

The Effect of Ecopedagogy-Based Environmental Education on Environmental Attitude of In-service Teachers *

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Abstract

Environmental attitude covers a person's behavioural aims, impacts, and believings which is acquired from environmental subjects or activities. It is also mentioned that environmental attitude can be used in order to predict environmental behaviour. The aim of this study is to analyse the efficiency of an ecopedagogy-based TUBITAK environmental education project, which comprised of community of practice and was titled 'Ecology in Canakkale and Around, 2010', on environmental attitude of in-service teachers and to determine whether there is any difference between genders in terms of environmental attitude. The methodology of the study was mixed methodology within a case study. The qualitative and the quantitative data were collected simultaneously and evaluated together. An environmental attitude scale was used in order to collect the quantitative data. The participants' diaries, semi-structured interview and non-participant observation notes were used in order to collect the qualitative data. It was found that the ecopedagogy-based environmental education caused to change environmental attitude of in-service teachers favourably and this change was observed mostly on male in-service teachers.

Key words: Eco-pedagogy, community of practice, in-service teachers, environmental attitude, TUBITAK.

Introduction

'Ecology' has gained a status of common use in the 21st century. This is attributable to the UN Rio Summit Declaration adopted in 1992 which puts strong emphasis upon need for paying greater attention to ecological elements in the developing programs and efforts, adding that ecology has social and economic impacts. Even though economy and ecology are not considered complimentary (Lummis, 2002), this has changed over the time; currently, even commercial titles seek to underline that their products are so-called 'environment friendly'. Does this refer to an actual environmental awareness or a fashion of becoming ecological? What really matters should be the awareness that ecology is extremely important.

A number of suggestions have been made in an attempt to address global ecological problems (Çepel, 2008). McCallum (2008), on the other hand, underlines that it is us-human- and not the globe that needs to be saved and addressed. It appears that perspective is important to consider because ecology-related issues including erosion, environmental degradation, climate and flora are discussed with almost no reference to human (Postel, 1999). However, scholars note that environmental approach needs to be holistic (Öztunalı- Kayır, 2003; Vester, 1997). From holistic approach, the human is considered as a part of nature—not master of it, implying that any harm done to nature will eventually affect people as well (Öztunalı- Kayır, 2003; Vester, 1997). As an

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observation, it could be argued that the focus on nature has been mostly human-oriented. This sort of approach considers nature as the servant for human (Lummis, 2002; Ünder, 1996). Achievement of holistic approach therefore matters for a sustainable nature; at this point, 'education' appears to be the most important subject to discuss (Gadotti, 2008; UNEP, 1972).

Eco-pedagogy

The 1972 UN Stockholm Conference on Environment final declaration states in its 19th principle that ecological problems are to be solved via education for a sustainable life, stressing the importance of adult education (UNEP, 1972). A diverse set of education and education is employed (ecological education, integrated education, and eco-justice etc.) for sustainable development (Kahn, 2010; Kahn, 2008). Kahn (2010) notes that these educations have positive impacts upon ecological literacy while falling short to achieve bold goals. According to Kahn, sustainability is achievable by development of a critical approach towards political, ideological and economic events. This critical approach towards education is called 'eco-pedagogy or earth pedagogy' (Kahn, 2010; Kahn, 2008). The fundamentals of the eco-pedagogy include protection of nature (natural ecology), the impact of the human societies upon nature (social ecology) as well as the influence over civilization and economic, social and cultural composition (integrated ecology) therefore, essentially it promotes respect for nature, human, culture and diversity. In fact, all these notions constitute core of the 'World Convention'. Considered necessary for a sustainable development, the global convention is made possible by interaction between all elements in the world. However, it is also stressed that subscription to this convention should begin at schools and social groups (Antunes & Gadotti, 2009).

Community of practice

Etienne Wenger has also put special emphasis upon education within a society. Etienne Wenger's (2004) conceptualization of 'community of practice' is defined as a learning of cooperation with a constructive approach (Johnson, 2001) and is considered for use in the restructure of knowledge by an application in a social environment (Baran, 2006). In fact, community of practice is not a new perspective or approach. Even though it is first introduced in industry, this perspective is said to be traceable back to many centuries ago (Wenger, McDermott & Snyder, 2002). Community of practice is first determined as a field of subject that will gather the group or community. Around the field of subject, a group of people sharing the same goals and ambitions are gathered together. The knowledge and talents to be transmitted are learned by cooperation based on implementation and practice (Wenger, 2004).

