P. Hansen & M. J. Zweng (Eds.), *Computers in mathematics education*: *1984 yearbook of the National Council of Teachers of Mathematics* (pp. 89-96). Reston, VA: NCTM.

Healy, L., & Hoyles, C. (2001). Software tools for geometrical problem solving: Potentials and pitfalls. *International Journal of Computers for Mathematical Learning, 6*(3), 235-256.

Hendrix, L. J., Carter, M. W., & Hintze, J. L. (1979). A comparison of five statistical methods for posttest designs. *Journal of Experimental Education, 47*, 96-102.

Hershkowitz, R. (1989). Visualization in geometry: Two sides of the coin. *Focus on Learning Problems in Mathematics. 11*, 61-75.

Hershkowitz, R. (1990). Pschological aspects of learning geometry. In P. Nesher & J. Kilpatrick (Eds.), *Mathematics and cognition* (pp. 70-95). Cambridge: Cambridge University Press.

Hershkowitz., R., Vinner, S., & Bruckheimer, M. (1987). Activities with teachers based on cognitive research. In M. M. Lindquist & A. P. Shulte (Eds.), *Learning and Teaching Geometry K-12* (pp. 222-235). Reston: NCTM.

Hoffer, A. (1983). Van Hiele based research. In R. Lesh, & M. Landau (Eds.), *Acquisition of mathematics concepts and process* (pp. 205-227). New York: Academic Press.

Hull, A. N., & Brovey, A. J. (2004). The impact of the use of dynamic geometry software on student achievement and attitudes towards mathematics. *Action Research Exchange*, *3*(1). *Retrieved* September 1, 2008 from http://chiron.valdosta.edu/are/vol3no1/pdf/anhull-article.pdf

Jackiw, N. (2006). *The Geometer's Sketchpad* (Version 4.07) [Computer software]. Berkeley, CA: Key Curriculum Press.

Kantowski, M. G. (1981). The microcomputer and instruction in geometry. *Viewpoints in Teaching and Learning, 57*, 71-81.

Kilpatrick, J., Swafford, J., & Findell, B. (Eds). (2001). *Adding it up: Helping children learn mathematics.* Washington, DC: National Academy Press.

Kulik, J.A., Bangert, R. L., & Williams, G. W. (1983). Effects of computer-based teaching on secondary school students. *Journal of Educational Psychology, 75*, 19-26.

Laborde, C. (1992*).* Solving problems in computer-based geometry environments: The influence of the features of the software. *Zentralblatt fuer Didaktik der Mathematik, 24*, 128-135.

Laborde C. (2000). Dynamic geometry environments as a source of rich learning contexts for the complex activity of proving. *Educational Studies in Mathematics, 44*(1&2), 151-161.

Laborde, C., Kynigos, C., Hollebrands, K., & Strässer, R. (2006). Teaching and learning geometry with technology. In A. Gutierrez, & P. Boero (Eds.), *Handbook of research on the psychology of mathematics education: Past, present and future* (pp. 275-304), Rottedam, Netherlands: Sense Publishers.

Leung, A. (2008). Dragging in a dynamic geometry environment through the lens of variation. *International Journal of Computers for Mathematical Learning*, *13*, 135–157.

Levin, T., & Gordon, C. (1989). Effect of gender and computer experience on attitudes toward computers. *Journal of Educational Computing Research, 5,* 69-88.

Marrades, R., & Gutierrez, A. (2000). Proofs produced by secondary school students learning geometry in a dynamic computer environment. *Educational Studies in Mathematics, 44*, 87-125.

Massoud, S. L. (1991). Computer attitudes and computer knowledge of adult students. *Journal of Educational Computing Research, 7*, 269-291.

Milli Eğitim Bakanlığı. (1998). *İlköğretim okulu matematik dersi öğretim programı (6-7-8. Sınıflar)* [Elementary school mathematics curriculum for Grades 7-8-9]. Ankara, TURKEY: Milli Eğitim Basımevi.

Mullis, I. V. S., Martin, M. O., Gonzales, E. J., Gregory, K. D., Garden, R. A., O'Connor, et al. (2000). *TIMSS 1999 International Mathematics Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade.* Chestnut Hill, MA: Boston College. *Retrieved* November 13, 2007, from http://timss.bc.edu/timss1999i/pdf/T99i_Math_All.pdf

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Noss, R. (1987). Children's learning of geometrical concepts through logo. *Journal for Research in Mathematics Education*, *18*, 343-362.

Noss, R., Hoyles, C., Healy, L., & Hoelzl, R. (1994). Constructing meanings for constructing: An exploratory study with Cabri-geometry. In J. P. Ponte & J. F. Matos (Eds.), *Proceedings of the 18th Conference of the International Group for the Psychology of Mathematics Education* (Vol. 3, pp. 360–367). Lisbon, Portugal: University of Lisbon.

Olivero, F., & Robutti, O. (2007). Measuring in dynamic geometry environments as a tool for conjecturing and proving. *International Journal of Computers for Mathematical Learning, 12, 135-156.*

Organization for Economic Cooperation and Development (OECD). (2004). *Learning for tomorrow's world: First results from PISA 2003*. Paris: Author.

Pratt, D., & Ainley, J. (1996). Construction of meanings for geometric construction: Two contrasting cases. *International Journal of Computers for Mathematical Learning*, *1*(3), 293–322.

Prevost, F. J. (1985). Geometry in the junior high school. *Mathematics Teacher, 78*(6), 411-418.

Schoenfeld, A. H. (1989). Problem solving in context(s). In R. I. Charles, & E. A. Silver (Eds.), *The teaching and assessing of mathematical problem solving* (pp. 82-92).Hillsdale, NJ: Lawrence Erlbaum Associates.

Shashaani, L. (1993). Gender-based differences in attitudes toward computers. *Computers and Education, 20*(2), 169-181.

Schwarz, B. B., & Hershkowitz, R. (1999). Prototypes: Brakes or levers in learning the function concept? The role of computer tools. *Journal for Research in Mathematics Education, 30*, 363-387.

Ubuz, B. (1999). 10th and 11th grade students errors and misconceptions on basic geometric concepts. *Hacettepe University Journal of Education, 16&17*, 95-104.

Ubuz, B., & Ustun, I. (2004). Figural and conceptual aspects in defining and identifying polygons. *Eurasian Journal of Educational Research, 16*, 15-26.

Usiskin, Z. (1982). *Van Hiele levels and achievement in secondary school geometry* (CDASSG Project). Chicago: Chicago University.

Wilson, P. S. (1983). Use of negative instances in identifying geometric features. In J. C. Bergeron & N. Herscovics (Ed.), *Proceeding of the fifth Conference of the International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 326-332). Montreal: Canada.

Van Hiele, P.M. (1986). *Structure and insight*. Orlando: Academic Press.

Yıldırım, H. (2001). *İlköğretim matematik 7* [Mathematics for seventh grade]. Ankara, Turkey: Yıldırım Yayınları.

Dinamik Geometri Ortamlarının Yedinci Sınıf Öğrencilerin Başarılarına ve bu Başarının Kalıcılığına Etkisi

(Özet)

Problem Tanımı: TIMSS-R ve PISA gibi uluslararası karşılaştırmalı çalışmalarda elde edilen sonuçlar, ülkemiz öğrencilerinin matematik başarılarının uluslararası otalamanın oldukça altında olduğunu ortaya koymaktadır. Matematiğin diğer alanlarıyla kıyaslandığında bu durum özellikle geometri için daha da düşüktür. Geometri eğitim ve öğretiminde teknoloji, özelliklede

dinamik geometri yazılımlarının kullanımı oldukça fazla ilgi görmektedir. Bunun nedeni, bu tür yazılımların keşfetme yoluyla öğrenmeyi teşvik etmesi ve öğrencilerin problem çözme becerilerinin geliştirilmesine katkıda bulunmasıdır. Ayrıca bu tür ortamların, öğretmen, öğrenci ve bilgisayar arasında etkileşimli ve üretken bir iletişim kurulması ve daha etkin bir şekilde geometri öğretimi yapılmasına katkıda bulunduğu çeşitli araştırmacılar tarafında ortaya konulmuştur. Her ne kadar dinamik geometri yazılımlarının öğrencilerin çeşitli geometri kavramlarını öğrenmedeki etkilerini araştıran çeşitli çalışmalar bulunsa da, bu çalışmalar genelde durum çalışması türünden nitel araştırmalar olup, küçük öğrenci grupları ile yapılmıştır. Bu nedenle, dinamik geometri yazılımlarının entegre edildiği eğitim/öğretim ortamlarının öğrencilerin geometri başarılarına etkisinin araştırıldığı nicel, daha da ötesinde deneysel çalışmalara ihtiyaç bulunmaktadır.

