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THE COMMON METHODS USED IN BIODIVERSITY EDUCATION BY PRIMARY SCHOOL TEACHERS (ÇANAKKALE, TURKEY)

(SINIF ÖĞRETMENLERİNİN BİYOLOJİK ÇEŞİTLİLİK KONULARININ ÖĞRETİMİNDE SIKLIKLA KULLANDIKLARI YÖNTEMLER (ÇANAKKALE-TÜRKİYE)

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ABSTRACT

Biodiversity, which is the variety of all life on the world, is one of the environmental issues; increasing human impacts affect the biodiversity negatively. Environmental education is an important factor for eliminating the negative impacts of human. In order to improve more effective techniques in biodiversity education, initially, present conditions should be verified in primary schools. The purpose of this study is to determine common implemented methods for teaching "biodiversity" concept. A questionnaire was implemented to 88 primary school teachers (4^{th} and 5^{th} grade) and the results indicate that the most common implanted methods are "lecturing, question-answer, problem-solving'" while teaching the science-technology and biodiversity concepts.

Key Words: environment, biodiversity education, primary school, Turkey, Çanakkale

ÖZ

Dünya üzerindeki tüm canlıların çeşitliliğini ifade eden biyolojik çeşitlilik, çevre konularından birisi olup, artan insan baskısından olumsuz yönde etkilenmektedir. Çevre eğitimi, insan baskısının doğal yaşam üzerine olumsuz etkilerini azaltmada ve sürdürülebilir bir geleceğin sağlanmasında önemli bir rol oynar. Biyoçeşitlilik konularının ilköğretim öğrencilerine öğretilmesinde etkili teknikler geliştirmeden önce, mevcut durumu ortaya koymak önemlidir. Bu çalışmanın amacı, "biyolojik çeşitlilik" kavramının öğretiminde yaygın sıklıkla kullanılan yöntemleri belirlemektir. Seksensekiz sınıf öğretmenine (4. ve 5. sınıf) anket çalışması uygulanmış; biyolojik çeşitlilik ve fen- teknoloji konularına ait diğer konuların öğretiminde, "düz anlatım, soru-cevap, problem çözme" yönteminin sıklıkla kullanıldığı belirlenmiştir.

Anahtar Sözcükler: çevre, biyolojik çeşitlilik eğitimi, ilköğretim, Türkiye, Çanakkale.

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INTRODUCTION

The concept of 'nature' is a matter that has been discussed since the Ancient Greek. In the Ancient Greek, Platon suggested the basics of the idea of the 'organic world' (Arslan, 2009), then in the Middle Age that idea became popular due to the effects of Christianity and Islam (Görmez, 2007). The understanding of 'Modernity', appeared with the Scientific Revolutions, eliminated the idea of 'organic world', and brought an order which is more individual, aiming at domination of nature instead of recycling and being a part of it. Moreover, Giddens (2005) stated that one of the theoretical dimensions forming the modernity is 'recycling the nature (industrialism) and the development of the artificial environment.

It is thought that the understanding of 'domination to nature' brings together the rashly usage of natural sources. Biodiversity is one of the most damaged concepts because of very selfish usage of resources. Çepel (2008) defined the biodiversity like as 'Biodiversity is the life worlds consisting of living species having genetic differences, and various functions, constituted by living things community that are rich with respect to their numbers and species, and dispersed to various ecosystems.' In short, biodiversity defines the richness of living things in a specific field with respect to the variety. Because of its geographical location, Turkey is also one of the richest countries among European and Middle Eastern countries in terms of biodiversity (Çepel, 2008). Because of its geographical location, Anatolia is the bridge between continents; in this way, it is on a migration path, it has different altitudes, and this leads regional climatic structure, and all these elements increase the biodiversity (Çepel, 2008).

The city of Çanakkale, the subject of this research, is a rich region in terms of biodiversity because of the reasons mentioned above. In the researchs, it is stated that there are 1370 plant taxa in Çanakkale city flora, and 102 of them are endemic (Karabacak, Uysal, & Öner, 2006). Tok, Yalçın-Özdilek, Özkan, Gürkan, Sevim, Topyıldız, Paksuz, & Kaya (2007a, 2007b) determined that 9 amhibians and 29 reptile species live in and around Çanakkale. It is documented that 8 fish species inhabit in Karamenderes River, one of the main freshwater systems in Çanakkale (Yalçın Özdilek, 2008). The city of Çanakkale, surrounded by the seas by three sides, has great importance with its shores with respect to biodiversity (Dural & Aysel, 2007; Özen, İşmen, Özekinci, Ayaz, Altınağaç, Ayyıldız, & Cengiz, 2008).

Rapid growth in human population, increase in urbanization, industrial area occupancy, non-ecological agricultural applications cause to decrease biodiversity (Çepel, 2008; Görmez, 2007; Dobson, 2005; Keating, 1993). The importance of biodiversity and its threats in global scale have been presented to wide public groups as an environmental problem and the subject was held in many organisations including The United Nations. Pollution, disappearing

of the tropical forests and the decresasing of biodiversity together with the global climate change all has been defined as the major problems of our age in Environment and Development Conference (Görmez, 2007; Young, 2001). In the Convention on Biological Diversity (CBD) it was envisioned in '2010 Aims' that a data bank should be formed by collecting the detailed information about biodiversity until 2010, and with these information the economical importance of biodiversity for people (nutrition, medical raw material, etc.) should be realized (as cited in, Dobson, 2005). The protection of biodiversity is guaranteed national and international agreements, and the International Biodiversity Congress, in which our country also took part, presented the subject of biodiversity world-wide to the scientists, educationists/pedagogists, politicians, and the public; and made the congress countries to protect biodiversity and keep the elements of it (as cited in Kassas, 2002; as cited in Dreyfus, Wals & Weelie, 1999). The United Nations declared 2010 to be the International Year of Biodiversity (CBD, 2010).