The features of the community of practice and the goals and content of the ecopedagogy-based education on nature overlap in many respects. In the ecopedagogy-based environment education, a group of select participants are gathered together to make sure that they learn the language of the nature and subsequently develop holistic approach (Ozaner, 2004). Three major titles stand out here: (a) Ecopedagogy-based environment education, (b) a group of selected participants, (c) learning by practice. The ecopedagogy-based environment education as defined in this study refers to the field under review, the group of participants consists of in-service teachers who work at Ministry of Education of Turkey and students as well as academics. Some of the aims of ecopedagogy-based environmental education help to improve favourable environmental attitude and

awareness, increase environmental knowledge level, have holistic approach towards nature (Turner, 2011).

Particular attention is paid in Turkey and in the world to ecology education; there are a number of international (Chenoweth, Wehrmeyer, Lipchin, Smith & Gazit, 2007; Davis, 2013; de Wet, 2007; Dori & Tall, 1998; McNaughton, 2010; Miller, 2008; Misiaszek, 2011; Turner, 2011) and domestic (Akşit, Akşit & Kayacılar, 2012; Eryaman, Yalçın-Özdilek, Okur, Çetinkaya & Uygun, 2010; Güler, 2009; İstanbullu, 2008; Keleş, Uzun & Varnacı-Uzun, 2010; Oğurlu, Alkan, Ünal, Ersin & Bayrak, 2013; Okur-Berberoğlu, Yalçın-Özdilek, Eryaman, Uygun & Çetinkaya-Edizer, 2013; Yalçın & Okur, 2014; Yardımcı, 2009) studies on this subject.

Literature Review

Misiaszek (2011) studied on how an ecopedagogy education should be with 31 ecopedagogy specialist from South America (Buenos Aires, Cordoba, Santa Monica, Argentina and Sao Paulo, Brazil) and North America (Appalachia). One of the specialist asked why environmental educations were intended for students, not in-service teachers. Whereas adults such as in-service teachers earn money so they especially need environmental education. Ecopedagogy supports social and environmental justices beside traditional environmental education (Gadotti, 2008; Kahn, 2008; Lummis, 2002) therefore there is critical perspective to politic and educational systems (Kahn, 2008; Lummis, 2002). Social transformation might happen by this perspective. Hence in-service teachers need more ecopedagogy education than the other human community. On the other hand this critical perspective should not be taught just within formal education, outdoor activities should also be used for ecopedagogy education. (Misiaszek, 2011)

TUBITAK ([The Scientific and Technological Research Council of Turkey](#)) has been financed environmental education projects intended for professional development of in-service teachers since 1999 (Erentay & Erdoğan, 2009). The expectations of the TUBITAK from these projects are to have favourable environmental attitude and awareness, increase environmental knowledge level, have positive behaviour change, teach nature's language in natural environment by activities. The expectations from in-service teachers are to share these knowledge, experiences, and acquisitions at private and social lives, by this way TUBITAK aims to have common impact of educations on public. (TUBITAK Call Paper, 2010)

TUBITAK projects intended for in-service teachers help to fill the gap which Misiaszek (2011) mentioned in her research because there are many theoretical publications related to ecopedagogy (Hung, 2014; Lucksinger, 2014; Monani, 2009) however I could not reach to praxis research. The budgets of TUBITAK projects are mostly high however there is a problem at sharing of the outputs of the projects (Okur-Berberoğlu & Uygun, 2013a). The most remarkable result when we have considered literature review above is that the most of the publications' data are derived from the TUBITAK 4004 coded projects intended for students (Akşit et al., 2012; İstanbullu, 2008; Yardımcı, 2009). On the other hand one of the target group of 4004 coded projects is in-service teachers (TUBITAK, Call Paper, 2010, 3).