Araştırmanın Amacı: Bu çalışmanın amacı, bir dinamik geometri yazılımı olan Geometer's Sketchpad programının entegre edildiği bir öğrenme ortamı ile geleneksel ders anlatımı yönteminin kullanıldığı bir öğrenme ortamının yedinci sınıf öğrencilerinin doğru, açı ve çokgen kavramlarındaki akademik başarılarını ve bunun kalıcılığını belirlemektir. Bu çerçevede, çalışmayı yönlendiren araştırma soruları şu şekildedir: (1) Dinamik geometri ile öğrenim gören öğrencilerin başarıları ile geleneksel ders anlatımı ile öğrenim gören öğrencilerin başarıları arasında verilen ön, son ve geciktirilmiş son test arasında fark var mıdır? (2) Öğrencilerin geometri başarıları ile cinsiyetleri arasında ilişki var mıdır? (3) Kavram algıları, özellikle de ilk örnek olgusu yönünden kontrol ve deney grubu öğrencilerinin sorulara verdikleri cevaplar arasında fark var mıdır?

Araştırmanın Yöntemi: Dinamik geometri eksenli öğrenme ortamının yedinci sınıf öğrencilerinin geometri başarılarına etkisini ölçmek için, ön test, son test ve geciktirilmiş son test uygulanan deney-kontrol grubu yarı-deneysel araştırma tasarımı yapılmıştır. Bir devlet ilköğretim okulundaki aynı matematik öğretmeni tarafından okutulan iki yedinci sınıftan biri rastgele olarak deney grubu, diğeri de kontrol grubu olarak atanmıştır. Deney grubunda 15'i kız, 16'sı erkek olmak üzere toplam 31; kontrol gurubunda ise 17'sı kız 15'i erkek olmak üzere 32 öğrenci bulunmaktaydı. Kontrol grubundaki öğrenciler, doğru, açı ve çokgen konularını geleneksel öğretim yöntemi ile sınıf ortamında; deney grubundaki öğrenciler ise aynı konuları, araştırmacılar tarafından hazırlanan, "Sketchsheets" adı verilen etkinlikler ile dinamik geometri yazılımı kullanarak bilgisayar lâboratuarında çalışmışlardır. Uygulama toplam beş hafta olmak üzere 20 ders saati sürmüştür. Öğrencilerin ilgili konulardaki geometri başarılarını ölçmek amacıyla, bir geometri başarı testi (GAT) geliştirilmiştir. Testin içeriğinin belirlenmesinde Türkiye'de bu sınıf seviyesinde kullanılan geometri müfredatı temel alınmıştır. GAT, çalışma başlamadan önce ön test, çalışma bittikten sonra ilki bir hafta içinde, diğeri de beş ay sonra olmak üzere iki kez son test olarak uygulanmıştır.

Araştırmanın Bulguları: Deney ve kontrol gurubundaki öğrencilerin ön testten aldıkları sonuçların varyans analizi (ANOVA) ile değerlendirilmesi sonucunda, her iki gruptaki öğrencilerin çalışma başlamadan önce ilgili geometri konularındaki başarı düzeylerinin istatistiksel olarak eşit olduğu

gözlenmiştir. Öğrencilerin ön test sonuçları ortak değişken olarak atanarak kovaryans analizi (ANCOVA) yapıldığında, deney grubundaki öğrencilerin kontrol grubundaki öğrencilere göre son teste istatistiksel olarak daha başarılı oldukları belirlenmiştir. Fakat ön test ve son test sonuçlarının ortak değişken olarak atanarak gerçekleştirilen kovaryans analizi sonucuna göre, her ne kadar daha yüksek olsa da bu başarının istatistiksel olarak kalıcı olmadığı bulunmuştur. Ayrıca, kız öğrencilerin başarılarının, erkek öğrencilere göre daha kalıcı olduğu belirlense de, laboratuar uygulaması ve cinsiyet arasında herhangi bir etkileşim bulunmamıştır.

Araştırmanın Sonuçları ve Önerileri: Etkileşimli bir ortamda ders işlenmesi, öğrencilerin geometrik şekiller hakkında gittikçe gelişen zihinsel modeller geliştirmelerine, şekillerin analizi ve sınıflandırılması için özellik temelli kavramsal sınıflandırma sistemi oluşturmalarına ve ilk örnek (prototip) fenomenini yenmelerine önemli katkıda bulunmuştur. Dinamik geometri yazılımı öğrencilerin dinamik geometri ortamında geometrik şekilleri çizim ile geometrik çizim arasındaki belirgin farka (*drawing vs. construction*) göre oluşturmaya, sonrada bu şekilleri hareket ettirerek özelliklerini araştırmaya ve genel sonuçlar çıkarmalarını sağlamıştır. Öğrencilerin ilk, son ve geciktirilmiş son test cevapları incelendiğinde, deney grubu öğrencilerinin tanım ve açıklamalarında kontrol gurubu öğrencilerine göre daha iyi bir gelişim olduğu belirlenmiştir. Deney gurubu öğrencilerinin ilk testlerde geometrik şekillerle ilgili daha çok önemli olmayan özelliklere ve açıklamalara yer verirken, son testlerde durumla doğrudan ilgili özelliklere ve açıklamalara yer verildiği gözlemlenmiştir.

Eğer öğrencilerin geometri öğrenimini anlamlı bir etkinlik olarak algılamaları isteniyorsa, varsayım oluşturma, analiz yapma, araştırma ve akıl yürütme geometri derslerinin günlük rutinleri olmalıdır. Uygun bir şekilde kullanıldığında teknoloji, özellikle de dinamik geometri yazılımları bu tür bir geometri dersi kültürü oluşturmada önemli araçlar olacaktır. Bununla birlikte, öğretmenlerin özelde geometri genelde matematik derslerine teknolojiyi bütünleştirebilmeleri, bu konuda hizmet öncesi ve hizmet içi eğitim lamaları ile mümkündür. Bu çerçevede, kısa süreli bilgilendirme etkinlikleri yerine öğretmenlere sınıf içinde teknolojiyi nasıl ve etkin bir şekilde kullanabileceklerine odaklanan, uzun süreçli mesleki gelişim etkinliklerinin düzenlenmesi gerekmektedir.

Anahtar Sözcükler: Eğitimde bilgisayar kullanımı, matematik eğitimi, dinamik geometri yazılımları, Geometer's Sketchpad, öğrenci başarısı, ilköğretim geometri eğitimi.

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Values Education Experiences of Turkish Class Teachers: A Phenomonological Approach

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Abstract

Problem Statement: Teachers endow children with values through education. The effective role they play in the teaching of values has been documented through extensive research. These studies have shown that teachers should act as favorable role models reflecting values accurately inside and outside schools, creating ethical classroom environments, and using different strategies to provide children with various value-related experiences formally in the classroom and informally outside of the classroom. Naturally, individuals with democratic citizenship skills who will contribute positively to their society can only be raised by teachers who are equipped to offer values education. For these reasons, the opinions and experiences of teachers regarding the process of values education are important.