Defining the aim of the education of biodiversity, Kassas (2002, p.347) has suggested that various points of views should be considered while teaching biodiversity. With broad attention to the protection of biodiversity and sustainable use of natural sources; different nations have revised their education policies and applications, and have developed formal and/or informal programmes for biodiversity education (Fernandez Lo Faso, Gemio, Garcia, Ceballas- Zuniga, Bueno, & Gallardo, 2006; Robottom, 2005; Robottom & Sauve, 2003; Storksdieck, Ellenbogen, & Heimlich, 2005; Robottom, 2004; Galbraith, 2003; Kassas, 2002; Young, 2001; Robottom & Kyburz-Graber, 2000; Gayford, 2000; Disinger, 1997; Dreyfus, Wals, & Weelie, 1999).

The concept of biodiversity is considered in the frame of Biology in Science. In our country, while there are few studies about the importance of biodiversity (Erten, 2004a); it hasn't been met any study on biodiversity education or the methods used in this education. Mostly the researches are generally interested in the subject of 'environment' (Çınar, Doğu, & Meydan, 2008; Yalçın & Doğan, 2007; Erten, 2004b; Yıldız, Baykal, & Altın, 2000; Haktanır & Çubuk, 2000; Doğan & Akaydın, 2000; Kale, 2000) or the methods (Aksoy, 2004; Akaydın & Güler, 2000; Çallıca, Erol, Sezgin, & Kavcar, 2000; İflazoğlu, 2000) and the strategies (Sezgin, Çalışkan, Çallıca, Ellez & Kavcar, 2000) used in Science Education. In our country, the subjects containing biodiversity are discussed in basic learning field in primary and secondary education programmes. Yet, environmental subjects including biodiversity are usually complicated and in order to reach success in this subject; adaptation of interdisciplined totalitarian learning-teaching points of view plays an important role (Özdemir, 2007; Storksdieck, Ellenbogen & Heimlich, 2005; Kassas, 2002). In this context, the selected method and techniques during teaching biodiversity concept will be important to acquire

the most profit. (Erten, 2004a; Doğan & Akaydın, 2000). Because each method and tecnique used in teaching-learning process serves a strategy and theory (Reigeluth, 1983). Recent studies have shown that student-centered/learner-centered active learning strategy together with the traditional strategy played an important role in the acquisition of profits in mcience education (Özdemir & Üstündağ, 2007; Çetin, Ertepınar, & Geban, 2004). As mentioned above, it is stated that, in biodiversity teaching in some foreign countries, especially formal and informal education are given together. Particularly, 'visiting natural museums and parks' are the most commonly used techniques while teaching biodiversity in developed countries (Dori & Tall; 2000; Koran & Koran, 1998). When someone investigates the fourth and the fifth grade programmes in primary education, it was seen that the subject of 'The Living Things World and Biodiversity'is discussed under the unit 'Let's Stroll and Recognize The Living Things World'. When we investigate this part, specifically in teachers' guidebooks, we can see that traditional teaching methods such as 'narration, question-answer method and doing exercises on the subject' are mainly used (MEB, 2005-The fourth grade; MEB, 2006-The fifth grade).

Aim

The common methods and techniques used for teaching biodiversity are aimed to be determined on the basis of Çanakkale that is rich in biodiversity.

Sub-problems

With this subject, answering these questions is aimed:

a. What are the methods that primary school teachers commonly use in order to teach the concept of 'biodiversity'?
b. Are the same methods and techniques used in the learning-teaching process belonging to the subjects other than biodiversity in primary school 'Science and Technology' programme?
c. Do the methods and techniques selected by the teachers in primary school 'Science and Technology' programme have a relationship with gender, the institution/foundation from which they graduated from, the situation of seniority in the profession, getting in-service training about education-instruction methods, level of graduate education, following a periodical related to their fields, frequency of using Internet for the preparation of lessons?

METHODOLOGY

This research aimed at determining the methods and techniques that the fourth and the fifth grade primary school teachers use in teaching biodiversity and 'science and technology.' The fourth and the fifth grade primary school teachers working at schools connected to the center in Çanakkale city in 2007-2008 Academic Year constitute the universe of this research. There are 24 primary schools in the center of Çanakkale and totally there are 45 fourth grade classes and 46 fifth grade classes. 88 of the 91 teachers forming the universe of this research have been reached. 52 of them are male and 36 of them are female.

Collection of the Data

The researchers developed a questionnaire. The first part of questionnaire includes demografic parameters such as; gender, the institution/foundation from which they graduated from, the situation of seniority in profession, getting in-service training about education-instruction methods, level of graduate education, following a periodical/journal related to their fields, frequency of using internet. Demographyc parameters on the questionaire are based on some themes such as ecofeminist point of wiew, the adaptibility of teachers to the new primary school programme, teachers' skills to be able to follow the innovations. While collecting these data, three kinds of qouestions were used: (1) yes-no questions, (2) measuring/evaluating, and (3) choosing the correct item from the list. In the second part, an item pool consisting of 34 items was constituted in order to collect data about the methods and the techniques the teachers use while teaching the subjects of 'science and technology' and the concept of 'biodiversity'. Two different tables consisting of 34 items were prepared; in the first table, the methods and techniques in the use of 'Science and Technology'; and in the second table, the methods and techniques used in biodiversity teaching were took place. The new primary school programme was taken into consideration while forming the item pool. As the new programme was based on the constructionist philosophy, the methods and techniques especially used in active learning that forms the basics of this philosophy were taken into consideration in the questionnaire (Açıkgöz, 2006). The questionnaires were graded as '5 Likert', which contains five ranges: always (5 points), usually (4 points), sometimes (3 points), rarely (2 points), never (1 point).