It has been observed that there is lack of publications derived from the 4004 coded projects intended for in-service teachers (Eryaman et al., 2010; Güler, 2009; Keleş et al., 2010; Oğurlu et al., 2013; Yalçın & Okur 2014) therefore this research focused on the publications derived from the 4004 coded projects intended for in-service teachers because the target group of this research was in-service teachers as well. There is limited research about ecopedagogy praxis so I mentioned Turner (2011)'s research

even she worked with students. 'Ecology-based Environmental Education IV' was carried out at Gala Lake National Park, and Igneada Longoz Forest National Park in Edirne collaboration with Hacettepe University and TUBITAK in 2008 (Güler, 2009). 24 in-service teachers attend to the project and it was for 12 days. The aims of the research were to determine expectations of in-service teachers from project, to indicate self-efficacy level of environmental education teaching, and to identify changing of personal opinion about environmental education. The data was collected by semi-structured interview and analysed by discourse analyses. At the end of the analyses, the participants said that their expectation from project was to gain environmental knowledge and they had it. They also said they were happy because their perspective to the world changed as favourable, they felt more responsible to the nature, and they would share and teach what they had learnt. On the other hand, the participants did not have enough self-efficacy about using outdoor education as a learning environment so they tended to invite an expert or academician about outdoor environmental education. (Güler, 2009)

Keles et al., (2010) carried out a TUBITAK project which was titled 'Nature Education at Ihlara Valley and Around' collaboration with Aksaray University in 2009. 25 pre-service teachers attend to the project which was applied for 10 days. The aims of the research were to determine the effect of the environmental education on environmental ideas, awareness, attitudes, and behaviours of participants via scales. The scales were applied as pretest- posttest- postpost test (after 3 months). At the end of the research, it was indicated that environmental awareness level of participants was increased, and environmental attitude and behaviour were changed as favourable while there was not any difference environmental ideas.

Eryaman et al., (2010) researched the effectiveness of an ecopedagogy- based and community of practice- based environmental education on participants. The data was derived from the project which was titled 'Ecology in Canakkale and Around, 2009' and collaboration with TUBITAK and Canakkale Onsekiz Mart University. The project was 10 days, two terms, and there were totally 40 in-service teachers who was working at different disciplines. The participatory action research was used as methodology. The data was collected via semi-structured interview, participant observation, camera records, and open-ended questions. The aim of the project was to determine tendency of the participants to take active role in solving any environmental problem. As a result, the researchers found that the participants were very enthusiastic in order to take active role to solve any environmental problem. They suggested that non-governmental organisations and schools should have more collaboration, be developed more effective environmental education programmes and followed up the participants after projects.

Turner (2011) designed an ecopedagogy-based environmental education programme for college students. The aim of the study was to determine environmental consciousness of the students. The research was carried out to two different group as two semesters at a state university in Maryland. The community of practice was applied in the research. Totally 35 (18+17) students joined the research as volunteer. The researcher carried out and lectured the subjects herself. Each education was for 14 weeks. The subjects were mostly related to the social sciences. The titles of the subjects were 'Nature and the Self; Masters, Stewards, Family; Language, Media, and the Environment; Place and Space, or Where We Live; Production, Consumption, and Waste; Rights, Ethics, and Environmental Justice; Envisioning the Future'. The researcher used the NEP (New Ecological Paradigm) survey, open ended questions, self reflections (poem, story, photograph etc) and writing assignments for the evaluation. The NEP survey was used as pretest-posttest and percentage of the

results were calculated. The other qualitative data were analysed by discourse analysis. The researcher determined her methodology as qualitative approach though she used NEP survey. The percentage of the posttest of the NEP survey increased at the end of the research. The increasing were calculated respectively as 5.3 % and 6.5 % but these increases were very low. 8 themes were determined at the end of the research. These were 'empathy, mutuality, ethical consciousness, context, critical language awareness, perspective, imagination, and agency'. The researcher found that her ecopedagogy-based education program was effective on having environmental consciousness of the students. The following up was not carried out at this research.

Oğurlu et al. (2013) explained some geography subjects (location, climate, flora, fauna, ecosystem etc.) to in-service teachers via activities within a TUBITAK project which was titled Isparta Nature Conservation Areas Nature Education (IDE) in 2012. The aims of the project were to examine competency of formal education system in terms of environmental education and to determine exist and potential contribution of 4004 coded projects on geography education. The data was collected by surveys and interviews which were held at the beginning and the end of the project. It was found that the competency of formal education system in terms of environmental education was insufficient; 4004 coded projects helped to eliminate this incompetency, the environmental knowledge levels of in-service teachers were increased, and their perspective to natural environment was changed as favourable.