Purpose of the Study: The study aims to identify the values education opinions of class teachers who have a critical role in transmitting the basic values of the society to children, and to describe their thoughts and experiences regarding this process.

Method: In line with the problem and the general aim of the study, a qualitative research paradigm was used. As the study aims to identify the opinions and experiences of primary school class teachers, it is a phenomenological case study. The data was collected through focus group interviews using a semi-structured form based on the literature. Participants were selected using convenience, homogeneous, and criterion sampling. The data was analysed with content analysis and NVivo2.0.

Findings: Data obtained from the focus group interviews was analysed and the findings were presented using the "Category (theme) based data display approach." Teacher opinions regarding the process of values education were collected under three categories. The "meanings attributed to values" category refers to how teachers perceive values and the general meaning of the concept of value. The "process of values education" category explains why values need to be taught; where, when and by

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whom they should be taught; and how teachers equip children with values. The "values education and problems" category denotes the problems encountered by teachers during the process of values education.
Conclusions: The results showed that teachers: prioritised "patriotism" among the values to be taught to children; tried to explain values using other concepts such as belief, attitude, virtue, character, ethics, esthetics, or morals; believed that values education should start at home and parents should play a more active role in the process until schools take over; organized different activities in and out of the classroom to equip children with values; and encountered numerous problems in the process of values education stemming particularly from the insufficiency of the family and the environment.
Keywords: Education, instruction, class teacher, values, values education

Values are ethical rules, basic beliefs, and standards explaining the rights and wrongs that guide behavior; they are life-related attitudes that shape the decision-making process and help to make an accurate assessment of beliefs (Erdem, 2007; Halstead, 1995; Nesbitt & Henderson, 2003). They are the protection and defense of people's human values (Kucuradi, 1999). Schwartz and Bilsky (as cited in Kagitcibası & Kusdil, 2000; Kurtulan, 2007) used the characteristics agreed upon by various theorists and defined values as follows:

1. Values are beliefs but they are not completely objective ideas freed from emotions; they are intertwined with emotions.

2. Values are related to the aims of individuals and the behavior patterns used to successfully reach these aims.

3. Values are beyond specific actions and situations. For instance, the value "obedience" applies to all of our relationships regardless of place or agents.

4. Values function as standards that guide behaviors, beliefs and situations.

5. Values are prioritized according to their importance.

Taking these into consideration, a major question to ask ourselves is: "Why do we teach values?" The answer is easy. We teach them because society relies on them to continue, they give meaning to the socio-cultural elements of a society (Ryals & Foster, 2001), and they are crucial in understanding a society. They lie at the heart of culture, which ensures the unity and continuity of the society. They reflect the characteristics of the society and its subunits (organizations, groups, individuals) (Ersoy, 2006).

Regardless of their different definitions, values have a direct or indirect effect on people's social adaptation and daily performance. However, they may not be acquired solely on individual effort. Schools should therefore ensure that every individual is equipped with the values that promote appropriate moral decisions and behaviors. It is the responsibility of education in general and social studies in particular to help individuals acquire democratic values, attitudes and beliefs, and to become aware of existing values and how these affect their interaction with others (Doganay, 2006). Education should also aim for whole person education (cognitive,

social, psychological, ethical, affective education). If education only appeals to the cognitive domain, it cannot fully fulfill its function; it falls short of meeting its aim (Bacanli, 2006). Seen from this perspective, schools should aim to raise academically successful individuals and individuals with basic values (Eksi, 2003). With the help of education, it is possible to raise self-actualized and innovative individuals who are equipped with the desired value judgments. Societies with such individuals are better prepared for the future (Akbas, 2004a). Schools then have an important role in giving individuals a tendency for positive behavior, as well as in maintaining this tendency. When certain values are supported by the society, they become reinforced but when the support wanes, so do the values (Dilmac, 1999; Gungor, 1993). In order to stop values from disappearing, schools should reinforce them.

As can be concluded, there is an increasing interest in values education. The recent rise in violence in schools make researchers wonder if children are receiving proper values education (Hayes & Hagedorn, 2000). Bohlin (as cited in Hayes & Hagedorn, 2000) argues that this discussion should revolve around the concept of values education at primary and high school levels. In other words, schools should play a more prominent role in equipping students with values of civic education (honesty, respect, tolerance, responsibility, helpfulness, moral values, etc.).

The most important element in values education is the teacher. Studies suggest that teachers should act as role models reflecting values inside and outside the school, create ethical classroom environments, engage children in various tasks and use different strategies to equip them with values formally in the classroom and informally outside of the classroom (Milson, 2000; Ryan, 1986; Ryals & Foster, 2001). Naturally, individuals taught by competent values education teachers will acquire democratic citizenship skills and will contribute to society. It is, therefore, important to know teachers' opinions and experiences regarding the process of equipping children with the basic values.

This study focuses on classroom teachers' opinions about values education and attempts to describe their thoughts and experiences about the process. In line with this general aim, the following questions were studied:

1. What does the concept of "value" mean for classroom teachers?

2. What are the views of classroom teachers about "why" children need to be equipped with values?

3. What are the views of classroom teachers about which values children need?

4. What are the views of classroom teachers about "when" children need to receive values education?

5. What are the views of classroom teachers about "where" children need to receive values education?

6. What are the views of classroom teachers about "who" should give children values education?

7. "How" do classroom teachers equip children with values?

8. What are the "problems" that classroom teachers encounter during values education?

Method

This qualitative study is a phenomenological case study which allows the researcher to record participants in detail, thus yielding a rich account of the case (De Vos, Strydom, Fouche & Delport, 2002). A case study is different from other types of research in that it is based on the questions of "how" and "why," and lets the researcher conduct an in-depth study into an uncontrolled subject or event (Yildirim & Simsek, 2005). The present study aimed at "exploration," which is the discourse of interpretive paradigm, instead of "proof," the discourse of rational paradigm. As such, the study focused on obtaining the quality of participants' thoughts, experiences and the meaning they derived from these experiences (Guba & Lincoln, 1989).

The most common data collection methods used in case studies are interviews, observations, and document analysis. This study made use of the interview technique, more specifically the focus group interview (Yildirim & Simsek, 2005). Focus group interviewing is the interactive discussion of an existing or new group, in a limited time period, on a prespecified topic (Brotherson, 1994; Överlien, Aronsson & Hydén, 2005). It was developed in the early 1940s by Merton to study the war period. It was later adapted by Morgan (1992, 1996) for use in various fields such as sociology, pedagogy, education and political science. The responses given to the questions in a focus group interview are shaped as a result of the group interaction. The fact that a member's response is heard by others in the group gives them an opportunity to construct their thoughts around this response. In other words, group dynamics is the most important factor affecting the scope and depth of the responses. This characteristic of focus group interviews is important as it helps the formation of a rich data set (Yildirim & Simsek, 2005).

Participants

The study was conducted in three primary schools attended by students from the lower socio-economic background in Kirsehir during the spring term of 2007-2008. More than one sampling method was used. Convenience sampling was used initially to select the three closest primary schools to the researcher's university. Secondly, homogeneous sampling was used in order to ensure that the selected schools were at the same socio-economic level. The aim here was to define a specific sub-group by forming a small, homogeneous group. According to Patton, this is the way to collect effective information in focus group interviews (Patton, 1990). Then, criterion sampling was used to ensure that the participants were all class teachers with at least 10 years of experience in teaching different grade levels (1st, 2nd, 3rd, 4th and 5th grades). Three sessions of focus group interviews were held with a total of 20 class teachers from three different schools meeting these criteria.