Analysis of the Data

Two experts revised validity and reliability of the items and none of the items was eliminated. A pre-application was done in order to test the validity of the questionnaire and item analysis was evaluated by using statistical

package programme (SPSS 10). Two tables and demographic informations were recorded in the same file in SPSS programme. A factor analysis for dimensional of questionnaire and Cronbach-Alpha coefficient for the reliability of questionnaire were defined (Büyüköztürk, 2007; Karasar, 2003). Cronbach-Alpha coefficient was found to be 0.908; Kaiser Meyer Olkin (KMO) level was determined to be 0.789; Barlett meaningfulness level was computed as smaller than 0.001. All these values showed that the questionnaire was valid and reliable to define the methods and techniques frequently used in teaching biodiversity in primary schools (Büyüköztürk, 2007; Karasar, 2003). As a result of factor analysis, the questionnaire was divided into two dimensions. The first dimension was named as 'commonly used methods and techniques' and the second one was 'rarely used methods and techniques'.

The percentages of frequencies were calculated for each method and/or technique in selected five ranges using the following formula:

$F\%_i = N_i \times 100 / N$

where, $F\%_i$ is the percentage of frequency in a specific range, N_i = the number of being chosen in the related range and N is the number of total teachers.

The methods selected by more than half of the all individuals were taken into consideration. The methods, which percentage frequency of the fourth range were 50% and above, were named as common methods. The differences between the methods used by primary school teachers when teaching "science and technology" and "biodiversity" subjects were analyzed using chi-square test. The difference between percentage frequency of groups for each demographic parameters was analysed by chi-square test. This tests if there is an expressive relationship between the two classifying variables; that is, the relationship between the expected values and the observed values. In comparision, the percentage of the groups, whose example numbers were below 5, were taken into consideration and it was paid attention to the proportion for it shouldn't have been less than 33% (Büyüköztürk, 2007).

FINDINGS

The fourth and the fifth grade primary school teachers working in Çanakkale city center frequently used the question-answer (54.5%), problem-solving (52.3%), and lecturing (50%) methods and techniques while teaching the subjects related to biodiversity (Table 1). It was also determined that they usually used the same methods while teaching "science and technology" subjects (Table 2). There wasn't any statistical difference between the frequency percentage of the methods and techniques that the primary school teachers used while teaching "science and technology" and the frequency of percentage of the methods and techniques that the primary school teachers used while teaching"biodiversity" subjects ($p>0.05$).

In the process of learning-teaching biodiversity subjects, there was no expressive difference between the choices of the methods and techniques by female and male teachers except from 'learning teams method' (Table 3). In biodiversity teaching, male teachers seemed to use this method more frequently than female teachers.

There wasn't any statistical difference between the choices of female primary school teachers and choices of male primary school teachers during the process of teaching other subjects of the science & technology ($p>0.05$).

The frequencies of percentage of chosen methods and techniques were not different among the teachers who have various experiences, during the teaching process of science & technology and biodiversity concepts. Similarly, other demographic parameters, such as the institution which were graduated, getting in-service training status, frequency of internet usage, didn't play important role on selection of particular methods and techniques during the teaching processes of science & technology and biodiversity.

Table 1. The frequencies and frequency percentages of the methods and techniques used by primary teachers during teaching-learning processes of biodiversity concept in Çanakkale

Methods and Techniques	**Always (5)**		**Usually (4)**		**Sometimes (3)**		**Rarely (2)**		**Never (1)**	
	%	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**
Quesition and answer method	23.9	21	**55.7**	**49**	18.2	16	1.1	1	1.1	1
Problem-solving method	15.9	14	**51.1**	**45**	30.7	27	2.3	2	0	0
Lecture method	23.9	13	**55.7**	**49**	18.2	21	1.1	4	1.1	1
Discussion method	15.9	14	43.2	38	35.2	31	4.5	4	1.1	1
Experiment method	20.5	18	47.7	42	27.3	24	4.5	4	0	0
Cooperative learning method	12.5	11	43.2	38	37.5	33	5.7	5	1.1	1
Brainstorming	15.9	14	26.1	23	37.5	33	15.9	14	4.5	4
Project method	8	7	23.9	21	47.7	42	13.6	12	6.8	6
Collaborative learning and alone	8	7	26.1	23	43.2	38	15.9	14	6.8	6
Group research	14.8	13	37.5	33	43.2	38	4.5	4	0	0
Showing and enforcement methods	15.9	14	31.8	28	43.2	38	6.8	6	2.3	2
Creating concept map	10.2	9	44.3	39	39.8	35	4.5	4	1.1	1
.Narrative method	29.5	26	42	37	21.6	19	6.8	6	0	0
Case study method	12.5	11	22.7	20	52.3	46	6.8	6	5.7	5
Drama method	3.4	3	3.4	3	46.6	41	27.3	24	19.3	17
Role playing method	3.4	3	3.4	3	36.4	32	34.1	30	22.7	20
Debating method	5.7	5	15.9	14	40.9	36	26.1	23	11.4	10
Small group discussion	2.3	2	18.2	21	48.9	43	20.5	18	10.2	9
Large group discussion	4.5	4	10.2	9	37.5	33	21.6	19	26.1	23
Excursion-Observation method	1.1	1	4.5	4	33	29	28.4	25	33	29
Team-supported individualising	1.1	1	9.1	8	31.8	28	25	22	33	29
Discriminating-Uniting method	3.4	3	20.5	18	36.4	32	21.6	19	18.2	16