Table 1

The Demographic Characteristics of Participants

School	Teacher	Gender	Grade Level Taught	Work experience
School A	1	M	2nd grade	25 years
	2	M	4th grade	28 years
	3	M	3rd grade	27 years
	4	M	5th grade	30 years
	5	F	1st grade	14 years
School B	1	F	2nd grade	17 years
	2	F	1st grade	16 years
	3	M	1st grade	20 years
	4	M	2nd grade	19 years
	5	M	4th grade	17 years
	6	M	5th grade	27 years
	7	M	3rd grade	16 years
	8	M	5th grade	20 years
	9	F	3rd grade	18 years
	10	F	4th grade	20 years
School C	1	F	5th grade	21 years
	2	F	4th grade	24 years
	3	M	2nd grade	19 years
	4	M	3rd grade	25 years
	5	M	1st grade	21 years

Procedure

Prior to the focus group interviews, the participants and school principals were informed about the aims of the study and their consent was obtained. Interviews were held in three different schools in the afternoon. The number of participants ranged between five and ten in each interview group. At the beginning of each interview, the aims of the study were announced. Participants were then told that the study had a voluntary nature and they could quit at any point. Also, they were informed that their names would be coded for confidentiality purposes and the codes would not be revealed to anyone outside of the group. They were also told that they would not be judged, tested, or evaluated as there were no right or wrong answers. This was done to increase their sense of trust and give them an opportunity to express themselves freely. Before the interviews, the participants were asked warm-up questions such as: "What is your name?", "How many years have you been

teaching?", and "Which grade level are you teaching?" This too was done to create a relaxed atmosphere. These steps were repeated in all three sessions, each of which lasted between 90 and 130 minutes.

Interview Form and Role of the Moderator

The study used a "semi-structured interview form" to collect data. To prepare the form, the literature was reviewed and pilot questions were written. Expert opinion was then taken to revise the questions. Following a pilot application, the questions that did not best serve the purposes of the study were removed and the form was finalized with eight questions that worked well. Considering the risk of misunderstanding, "alternative questions" were included in the form. "Probing questions" were also included to delve further into the responses given to the original questions, help the decision-making process of participants, and be able to collect more detailed data. The study was conducted with three assistant researchers in addition to the main one. The first assistant took notes during the interviews and completed analysis forms, the second assistant took care of participants' needs, and the third assistant handled the audio and video-recording. The main researcher's responsibilities, on the other hand, were to announce the aim of the study at the beginning of the interviews, handle any arguments that might interfere with the study, ensure that the interviews were conducted in a relaxed atmosphere by not diverting from the topic, encourage participants to enter into a meaningful dialogue with each other, and continue on to a new question when appropriate.

Ethical Considerations

The interviews were held in line with the knowledge obtained from the literature. The study was not guided by the researchers' personal judgments. When the questions were prepared, care was taken to write questions which would facilitate discussion. The participants were offered an environment where they could freely share their opinions. The names of the participants and their schools were coded in the forms. Additionally,

- Participants were allowed the freedom to quit the study at any time during the sessions.
- The opinions and behaviors of the participants were not abused during the interviews.
- Participants were informed in detail about the study.
- Distractions during the interviews were minimized.
- No outsiders were allowed to sit in on the focus group interviews and the data obtained was not passed on to school personnel. All responses remained confidential and were coded for future studies and presentations.

Recordings and Transcriptions

Focus group interviews were recorded using audio and video-recording tools and analysis forms. These were transcribed and, thereafter, the selected parts were further detailed.

Data Analysis

Content analysis and NVivo2.0 was used for data analysis. The data was initially computed by using MS Office. The texts were read several times and codes were chosen. The concepts used in the coding were obtained from the literature. The continuous comparison method, which aims to help the researcher to clearly and briefly state bulky data (Kvale, 1996), was used in the analyses. Related codes were brought together to find the commonalities between them, and the draft themes (categories) were identified. These themes were based on interview questions. In the following stage, the qualitative analysis program NVivo2.0 was used. The aim was to re-analyze the raw data and thus confirm the categories drawn up by the researcher. Following this, the codes under the themes were interrelated, explained and interpreted (Maykut & Morehouse, 1994). Theoretical explanations and related research findings were used in interpreting the data, and both corroborating and conflicting results were given with their reasons. Results from the interview analyses were presented in conjunction with Miles and Huberman's (1994) "category (theme) based data display approach."

Trusthworthiness

Readjustments were made by supporting the interpretations here with those of other researchers. Additionally, results were shared with the participants to eliminate researcher bias and thus increase the trustworthiness of the study. Glesne and Peshkin (1992) have claimed that this will confirm researchers' interpretations and help develop different perspectives.

The content analysis was supported also by the computer-assisted qualitative data analysis program NVivo2.0. Analysis forms were used. More specifically, standardized copy forms were used to reveal the most complex parts of interviews. These forms typically show the pauses during the interview, the emphasized parts and intervals (as cited in Roberts & Priest, 2006; Shenton, 2004). The frequencies of words and sentences used in the coding are given in numerical form in the findings section.

The trustworthiness of the study was maximized by submitting the raw data, codes, themes, written copies, audio, and video-recordings of the study to an independent researcher to confirm that the results were based on data rather than personal opinions. LeCompte and Goetz (1982) and Mason (1996) state that such peer debriefing is a trusted way of confirming the accuracy and trustworthiness of qualitative research.

To support the interpretations of the researcher and reflect participants' opinions, sample quotations from transcriptions are given below. The abbreviations used in the study are: A, B, C for schools, M for male teachers and F for females. Each teacher was also identified by a number. To illustrate, (AM1): A: School, M: Male teacher, 1: first teacher, (BF3): B: School, F: Female teacher, 3: third teacher.

The following figure shows the stages followed in the analysis of qualitative data.

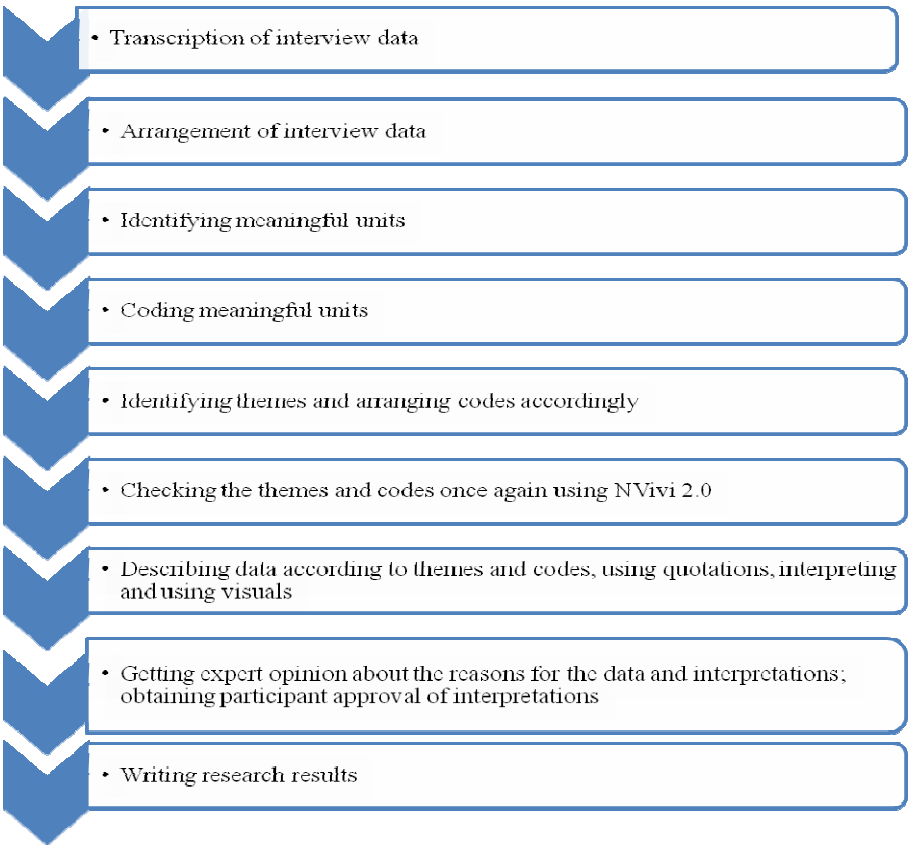

Figure 1. Stages followed in the analysis of data regarding teachers' opinions on values education.