Team-Game-Tournament technique	21.6	19	45.5	40	22.7	20	8	7	2.3	2
Uniting 2 technique	1.1	1	6.8	6	42	37	18.2	21	31.8	28
Contrary panel technique	5.7	5	36.4	32	18.2	16	39.8	35	0	0
Buzz groups	2.3	2	2.3	2	38.6	34	20.5	18	36.4	32
Forum technique	2.3	2	4.5	4	50	44	15.9	14	27.3	24
Learning teams technique	2.3	2	15.9	14	34.1	30	20.5	18	27.3	24
Circle technique	3.4	3	11.4	10	43.2	38	17	15	25	22
Six hat thinking technique	5.7	5	18.2	21	39.8	35	13.6	12	22.7	20
Seminar technique	2.3	2	15.9	14	46.6	41	12.5	11	22.7	20
Conference technique	1.1	1	11.4	10	44.3	39	13.6	12	29.5	26
Panel technique	19.3	17	34.1	30	34.1	30	8	7	4.5	4
Symposium technique	23.9	21	39.8	35	29.5	26	3.4	3	3.4	3

Table 2. The frequencies and frequency percentages of the methods and techniques used by primary teachers during teaching-learning processes of science & technology concepts in Çanakkale

Methods and Techniques	**Always (5)**		**Usually (4)**		**Sometimes (3)**		**Rarely (2)**		**Never (1)**	
	%	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**
Quesition and answer method	29.5	26	**54.5**	**48**	12.5	11	2.3	2	1.1	1
Problem-solving method	12.5	11	**52.3**	**46**	29.5	26	4.5	4	1.1	1
Lecture method	17	15	**50**	**44**	27.3	4	4.5	4	1.1	1
Discussion method	13.6	12	48.9	43	34.1	30	3.4	3	0	0
Experiment method	22.7	20	47.7	42	21.6	19	8	7	0	0
Cooperative learning method	5.7	5	47.7	42	38.6	34	8	7	0	0
Brainstorming	14.8	13	46.6	41	35.2	31	2.3	2	1.1	1
Project method	9.1	8	44.3	39	39.8	35	6.8	6	0	0
Collaborative learning and alone	18.2	16	40.9	36	34.1	30	3.4	3	3.4	3
Group research	11.4	10	39.8	35	35.2	31	11.4	10	2.3	2
Showing and enforcement methods	28.4	25	38.6	34	29.5	26	3.4	3	0	0
Creating concept map	8	7	36.4	32	46.6	41	8	7	1.1	1
.Narrative method	4.5	4	31.8	28	53.4	47	5.7	5	4.5	4
Case study method	5.7	5	30.7	27	52.3	46	10.2	9	1.1	1
Drama method	4.5	4	26.1	23	46.6	41	18.2	16	4.5	4
Role playing method	5.7	5	25	22	48.9	43	15.9	14	4.5	4
Debating method	1.1	1	19.3	17	39.8	35	23.9	21	15.9	14
Small group discussion	1.1	1	18.2	16	58	51	19.3	17	3.4	3
Large group discussion	2.3	2	15.9	14	51.1	45	19.3	17	11.4	10
Excursion-Observation method	4.5	4	14.8	13	61.4	54	11.4	10	8	7
Team-supported individualising	1.1	1	13.6	12	48.9	43	**17**	**15**	**19.3**	**17**
Discriminating-Uniting method	3.4	3	12.5	11	51.1	45	**14.8**	**13**	**18.2**	**16**
Team-Game-Tournament technique	3.4	3	10.2	9	45.5	40	**25**	**22**	**15.9**	**14**
Uniting 2 technique	1.1	1	10.2	9	45.5	40	**12.5**	**11**	**30.7**	**27**
Contrary panel technique	0	0	10.2	9	34.1	30	**22.7**	**20**	**33**	**29**

Buzz groups	2.3	2	9.1	8	42	37	**23.9**	**21**	**22.7**	**20**
Forum technique	0	0	8	7	39.8	35	**25**	**22**	**27.3**	**24**
Learning teams technique	5.7	5	6.8	6	40.9	36	**21.6**	**19**	**25**	**22**
Circle technique	1.1	1	6.8	6	35.2	31	**23.9**	**21**	**33**	**29**
Six hat thinking technique	1.1	1	6.8	6	40.9	36	**19.3**	**17**	**31.8**	**28**
Seminar technique	1.1	1	5.7	5	40.9	36	**33**	**29**	**19.3**	**17**
Conference technique	1.1	1	4.5	4	37.5	33	**34.1**	**30**	**22.7**	**20**
Panel technique	0	0	3.4	3	36.4	32	**25**	**22**	**35.2**	**31**
Symposium technique	0	0	2.3	2	36.4	32	**20.5**	**18**	**40.9**	**36**

Table 3. The table of comparison between the genders in terms of 'learning teams technique' in biodiversity education.

		Never	Rarely	Sometimes	Usually	Always	Total
Male	N	17	13	11	11	-	52
	%	32.7	25	21.2	21.2	-	100
Female	N	7	5	19	3	2	36
	%	19.4	13.9	52.8	8.3	5.6	100
Total	N	24	18	30	14	2	88
	%	27.3	20.5	34.1	15.9	2.3	100

χ^2 : 13.98 (Degrees of freedom) df:4 P= 0.007

An important difference was found between the teachers who followed a periodical/journal related to their fields and the ones who didn't with respect to their choice of using 'learning teams' during the process of teaching-learning biodiversity subjects (Table 4). It's clearly seen that the frequency of 'usually and rarely' choices of the use of 'learning teams technique' by the teachers who followed a periodical was higher than the ones who didn't.

Table 4. The table of comparison between teachers who follow a periodical related to their field and the ones who didn't in terms of the usage of 'learning teams' in biodiversity education.

		Never	Rarely	Sometimes	Usually	Always	Total
Yes	N	3	9	6	5	2	25
	%	12	**36**	24	**20**	8	100
No	N	21	9	24	9	-	63
	%	33.3	**14.3**	38.1	**14.3**	-	100
Total	N	24	18	30	14	2	88
	%	27.3	20.5	34.1	15.9	2.3	100

χ^2 : 13.563 (Degrees of freedom) df:4 P = 0.009

In the process of teaching the other subjects of 'science & technology'; the percentages of the teachers who followed a periodical/journal related to

their field and the ones who didn't were compared with respect to their choice of using 'buzz groups'; and an statistically significant difference was found between the two groups (Table 5). It can be seen that in the process of teaching science & technology subjects, the frequencies of the choices of 'usually and never' by the teachers who followed a periodical/journal related to their fields were more than the ones who didn't.

Table 5. The table of comparison between teachers who follow a periodical related to their fields and the ones who didn't in terms of the usage of 'buzz groups' in teaching 'Science & Technology' subjects.

		Never	Rarely	Sometimes	Usually	Always	Total
Yes	N	10	3	6	4	2	25
	%	**40**	**12**	24	**16**	8	100
No	N	10	18	31	4	-	63
	%	**15.9**	**28.6**	49.2	**6.3**	-	100
Total	N	20	21	37	8	2	88
	%	22.7	23.9	42	9.1	2.3	100

χ^2 : 16.222 (Degrees of freedom) df:4 P= 0.003

In Table 1 and 2; it can be seen that especially traditional teaching methods like 'lecturing, question-answer and problem-solving' are generally used (>50%). Therefore, it can be confirmed that the primary school teachers in Çanakkale apply the teacher-centered strategies more in teaching Science subjects including biodiversity.

DISCUSSION

Biodiversity is an environmental/ecological subject; and as it is directly related to the environmental problems, this research can be evaluated among the other researchs about environmental education (Gökçe, Erdoğan, Aktay, & Özden, 2007; Başal, Atasoy, & Doğan, 2001; Yalçın & Doğan, 2007).

As a result of this research, it is determined that 'lecturing, question-answer and problem-solving' methods are often used by the teachers in teaching 'science & technology' and biodiversity. The drawbacks of 'lecturing' and 'question-answer' methods and their ineffectiveness in environmental education has been mentioned in various source (Armstrong, 2005; Gerçek & Soran, 2005; Sünbül & Yılmaz, 2003). Evaluating the drawbacks of this teacher-centered strategy, the Ministry of Education-Training Commitee Chairmanship revised the primary school problem and teacher guide books were prepared in order to help teachers in the direction of newly applied primary school programme. This new programme is based on the 'reconstructionist theory.' It is student-centered/learner-centered and the

teacher is only a guide in the classroom. It has been mentioned that active learning methods should be used in order for the student to be active during his/her learning process. Especially; as the subjects of 'Living Things World' and 'biodiversity' were discussed under the name of the unit 'Let's Look Around and Recognize the Living Things World'; when this part is examined particularly in teachers' guide book, it can be seen that traditional teaching methods like 'lecturing', 'question-answer' methods and research about the subjects are largely used (MEB, 2005-the fourth and the fifth grade; MEB, 2006-the fifth grade). The obtained result wasn't appraised surprising. However, according to the restructionist approach; learning is not the solely the transfer of the knowledge directly from the teacher or the book to the student. Each student has different buildups from the past and the student himself/herself structures the knowledge by making connections between his/her old knowledge and the new data (Ün-Açıkgöz, 2006; Martin, 1997; Jones & Howe, 1998). Though the elementary education is new, the methods used are thought to have traces of the old programme in Turkish Primary School programme.

The vision of the new elementary 'science & technology' education programme (MEB, 2005-the fourth grade; MEB, 2006-the fifth grade) is to make the students as 'science & technology' literacy. We need to know how the science is taught is, to improve the 'science & technology' literacy. For this, it is suggested to go and examine the places in which science is made such as museums, nature and science centers, botanical gardens, zoos, aquariums, etc (Yalçın- Özdilek, Kaska, Olgun, & Sönmez, 2006; Armstrong, 2005). According to the reconstructionist approach; field trip provides the student with making his/her own decision yet this is not without a plan and a programme. In this way, out-of-school learning can be achieved (Martin, 1997). In environmental education, Jones and Howe (1998) referred to the use of active learning methods like cooperational learning, role play, and field trip, in particular. Yet, the result of the research shows that these methods and techniques aren't used often in Çanakkale region. Among the reasons why this method is not used frequently, the problems related to the application of the method are noted. A kind of field trip as a teaching method was searched by Akaydın and Güler (2000). The researchers investigated the possibilities of usage of field trips by biology teachers, 78% of the teachers expressed that they couldn't use the field trips; and they indicated mostly the lack of time (78%), material availabilities (17%), and being incapable of getting legal permission (4%) among the reasons. The primary school teachers didn't prefer any active method such as field trip in the same reason in Çanakkale.