Findings

This part includes findings from the analyses of focus group interview data. The findings were presented in conjunction with Miles and Huberman's (1994) "category (theme) based data display approach."

Meanings Attributed to Values

In order to understand teacher conceptions of values, they were asked the meaning of the concept of "value." The most common responses were "rules that define acceptable behavior" and "elements that ensure the continuity of a society." While the former was stated by five class teachers, the latter was stated by six. Apart from these, the teachers associated values with basic beliefs (three teachers), the rights and wrongs guiding individuals (one teacher), suggestions for right behavior (two teachers), truth that changes from person to person (two teachers), ideal life

standards (one teacher), moral values thought appropriate by the society (three teachers), distinguishing characteristics of societies (two teachers), a must for human life (one teacher), socialization period (one teacher) and attitudes toward life (three teachers). Samples of teacher responses are as follows:

"Maximizing success, working better and more consciously. (AM3)"

"Things that form a nation, that distinguish societies. (BM5)"

"National and moral rules agreed by a society. (BF10)"

"A sample of social life that ensures a more comfortable life. (CF2)"

"Things I like and have adopted; things that reflect me. (AM1)"

Values Education Process

The teachers stated that the values children should acquire were patriotism (eleven teachers), working hard (three teachers), giving importance to family (two teachers), sensitivity (two teachers), respect (four teachers), love (five teachers), honesty (two teachers), freedom (one teacher), tolerance (one teacher), helpfulness (one teacher), solidarity (one teacher), giving importance to health (one teacher), and conducting scientific studies (one teacher). Below are some sample teacher statements about the values that children should acquire:

"They should learn to value human beings, live a humanistic life, value their family and society. (AM2)"

"Our country has some values. Teachers need to equip children with a love of their flag and country. (CM4)"

"I'd like to raise individuals who have national values and who love their country, nation, and flag. (BM8)"

"I'd like to raise individuals who respect themselves, their elders and friends, and who are loyal to national and moral values. (CM5)"

"We need to equip children with values that will make them self-confident; loyal to national, moral and ethical values; responsible for the flag, country and nation; sociable; helpful; willing to solve problems. (BF1)"

While the teachers stated that there is a need to raise children who have an awareness of patriotism (seven teachers), are loyal (one teacher), value their families (four teachers), are responsible (three teachers), make an effort for the continuity of the society (nine teachers), work towards being peaceful and happy (one teacher), accept and respect diversity (seven teachers), are thoughtful of others (one teacher), value cleanliness and health (three teachers) and seek peaceful solutions in conflicts (two teachers), two teachers claimed that values need to be taught to allow the socialization of children, four said to create a sensitive society, and one said to ease the children's lives. The concepts of country and society emerge from teacher

responses as most important items. Below are some responses to the question of why children need to be equipped with values:

"We all live in this country, we should equip children with values so that they love their country, respect ancient Turkish traditions, and care for their families. (BM3)"

"So that children can interact with the society, adapt to it, become one with it and live without problems. (CF1)"

"We should take responsibility for these values so that we are helpful to the society, elevate the nation to the level of modern civilizations as Atatürk said, establish positive social relationships with people of different countries, and ensure a bright future for the country. (BM8)"

"Values need to be taught so that we can become a good society. (AM2)"

"Children who have learned values do not conflict with their families and the environment. They feel ownership of their nation and have self-confidence. (BF9)"

"Firstly, it is necessary for the mental health of the society. Secondly, it is necessary for the protection of the family. Also, national unity and oneness are necessary for the future of this country because these are the values that we thrive on. (BM4)"

The participating teachers voiced different opinions about when, where, and by whom the children need to be taught values. Many (fifteen teachers) argued that values education should start at home and families should play an effective role in the process until school, whereas five teachers said that the family would not be able to offer proper values education and, therefore, schools should teach them. Below are sample quotations from teachers:

"There are different values to be taught in each age group. Children who come to the 1st grade need to be given the values of cleanliness and good health. (AM3)"

"From the very first days at school, children need to be taught about the values of their society. (BM6)"

"Values education should start in the family and continue at school. (CF1)"

"As an infant is mostly at home, values education should start at home; once the child starts school, teachers should take over values education. (BM5)"

"The process actually starts at birth because the child, like a camera, reflects what s/he sees. If parents have wrong attitudes, the child will only imitate that. Later on, values education continues at school. (BF10)"

"Basic values need to be taught at home by family members and then schools ought to take over. (CM3)"

"Values are learned at home first, followed by the environment and school. (AM4)"

The teachers stated that they tried to transfer values to children by modeling proper behavior in and outside the school (two teachers), establishing democratic classroom environments (two teachers), using stories including different values in the classroom (eleven teachers), making use of the texts in course books (four

teachers), explaining right and wrong by using situations and drama (eleven teachers), organizing group work (one teacher), direct lecturing (two teachers) and questioning classroom events together with children in order to make values more understandable (five teachers). As can be seen, teachers said they used different techniques to equip children with values. Sample teacher opinions about how they teach values to students are as follows:

"We use imitation and drama in class. (CM3)"

"We focus on the heroes mentioned in the reading texts. We associate the positive and negative aspects of these heroes with the children's immediate environment and give examples. (BM8)"

"We use examples from the past. For instance, we discuss the heroes of Çanakkale War to teach children love of one's country. (AM2)"

"We use sample cases, drama and real events. (BF9)"

"My most common activities are "show and do" and games. If there is a negative behavior, we discuss it and ways to improve it, or I use historical heroes that children are familiar with to teach values. (BM7)"

Values Education and Problems Encountered

The teachers summarized the problems they encountered in values education as follows: deficient or insufficient family education (seven teachers), wrong values education by the family (eight teachers), insufficiency of the teacher (one teacher), lack of awareness in the society about values education (two teachers), wrong value guidance by the media and their failure to educate (four teachers), insufficient texts in values education books (one teacher), lack of communication between the school and families (six teachers), and the resulting value conflicts seen in children. On the other hand, three teachers said they did not face any problems. Sample teacher opinions about problems during values education are as follows:

"Here, many parents have a low level of education. As they misguide their children, we have to tackle difficulties trying to fix their mistakes. (BF1)"

"We teach values to children at school but when they go home, they cannot observe these values in their home environment. (BM5)"

"Among the reasons why the values we teach cannot become student behavior is the uneducated family and social environment. (AF5)"

"Families may sometimes teach wrong values. Subsequently, conflicts arise between the basic values of the society and those taught by the family. (CM4)"

"There may be differences between the values given at home and school. Therefore, we encounter difficulties in the process of values education. (AM3)"

"The many differences between the values we try to give the students and the ones they see on TV lead to value conflicts. (BM3)"

Discussion

The aim of the study was to examine and reveal classroom teachers' opinions and experiences regarding values education; therefore, focus group interviewing was selected as the data collection technique. An important characteristic of focus group interviews is that the researcher who conducts the interview tries to facilitate group discussion. Although the first interview in this study yielded relatively poor information due to the researcher's lack of experience, the subsequent interviews yielded the desired result. The study also attempted to bring to light the facts below the surface, rather than to reach generalizations.

In order to reach accurate and objective findings, the data obtained throughout the study was described step by step. In order to enhance the accuracy and objectivity of the findings, the data was shared with another field expert and re-analyzed with the qualitative analysis program NVivo2.0. Also, sample interview quotations were given.

Most participating teachers were seen to perceive values as rules identifying codes of behavior and elements ensuring the continuity of the society. They attributed to values meanings such as basic beliefs, good and bad things that guide people, suggestions, facts that change from person to person, moral values required by the society, a must of human life, distinguishing characteristics of societies, and attitudes regarding socialization and life. Does a value consist of only a belief or a subjective judgment, or does it represent the objective truth? The definition of the concept of value has become an issue of debate among sociologists. The examination of values has opted for descriptive definitions rather than absolute rational definitions (Ozensel, 2003). According to Schwartz and Bilsky (1990), values are criteria that people use to evaluate events and people including themselves and to choose and justify their actions. Theodorson and Theodorson (1979) define values as abstract and generalized behavior principles offering a basic standard in judging actions and aims, and formed by the strong emotional ties of the members of a group.

Socrates explains values with the concept of virtue. Virtue, according to Socrates, is equal to knowledge in one way. He also thinks that happiness can only be reached through a virtuous life; in other words, the highest and most improtant good for the spirit is moral virtue in a general sense. He claims that virtue is not inherent but learned, and he encourages people to use his Socratic method (dialectic) to question ideas before adopting them so as to reach the truth (Day, 1994; Guthrie, 1989). Plato, on the other hand, takes virtue as the good side of spirit to control the bad side of reason, the body, bodily wishes and passions, and thus the most superior good reaching for the greatest idea. Virtue has been defined by Aristotle as the resource which bears good effectiveness and virtuous behavior as the way to happiness (as cited in Eren, 2006). As stated by Doganay (2006), values can be explained with the concepts of belief, attitude, virtue, ethics, morals, and character. The differences mentioned in the definitions can be seen in participating teachers' perceptions of values as well.

According to the teachers, values to be taught to children included patriotism, working hard, caring for the family, sensitivity, respect, love, helpfulness, solidarity, caring about health, and conducting scientific studies. Teachers thus mentioned almost all of the basic values covered in the primary school curricula. It is worth mentioning that, among these, the most commonly emphasized value was "patriotism."

Conflicts may arise as to which value needs to be given priority in a given society, at a given time and under given circumstances. A person may find a value important and worthy of prioritizing in one social situation, but not in others. Also, two contemporary societies may have different value judgments due to the cultural and socio-economic differences between them, showing the cultural relativity of values (Ozensel, 2003). Thus, the emphasis placed on the value "patriotism" by the teachers may have been due to the history of the Turkish society, its current circumstances, and the various internal and external threats in the region.

The teachers stated that values should be taught to raise individuals who have an awareness of patriotism, are loyal, value the family, are aware of their responsibilities, make an effort for the continuity of their society, accept and respect diversity, think about others, value cleanliness and good health, and seek peaceful solutions to conflicts. They also mentioned that values are necessary to help the socialization of children, create a sensitive society, and ease children's lives. As mentioned by Ozensel (2003), values are the general criterion for conscious and purposeful behavior; they form the basis of culture; they are a part of one's character; they are used as a tool to judge the social value of people; they guide people's selection of and fulfillment of social roles; and they become a tool for social control and pressure.

As a result, values reveal the ideal ways of thinking and behaving in a society and set the boundaries of socially acceptable behavior. Bennett (as cited in Milson & Mehlig, 2002) writes that values are needed to raise children with a solid character. Similarly, Eyre and Eyre (as cited in Doganay, 2006) state the need to possess a sound set of values as a source of happiness. The teachers here also emphasized the need to equip children with values to raise individuals who work for their own and other people's happiness, and are independent but have a feeling of responsibility.

While the majority of teachers claimed that values needed to be taught in the family, others favored the teaching of values at school. Until age five, most children spend the majority of their time with their families. Any education that the family gives is, therefore, important in the shaping of their character. It would then be correct to assume that the proper place to start values education is at home by the family. Values education given to children during early childhood will contribute to the future development of citizenship skills. The school will take over the role of values educator afterwards (Dilmac & Eksi, 2007).

Kucuradi (2007) states that, in particular, values and human rights education should be offered directly or indirectly at all stages of education and that educators

need to develop their programs according to the level they will be teaching, in other words, according to the objectives included in each stage.

The teachers here said that they taught values to children by modeling, using true stories including different values, using stuations to explain right from wrong, and continuously questioning classroom events together with the students. It is then evident that the teachers used various techniques to teach values.

Kucuradi (2007) also writes that when offering values and human rights education to students, sample stories from history (those showing ethical successes) can be used to make students aware of the human identity, and that even Socratic questioning can be used as long as it is used at the students' level.

Previous studies also emphasize the need for teachers to become models inside and outside school, make an effort to create ethical classroom environments, and use different strategies to prepare the right environment for children to gain the basic values formally in the classroom and informally outside (Milson, 2000; Ryan, 1986). Naturally, teacher competence comes to the forefront here. Milson and Mehlig (2002) concluded in their study that primary teachers felt confident about modeling, disussing what is right and wrong, and using strategies to bring about positive changes in the students' character.

The teachers here summarized the problems they encountered in values education by stating that the family, environment, and media could not adequately guide students. Another striking result was that a teacher complained that values were not reflected properly in course books. Every society has common basic values to offer to its members. Despite this, it is not impossible to find conflicting values between the basic institutions of the society. If the values emphasized at school do not match the ones acquired at home and from the media, serious problems may arise between these institutions and children may experience value conflicts.

Naturally, teachers have an important role here. If basic values are ignored or misrepresented elsewhere, teachers will have to correct the deficient or wrong teaching of children's natural sources of education (the family, neighbors, the environment). While doing so, the teacher may choose to give examples, approve or disapprove of students' behaviors, or explain the reasons why a certain behavior is wrong (Akbas, 2004b).

In conclusion, values education training for teachers, families and the media may alleviate the lack of cooperation between them, increase their competency in values education, and minimize problems coming from any of these sources during the process. In this way, the Turkish education system may take one step closer to raising constructive, creative, and efficient individuals with physical, mental, emotional and ethical balance and health, with independent and scientific thought, with respect for human rights, with an attachment to an importance of personality and initiative, and with a responsibility towards the society.

References

Akbas O. (2004a). *Turk milli egitim sisteminin duyussal amaçlarinin ilkogretim ikinci kademedeki gerceklesme derecesinin degerlendirilmesi* [*An evaluation study on the materialization level of the affective goals (values) of the Turkish education system on primary 2nd grade pupils*]. Unpublished doctoral dissertation, University of Gazi, Ankara.

Akbas, O. (2004b). *Turk milli egitim sisteminin duyussal amaclarinin (degerlerinin) ilkogretim 8. sinif ogrencilerinde gerceklesme derecesinin degerlendirilmesi* [*An evaluation study on the materialization level of the affective goals (values) of the Turkish education system on primary 8th grade pupils*]. Paper presented at the International Values and Education Symposium, Istanbul.

Bacanli, H. (2006). *Duyussal davranis egitimi* [*Affective behavior education*]. Ankara: Nobel Publications.

Day, J.M. (1994). *Plato's meno in focus*. New York: Routledge.

De Vos, A.S., Strydom, H., Fouche, C.B., & Delport, C.S.L. (2002). *Research at grass roots. For the social sciences and human professions.* Pretoria: Van Schaik Publishers.

Dilmac, B. (1999). *Ilkogretim ogrencilerine insani degerler egitimi verilmesi ve ahlaki olgunluk olcegi egitimin sinanmasi* [*Human values education for primary pupils and testing moral maturity scale*]. Unpublished master's thesis, University of Marmara, Istanbul.

Dilmac, B., & Eksi, H. (2007). Degerler egitiminde temel tartismalar ve temel yaklasimlar [Basic discussions and approaches in values education]. *Ilkogretmen Egitimci Dergisi*, 14, 21-29.

Doganay, A. (2006). Degerler Egitimi [Values Education]. In C. Öztürk (Eds.), *Hayat bilgisi ve sosyal bilgiler ogretimi* [*Life sciences and social studies education*] (pp. 255-286). Ankara: Pegem A Publications.

Eksi, H. (2003). Character educations programs: An approach for acquiring core human values. *Journal of Values Education*, 1, 79-96.