The least used techniques in 'science & technology' and biodiversity education were determined as uniting 2, panel discussion, contrary panel discussion, forum, circle, seminar, conference, symposium, thinking with six hats techniques. Although rarely used, the techniques of 'learning teams' and

'buzz groups' were more selected by the innovative teachers who follow periodical journals. The techniques above are named a kind of group work. A particular number of students are needed for the group studies in order to get effective results in literatures. Ün-Açıkgöz (2006) stated that teams can be compost of 4 people; and the smaller group is appropriate for buzz technique. Hesapçıoğlu (2008) clarified that seminar technique is suitable for the teaching groups containing 20 students; Sünbül and Yılmaz (2003) explained that panel discussion and contrary panel discussion can be applied in students group containing maximum 15 students. In Marmara Region, the number of student in a class (mean 24.4 students per class) is higher than the suggested student numbers above mentioned (Albayrak, Kalaycı, & Karataş, 2004). Therefore, the rarely usage of this technique could be resulted from excessive numbers of students in class. In the other words, the crowded class could be preventing the usage of these active learning techniques.

Panel discussion, contrary panel discussion, symposium, forum, and circle techniques are taken into consideration in the discussion method (Hesapçıoğlu, 2008). Although discussion method was determined as one of the most used, the related techniques are less preferred. Therefore, the most preferable discussion methods could include a few techniques in this study. In addition, instead of groups, individuals could have an active role in discussion method during the teaching proceses of science & technology and biodiversity subjects in Çanakkale.

The interest of the teachers decreases to various techniques day by day, and there may not be a linear proportion between professional experience and effective use of methods and techniques (Rodriguez & Kitchen, 2005). The degree of seniority of the teachers was not important in selection of the methods and techniques in our study and this could be explained by the similar reason. Researchers and educators can develop the in-service training programmes in order to help teachers build up their professional improvement.

The application way of thinking with six hats technique was desribed in the fifth grade teacher guide book (2006), and it was included especially in the unit 'Let's Look Around and Recognize the Living Things World'. This technique is among the least used techniques in our study. A lack of harmony can be thought between the theory and the application. The adaptation of teachers to the new tecniques could be managed by in-service training programs. Although 81.8% of the teachers got in-service training about the new active teaching methods, they used active learning methods rarely during teaching processes. From this, it can be thought that the implemented in-service training programmes for teachers are ineffective. The contributors of this program said that the in-service training programs are only compost of lecturing and far away from the applications and also evaluation processes (Pers. Comm. with trainers). Therefore, in-service training programmes should be revised.

The present study indicates obviously that primary school teachers use a few methods and technics, mostly conventional, during teaching processes of 'biodiversity'. However, some active teaching methods such as 'learning teams' are used females more frequent than males. From ecofeminist point of view, it could be claimed that females use various techniques during teaching processes of 'biodiversity'.

Increasing population pressure also increased the environmental problems successively. Now together with the globalization, environmental problems are not thought as local, but in global scale. For example, biodiversity is decreasing in local level and the effects of this eradication are a wide scale. 'Thinking globally and acting locally' is needed to realise. Globalization and technological developments cause changes not only in environmental dimension, but also in educational dimension. Education programmes are prepared with respect to the current circumstances of today. Most of these programmes aim increasing not only cognitive, but also affective acquisitions. Effective teaching can be managed by using active learning methods in that programmes. Innovative and easy to apply methods in 'biodiversity' should be desribed more detailed so that the teachers can understand and can use them in practice. Hence, the succession in conservation of biodiversity at local will bring a global solution of this environmental problem.

The recommendations below are presented in conclusion of the research:

a. Guidebooks prepared for teachers should be renewed; in these books more active teaching methods such as cooperational learning and field studies should be added to the guidebooks for environmental education;
b. The use of active teaching methods in biodiversity education should be revised for training teachers in higher education.
c. The present in-service training programmes should be revised and should be prepared by scientifically. Especially, the programme should be included an evaluation methods for assessing the feedbacks.

REFERENCES

Akaydın, G. & Güler, H. M. (2000). The importance of field trip at science education. *In IV. Science Education Congress* (p. 34-36). Ankara: Hacettepe University.

Aksoy, B. (2004). Using of problem solving methods at environmental education. *Journal of Pamukkale University Department of Education*, 2 (4), 83-98. Retrieved November, 10, 2009 from http://pauegitimdergi.pau.edu.tr/Makaleler/1858439104_7-PROBLAM%20%c3%87%c3%96ZME%20Y%c3%96NTEM%c4%b

0N%c4%b0N%20%c3%87EVRE%20E%c4%9e%c4%b0T%c4%b0M%c4%b0NDE%20UYGULANMASI.pdf

Albayrak, S. A., Kalaycı, Ş., & Karataş, A. (2004). By geographical region of the provinces in Turkey, a key component of Socio-Economic Development-level analysis examining. *Süleyman Demirel University İ.İ.B.F.Y. Journal,* 9(2), 101-130. Retrieved December, 15, 2009 from http://iibf.sdu.edu.tr/dergi/files/2004-2-6.pdf

Armstrong H. G. (2005). Environmental education in Tobago's primary schools: a case study of coral reef education**.** *Revisa de Bioogia Tropical* 53 (1): 229-238. Retrieved May, 12, 2009 from http://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S0034-77442005000300028&lng=es&nrm=iso&tlng=en

Arslan, A. (2009). *The History of ancient times philosophy* (2nd Volume). İstanbul: Bilgi University Publisher.

Başal, H. A., Atasoy, E., & Doğan, Y. (2001). Developing an environmental sensitivity scale for children. *In IV. National Ecology and Environment Conference, Association of Biologs*, 117- 123.

Büyüköztürk, Ş. (2007). *Data analysis handbook*. Ankara: PegemA Publishing.