Erdem, A.R. (2007). An important factor of culture of education faculties: Values (A case study of the education faculty of PALI). *Eurasion Journal of Educational Research*, 26, 95-108.

Eren, S. (2006). *Platon ve Aristoteles'in etik anlayislarinin karsilastirilmasi* [*A comparison of Plato and Aristotle's understanding of ethics*]. Unpublished master's thesis, University of Gazi, Ankara.

Ersoy, B. (2006). *Toplumsal degerler ve calisanlarin is doyumu arasindaki iliski: Ampirik bir uygulama* [*The relationship between social values and work satisfaction: An empirical study*]. Unpublished master's thesis, University of Dumlupinar, Kutahya.

Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers an introduction*. London: Longman Group Ltd.

Guba, E.G., & Lincoln, Y.S. (1989). *Fourth generation evaluation*. Newbury, Park, CA: Sage Publication, Inc.

Gungor, E. (1993). *Degerler psikolojisi uzerine arastirmalar* [*Studies on values psychology*]. Istanbul: Otuken Publications.

Guthrie, W.K.C. (1989). *A history of Greek philosopy*. Cambridge: Cambridge University Press.

Halstead, M. (1996) Values and values education in schools. In M. Halstead & M. Taylor (Eds.), *Values in education, education in values*. (pp. 3–14). London: Falmer.

Hayes, B., & Hagedorn, W. (2000). A case for character education. *Journal of Humanistic Counseling, Education & Development*, 2,3. Retrieved Wednesday, April 04, 2007 from the Academic Search Premier database.

Kagitcibasi, C., & Kusdil, E. (2000). Turk ogretmenlerin deger yonelimleri [Value orientations of Turkish teachers]. *Turk Psikoloji Dergisi*, 15, 56-76.

Kucuradi, I. (1999). *Nietzsche ve insan* [*Nietzsche and human beings*]. Ankara: Turk Felsefe Kurumu.

Kucuradi, I. (2007). *Insan haklari kavramlari ve sorunlari* [*Concepts and issues of human rights*]. Ankara: Turk Felsefe Kurumu.

Kurtulan, I. (2007). *Ozel egitim ogretmenlerinin mesleki etik degerler acisindan kendilerini degerlendirmeleri* [*Self evaluations of special education teachers regarding professional ethics values*]. Unpublished master's thesis, University of Marmara, Istanbul.

Kvale, S. (1996). *Interviews: An introduction qualitative research interviewing*. London: Sage Publication Ltd.

Lecompte, M.D., & Goetz J.D (1982). Problems of reliability and validity in ethnographic research. *Review & Educational Research*. 52, 31-60.

Mason, J. (1996). *Qualitative researching*. Thousand Oaks, CA: Sage.

Maykut, P., & Morehouse, R. (1994). *Beginning qualitative research: A philosophic and practical guid*. London: The Falmer Press.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. (2nd ed.) Thousand Oaks and London: Sage Publication.

Milson, A. J. (2000). Social studies teacher educators' perceptions of character education. *Theory and Research in Social Education, 28*, 144–169.

Milson, A. J., & Eksi, H. (2003). Toward a measure of teachers' sense of efficacy for character education: The character education efficacy belief instrument and its Turkish adaptation study. *Journal of Values Education,* 1, 99-130.

Milson, A.J., & Mehlig, L.M. (2002). Elementary school teachers' sense of efficacy for character education. *The Journal of Educational Research*, 96. 47-53.

Morgan, D. L. (1996). Focus groups. *Annual Review of Sociology*, 22, 129–152.

Morgan, D. L., & Krueger, R. A. (1993). When to use focus groups and why. In D. L. Morgan (Ed.), *Successful focus groups: Advancing the state of the art.* Newbury Park, CA: Sage.

Nesbitt, E., & Henderson, E. (2003). Religious organisations in the UK and values education programmes for schools [1]. *Journal of Beliefs & Values*, 24, 75-88.

Överlien, C., Aronsson, K., & Hydén, M. (2005). The focus group interview as an in depth method? Young women talking about sexuality. *Int. J. Social Research Methodology*, 8, 331-334.

Ozensel, E. (2003). Sociological relevance of values. *Journal of Values Education*, 1, 217-239.

Patton, M.Q. (1990). Qualitative Evaluation and Research Methods. London: Sage Publicatios.

Roberts, P., & Priest, H. (2006). Reliability and validity in research. *Nursing Standard*, 20, 41-45.

Ryals, K., & Foster, D. (2001). Classroom climate and value teaching. *Education*, 95, 354-359.

Ryan, K. A. (1986). The new moral education. *Phi Delta Kappan, 68*, 228–233.

Schwartz, S.H., & Bilsky, W. (1990). Towards a universial psychological structure of human values. *Journal of personality and Social Psychology*, 53, 550-562.

Shenton, A. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22, 63-75.

Theodorsan, G.A. & Theodarsan, A. (1979). *A modern dictionary of sociology*. New York: Barnes & Noble.

Yildirim, A., & Simsek, H. (2005). *Sosyal bilimlerde nitel arastirma yontemleri* [*Qualitative research methods in social sciences*]. Ankara: Seckin Publications.

Türk Sınıf Öğretmenlerinin Değerler Eğitimine İlişkin Deneyimleri: Fenomonolojik Bir Yaklaşım

(Özet)

*Problem Durumu:*Değer eğitimi konusuna duyulan ilgi ve ihtiyaç gittikçe artmaktadır. Eğitim danışmanları ve eğitimciler bugünün çocuklarını topluma daha yararlı hale getirmek için büyük bir uğraş içine girmişlerdir. Özellikle son zamanlarda okullarda yaşanan şiddet olayları uzmanların dikkatinin bu noktaya yönlenmesine neden olmuştur. Yaşanan bu problemler araştırmacıların aklına doğrudan şu soruyu getirmektedir:

"Çocuklara değer eğitimi gerektiği gibi verilmekte midir?". Bütün bu tartışmaları ilköğretim ve lise düzeyindeki değer eğitimi kavramıyla ilişkilendirilmesi gerektiği savunulmaktadır. Yani topluma iyi vatandaş yetiştirme üzerine odaklanan değerlerin (dürüstlük, saygı, hoşgörü, sorumluluk, yardımseverlik, ahlaki değerler vb.) kazandırılmasında okulların daha etkili rol oynaması gerektiği belirtilmektedir.

Eğitim sürecinde çocuklara bu değerleri kazandıracak okullardaki en önemli unsurlardan biri olarak da öğretmenler gösterilebilir. Yapılan araştırmalar da öğretmenlerin değerlerin öğretimindeki etkin rolünü önemle ortaya koymaktadır. Öğretmenlerin, okul ortamında ve dışında değerleri doğru yansıtan örnek model olmaları, ahlaki sınıf ortamları oluşturmaları, değişik stratejiler kullanarak formal olarak sınıf içinde, informal olarak da sınıf dışında değerlerin kazandırılmasına ilişkin çocuklara çeşitli uygulamalar yaptırmaları gerektiği önemle vurgulanmaktadır. Doğal olarak değer eğitimi konusunda yeterli donanıma sahip öğretmenlerin yetiştirecekleri bireyler de demokratik yurttaşlık becerilerini kazanarak, içinde bulundukları topluma gerekli katkıları sağlayacaklardır. Dolayısıyla öğretmenlerin çocuklara temel değerlerin kazandırılması sürecine ilişkin görüş ve deneyimleri önem arz emektedir.

Araştırmanın Amacı: Yapılan bu araştırma ile toplumun sahip olduğu temel değerlerin, kendini ayakta tutan bireylere aktarılmasını sağlayan en önemli unsurlardan biri olan sınıf öğretmenlerinin değerler eğitimi ilişkin görüşleri alınarak, değerlerin kazandırılması sürecine yönelik düşünceleri ve deneyimleri betimlenmeye çalışılmıştır.