CBD (2010). Convention on biological diversity, Retrieved December, 12, 2010 from http://www.cbd.int/2010/about/

Çallıca, H., Erol, M., Sezgin,G., & Kavcar,N. (2000). *A study related to the labratory applications in primary school institutions.* In the fifth Congress of Science Education (p.217-219) Ankara: Hacettepe University.

Çepel, N. (2008). *Ecological problems and solutions* (3rd Press) Ankara: TUBITAK Popular Books Series.

Çetin, G., Ertepınar, H., & Geban, Ö. (2004). Conceptual change approach to students' attitudes impact of ecology and biological success. *Hacettepe University Journal of Education***,** 26: 27-32. Retrieved May, 19, 2009 from http://www.efdergi.hacettepe.edu.tr/200426GÜLCAN%20ÇETİN.pdf

Çınar, D., Doğu, S., & Meydan, A. (2008). Attitudes of primary school teachers towards the environment. In B. Güven (Ed.), T*heSseventh National Primary School Teaching Symposium Reports* (p.79-82). Çanakkale: Çanakkale OnSekiz Mart University.

Disinger, J. F. (1997). Environmental education research news. *The Environmentalist,* 17 (3), 153-156. Retrieved February, 12, 2008 from http://www.springerlink.com/content/m6130x2xr2416n31/fulltext.pdf

Doğan, M., & Akaydın, G., (2000). National Agenda 21: Science education programmes and environmental education in Turkey. *In The fourth Congress of Science Education* (p.82-85) Ankara: Hacettepe University.

Dobson, A. (2005). Monitoring global rates of biodiversity change: challenges that arise in meeting the Convention on Biological Diversity. *Philosophical Transactions of The Royal Society,* 360, 229-241. Retrieved August, 12, 2009 from http://rstb.royalsocietypublishing.org/content/360/1454/229.full.pdf+html

Dori, Y. J., & Tall, R. T. (2000). Formal and ınformal collaborative projects: engaging in ındustry with environmental awareness. *Science Education*, 84 (1), 95- 113. Retrieved December, 31, 2010 from http://onlinelibrary.wiley.com/doi/10.1002/(SICI)1098-237X(200001)84:1%3C95::AID-SCE7%3E3.0.CO;2-W/pdf

Dreyfus, A., Wals, A.E.J., & Weelie, D.V. (1999). Biodiversity as a postmodern theme for environmental education. *Canadian Journal of Environmental Education,* 4:155-176. Retrieved June, 9, 2008 from http://cjee.lakeheadu.ca/index.php/cjee/article/view/326/270

Dural B., & Aysel V. (2007). The role of bentic algas and sea savannahs in biodiversity in Turkish Aegean and Mediterranean shores. *Acta Pharmaceutica Sciencia*, 49, 85-118. Retrieved May, 12, 2009 From http://www.actapharmasciencia.org/pdf/2007%20vol%2049%20no1-8.pdf

Erten, S. (2004a). Biodiversity as a rising value in the international scale. *The Journal of Hacettepe University, Faculty of Education*, 27, 98-105. Retrieved May, 12, 2009 from http://www.efdergi.hacettepe.edu.tr/200427SİNAN%20ERTEN.pdf

Erten, S. (2004b). What are environmental education and awareness of environment, and how should the environment education be? *The Journal of Environment and Human*, no 65/66.

Fernandez Lo Faso, R. P., Gemio, R. V., Garcia, J. C. E., Ceballas- Zuniga, E. G., Bueno, C., & Gallardo, J. M. (2006). Tench, *Tinca tinca* (L.), fish farms as a tool for enviromental education. *Aquaculture International,* 14, 209- 218.

Galbraith, J. (2003). Connecting with plants: lessons for life. *The Curriculum Journal***,** 14(2): 279-286.

Gayford, G. (2000). Biodiversity Education: a teacher's perspective. *Environmental Education Research*, 6 (4), 347- 361.

Gerçek C. & Soran H. (2005). Experimental methods using biology teachers teaching determination of status. *Hacettepe University Journal of Education*, 29, 95- 102. Retrieved May, 12, 2009 from http://www.efdergi.hacettepe.edu.tr/200529CEM%20GERÇEK.pdf

Giddens, A. (2005). *Sociology*. Ankara: Ayrac Publications.

Gökçe, N., Erdoğan, K., Aktay, S., & Özden, M. (2007). Elementary students' attitudes towards environment. *Elementary Education Online,* 6 (3), 452- 468.

Görmez, K. (2007). *The problems of environment*. Ankara: Nobel Publisher.

Haktanır, G. & Çabuk, B. (2000). Environment perceptions of preschool students. *In The Fourth Congress of Science Education* (p.76-79) Ankara: Hacettepe University.

Hesapçıoğlu, M. (2008). *Teaching principles and methods*. Ankara: Nobel Publishing.

İflazoğlu, A. (2000). The use and application results of cooperational learning activities in Science Education lesson in the fifth grade of fundamental education. *In The Fourth Congress of Science Education* (p.162-168) Ankara: Hacettepe University

Jones, L., & Howe, A. C. (1998). *Engaging children in science(Second Edition)*. New Jersey: Prentice-Hall Company.

Kale, N. (2000). Education of environmental rights in primary school. *In The Fifth Congress of Science Education* (p.110-114) Ankara: Hacettepe University.

Karabacak, E., Uysal, İ., & Öner, Ş. (2006). Flora of Kazdağı (Mt. Ida) Pseudo-Alpine Zone, Turkey. *IV Balkan Botanical Congress*, Sofia-Bulgaria, Scientific Area B No. 55.

Karasar, N. (2003). *Research methods*. Ankara: Nobel Publishing.

Kassas, M. (2002). Environmental education: biodiversity. *The Environmentalist***,** 22, 345- 351. Retrieved January, 11, 2008 from http://www.springerlink.com/content/n8h7r32830817m03/fulltext.pdf

Keating, M. (1993). *The earth summit's agenda for changed a plain language version of Agenda 21 and other Rio Agreements.* (p 6-7) Genova Switzerland: Centre for Our Common Future)

Koran, J. J., Koran, L. M., & Ellis, J. (1989). Evaluating the effectiviness of filed experiences: 1939-1989. Visitor Behaviour, 4 (2), 7-10.

Martin, D. J. (1997). *Elementary science methods, a contrustivist approach.* New York: Delmar Publishers.

MEB (Ministery of National Education) (2005). E*lementary science and technology teachers' guide book 4.* İstanbul: MEB Publisher.

MEB (Ministery of National Education) (2006). E*lementary science and technology teachers' guide book 5.* Ankara: MEB Publisher.

Özdemir, O. (2007). New perspective of environmental education: "Education for sustainable development purpose".*Education and Science***,** 32(145), 24-38. Retrieved May, 12, 2009 from http://egitimvebilim.ted.org.tr/index.php/EB/article/view/813/166

Özdemir, P. & Üstündağ, T. (2007). Science and technology in space celebrity science education program adam concerning the creative drama. *Elementary Online***,** 6(2), 226-233. Retrieved July, 12, 2008 from http://www.ilkogretim-online.org.tr/vol6say2.html

Özen, Ö., İşmen, A., Özekinci, U., Ayaz, A., Altınağaç, U., Ayyıldız, H., Cengiz, Ö. (2008). B*iodiversity of fish in çanakkale's shallow waters and population dynamics of economically young fish ındividuals.* TUBITAK Proje No: 106T123 110p.

Reigeluth, C. M. (1983). *Instructional Design Theories and Models.* London: Lawrence Erlbaum Associates Publishers.

Robottom, I., & Kyburz- Graber, R. (2000). Recent ınternational developments in professional development in environmental education: reflections and issues. *Canadian Journal of Environmental Education*, 5 (1), 249- 267. Retrieved May, 05, 2008 from http://cjee.lakeheadu.ca/index.php/cjee/article/viewFile/312/242

Robottom, I., & Suave, L. (2003). Reflecting on participatory research in environmental education: Some issues for methodology. *Canadian Journal of Environmental Education***,** 8 (1),111- 128. Retrieved May, 05, 2008 from http://cjee.lakeheadu.ca/index.php/cjee/article/view/241/101

Robottom, I. (2004). Environmental education and local initiatives: A rationale. *International Examples and an Issue for Research*, 3, 21–28.

Robottom, I. (2005). Critical Environmental Education Research: Re-Engaging the Debate. *Canadian Journal of Environmental Education*, 10 (1), 62- 78. Retrieved May, 05, 2008 from http://cjee.lakeheadu.ca/index.php/cjee/article/view/178/15

Rodriguez, A. J., & Kitchen, R. S. (2005). *Preparing mathematics and science teachers for diverse classrooms, promising strategies for transformative pedagogy.* London: Lawrence Erlbaum Associates Publishers.

Sezgin, G., Çalışkan, S., Çallıca, H., Ellez, M. A., & Kavcar, N. (2000). A study related to the usage of problem-solving strategies in Science Education. *In The Fourth Congress of Science Education* (p.239-242) Ankara: Hacettepe University.

Storksdieck, M., Ellenbogen, K., & Heimlich, E. J. (2005). Changing minds? Reassessing outcomes in free- choice environmental education. *Environmental Education Research*, 11 (3), 353- 369.

Sünbül, A. M., & Yılmaz, H. (2003). *Plan and assesment in teaching*. Konya: Çizgi Publisher.

Tok, C. V., Yalçın-Özdilek, Ş., Özkan, B., Gürkan, M., Sevim, İ., Topyıldız, H., Paksuz, S., & Kaya, S. (2007a). *Literature-supported fauna inventory based on field study around the Mountain Ağı***.** ÇOMU Revolving Fund Project Report.

Tok, C. V., Yalçın-Özdilek, Ş., Özkan, B., Gürkan, M., Sevim, İ., Topyıldız, H., Paksuz, S., & Kaya, S. (2007b). *Literature-supported fauna inventory based on field study around Kirazlı***.** ÇOMU Revolving Fund Project Report.

Ün- Açıkgöz, K. (2006). Active learning. İzmir: Kanyılmaz Press.

Yalçın S. & Doğan S. (2007). Effects of science and technology lesson on environmental attitudes of primary school pupils. *VI. National Symposium of Primary School Teacher Education*, (Anatolia University (USOS), Nobel Press), p: 703- 705.

Yalçın- Özdilek Ş., Kaska, Y., Olgun, O. S., & Sönmez B. (2006). *Monitoring of Samandag Sea Turtles (Chelonia mydas and Carette caretta).* TUBITAK Project No: YDABAG- 104Y055, 64p.

Yalçın Özdilek, Ş. (2008). Natural and invading fish of Karamenderes**.** In A. Akdemir, O. Demircan, S. Yılmaz, T. Takaoğlu, C. Akbulak (Ed.), *The Symposium of Ezine City Value* (pp. 129-144). Çanakkale: Çanakkale Onsekiz Mart University.

Yıldız, K., Baykal, T., & Altın, M. (2000). An example of marshy field study oriented towards acknowledging the environment and comprehending its importance. *The Fourth Congress of Science Education* (pp.72-75) Ankara: Hacettepe University.

Young, J. (2001). Linking EfS and Biodiversity? A UK-wide survey of the status of education within local biodiversity action plans. *Environmental Education Research***,**7(4): 339-449.