Araştırmanın Yöntemi: Araştırmanın ifade edilen problemi ve genel amacı doğrultusunda bu çalışmada nitel araştırma paradigması kullanılmıştır. Bu araştırma, ilköğretimde görev yapan sınıf öğretmenlerinin değerler eğitimine ilişkin görüş ve deneyimlerini belirlemeye yönelik bir çalışma olduğundan fenomenolojik bir durum çalışmasıdır. Bu çalışma 2007-2008 öğretim yılının ikinci döneminde Kırşehir ili merkeze bağlı orta sosyo-ekonomik düzeydeki üç devlet ilköğretim okulunda yürütülmüştür. Yürütülen araştırmada birden fazla örneklem metodu kullanılmıştır. Öncelikle kolay ulaşılabilir örneklem metodundan faydalanılmış ve görev yaptığım üniversiteye en yakın üç okulda çalışılmıştır. İkinci olarak benzeşik örnekleme metodu kullanılmış, seçilen okulların sosyo-ekonomik açıdan orta düzeyde olmasına dikkat edilmiştir. Buradaki amaç, küçük, benzeşik, bir örneklem oluşturma yoluyla belirgin bir alt-grubu tanımlamaktır. Aynı zamanda ölçüt örnekleme tekniği de araştırmaya dahil edilmiş, katılımcı adaylarının en az 10 yıllık sınıf öğretmenliği tecrübesi ve farklı sınıf düzeylerini (1., 2., 3., 4. ve 5. sınıflar) okutan sınıf öğretmenlerinin olmasına dikkat edilmiştir. Bu koşulları sağlayan toplam

20 sınıf öğretmeni ile toplam üç oturum halinde odak grup görüşmeler gerçekleştirilmiştir. Araştırmanın verileri odak grup görüşmeleri yoluyla toplanmıştır. Odak grup görüşmelerinde literatüre dayalı hazırlanmış yarı yapılandırılmış görüşme formu kullanılmıştır. Verilerin analizinde içerik analizi yaklaşımından ve NVivo2.0 programından yararlanılmıştır.

*Bulgular:*Bu bölümde odak grup görüşme verilerinin analizinden elde edilen bulgulara yer verilmiştir. Görüşmelerin analizinden elde edilen bulgular, "kategorilere (temalara) göre veri gösterimi yaklaşımı" izlenerek sunulmuştur. Öğretmenlerin değerler eğitimi sürecine ilişkin görüşleri üç kategori altında toplanmıştır. Bunlar, değerlere yüklenen anlamlar kategorisi; öğretmenlerin değerleri nasıl algıladıkları ve değer kavramının kendileri için ne ifade ettiğidir. Değerler eğitimi süreci kategorisi; öğretmenlerin değerlerin niçin öğretilmesi gerektiği, değerlerin nerede, ne zaman ve kimler tarafından öğretilmesinin uygun olduğu, öğretmenlerin değerleri çocuklara nasıl kazandırdığını açıklamaktadır. Değerler eğitimi ve yaşanan problemler kategorisi ise öğretmenlerin değerler eğitimi sürecinde yaşadıkları problemleri ifade etmektedir.

*Sonuçlar:*Bu çalışmanın amacı sınıf öğretmenlerinin değerler eğitimine ilişkin görüş ve deneyimlerini derinlemesine incelemek ve ortaya koymak olduğundan, araştırmada uygun veri toplama tekniği olarak odak grup görüşmeleri kullanılmıştır. Odak grup görüşmelerinin en önemli özelliklerinden biri de görüşmeyi gerçekleştiren araştırmacının grup üyeleri arasındaki tartışma ortamını kolaylaştırmaya çalışmasıdır. Bu araştırmada ilk odak grup görüşmesi araştırmacının deneyimsizliğinden dolayı araştırmanın amacı hakkında daha az bilgi vermesine rağmen diğer odak grup görüşmeleri istenilen amaca ulaşmıştır. Odak grup görüşmelerinin amacı elde edilen bulgular doğrultusunda genellemelere ulaşmak değil araştırmanın amacı doğrultusunda gizli kalmış çok önemli gerçekleri ortaya koymaktır. Bu çalışmada da bu ilkeye bağlı kalınmaya çalışılmıştır.

Öğretmenlerin çocuklara kazandırılması gereken temel değerler arasında "vatanseverlik" değerini ön plana çıkardıkları, değerleri; inanç, tutum, erdemli olma, karakter, etik, estetik, ahlak gibi farklı kavramlarla açıklamaya çalıştıkları, değerler eğitiminin ailede başlaması ve bu süreçte ailenin daha etkin bir rol üstlenmesi daha sonra çocukların okula başlaması ile bu görevi okulun üstlenmesi gerektiğini ifade ettikleri, değerleri çocuklara kazandırmak için hem sınıf içinde hem de sınıf dışında farklı etkinlikler düzenledikleri ve son olarak da değerler eğitimi sürecinde özellikle ailenin ve çevrenin yetersizliğinden kaynaklanan birçok problemlerle karşılaştıkları şeklinde görüş belirttikleri sonuçlarına ulaşılmıştır. Özellikle bundan sonraki yapılacak çalışmalarda aile, çocuk, çevre vb. unsurlar da araştırma sürecine dahil edilerek değerler eğitimi

konusunda daha net bilgilere ulaşılabilir. Ayrıca, değerler eğitimi sürecinde öğretmenlere, ailelere ve medyaya sağlanacak gerekli eğitimlerle aralarındaki işbirliği eksikliği giderilerek, değerler eğitimi sürecine ilişkin yeterlilikleri artırılabilir ve bu süreçte öğretmenden, aileden ve medyadan kaynaklanabilecek sorunlar asgari seviyeye indirilebilir. Böylelikle Türk Milli Eğitiminin beden, zihin, ahlak ruh ve duygu bakımlarından dengeli ve sağlıklı şekilde gelişmiş bir kişiliğe ve karaktere, hür ve bilimsel düşünme gücüne, geniş bir dünya görüşüne sahip, insan haklarına saygılı, kişilik ve teşebbüse değer veren, topluma karşı sorumluluk duyan; yapıcı, yaratıcı ve verimli kişiler yetiştirme ilkesine bir adım daha yaklaşılacağı düşünülmektedir.

Anahtar Sözcükler: Eğitim-öğretim, sınıf öğretmeni, değeler, değerler eğitimi

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13	☐	The article is preceded by English Structured Abstract of not more than 400 words and not less than 300 using five required headings: *Problem Statement, Purpose of Study, Methods, Findings and Results, and Conclusions and Recommendations*. (These headings may need some adaptation in the case of discussion papers: *Background, Purpose of Study, Sources of Evidence, Main Argument, and Conclusions*). More information available from (http://www.tandf.co.uk/journals/authors/rereabstracts.asp) Yapılandırılmış İngilizce öz 300-400 sözcük uzunluğunda olup, aday makalenin başında yer almakta ve *Problem Durumu, Araştırmanın Amacı, Araştırmanın Yöntemi, Araştırmanın Bulguları, Araştırmanın Sonuçları ve Önerileri* başlıklarını içermektedir. Bu başlıklar tartışma yazıları için: *Çalışmanın Temeli,*

		Çalışmanın Amacı, Kanıt Kaynakları, Ana Tartışma ve Sonuçlar şeklinde olabilir. Daha fazla bilgi için http://www.tandf.co.uk/journals/authors/rereabstracts.asp adresine başvurunuz.
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Düzeltme Notu / Correction Note

EJER'in 21. sayısında yayımlanan "Bilgi ve İletişim Teknolojileri ile Bütünleştirilmiş Fen Bilgisi Öğrenme Ortamı Üzerine Bir Araştırma" başlıklı çalışma Teoman Kesercioglu ve Bülent Cavaş tarafından yürütülmüş ve Dokuz Eylül Üniversitesi Bilimsel Araştırma Projeleri Şubesi tarafından desteklenmiştir.

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