Okur-Berberoğlu and Uygun (2013b), carried out an ecopedagogy-based environmental education program within a TUBITAK project which was titled as 'Ecology in Canakkale and Around'. The aim of the research is to determine the effect of the education program on in-service teachers' gaining environmental knowledge, having favourably awareness and attitude. The quantitative approach and pretest-posttest-control groups design were used. This research design was used just within this study. There were two control groups and one experimental group. The in-service teachers who had ecopedagogy-based environmental education were in experimental group. There were 66 in-service teachers totally. The in-service teachers were followed up after six months. The educators taught subjects via outdoor experimental activities for experimental group. The indoor experimental activities were used for control group 1; traditional methods (lecturing, question-answer, discussion) were used for control group 2. An environmental knowledge test, awareness and attitude scales were developed within quantitative approach. Indoor group was more effective in terms of gaining knowledge while experimental group had more favourable awareness, and attitude.

Yalçın and Okur (2014) examined the effectiveness of an ecopedagogy-based environmental education program on electromagnetic area awareness of in-service teachers. The project was held in Canakkale and financed by TUBITAK in 2010. The project was ecopedagogy-based and for 10 days. There were 24 in-service teachers as participants at the project. The triangulation mixed methodology was used within a case study. The participants were followed up after six months. The data was collected by the electromagnetic field awareness scale, diaries of the participants, semi-structured interview documents and 6th month following up data. It was identified that the participants' awareness was developed throughout the education and they tended to be careful about using of electrical devices such as mobile phone, computer, hair dryer in their daily lives.

The other important point at the literature above was that they rarely researched on environmental attitude (Keleş et al., 2010; Okur-Berberoğlu & Uygun, 2013b). However attitude is used an indicator of behavioural change (Barker & Roger, 2004) because

the main aim of environmental educations is to change environmental behaviour favourably (Barr & Gilg, 2007).

Environmental Attitude

Özgüven (1994) determines attitude as acceptance or rejection tendency to an idea. Attitude has three dimensions: cognitive, affective and behavioural (Morgan, 1989). Environmental attitude covers all personal behavioural aim, impact and believes which are acquired by environmental knowledge and activities. (Bogner & Wiseman, 2006). Kaiser, Wölfling and Fujrer (1999) say that environmental attitude might be used in order to predict environmental behaviour. Behavioural change can be observed directly however it takes a long time to observe this change (Kaiser et. al., 1999) so attitude is used in order to estimate behavioural change. It is needed a scale in order to determine attitude and there are environmental attitude scales which are developed for the different researches (Barr & Gilg, 2007; Çınar, Doğu & Meydan, 2008; Fernandez Lo Faso, Gemio, Garcia, Ceballas- Zuniga, Bueno & Gallardo, 2006; Gökçe, Erdoğan, Aktay& Özden, 2007; Kellstedt, Zahran& Vedlitz, 2008; Mostafa, 2007; Okur & Yalçın-Özdilek, 2008; Raykov & Marcoulides, 2006; Tikka, Kuitunen & Tynys, 2000). The researcher decided to use a scale which was developed by Okur ve Yalçın-Özdilek (2012) beacuse it was very suitable for the aim of this research.

The other important point environmental attitude research is gender difference. Fox-Keller (1983) said that female students were keener on to ecology in natural science; this might be related to higher empathy abilities of females (in Bowen& Roth, 2007). Kellstedt et al., (2008) carried out a modelling study intended for adults about the subjects of global warming such as knowledge, attitude and personal competency. They designed two kinds of modelling for men and women because they thought that women were more aware than men in terms of environmental subjects therefore the modelling could be affected this tendency of women. Mostafa (2007) said that men had more favourable attitude in terms of using eco-friendly products than women while Tikka et al., (2000) found women have more favourable attitude. Similarly Gökçe et al., (2007), Okur and Yalçın-Özdilek (2008), Çınar et al., (2008) found that female students had more favourable attitude than male students. Yalçın-Özdilek, Kaska, Olgun and Sönmez (2006) did not find any difference between genders in terms of environmental attitude.

Some research as seen above did not find any gender difference in terms of environmental attitude while some of them found that females have more favourable attitude. On the other hand there were no explanation why females had more favourable attitude except Fox-Keller's (1983 in Bowen & Roth, 2007) explanation by empathy ability of females. On the other hand Okur, Yalçın-Özdilek and Sezer (2013) checked out the correlation between multiple intelligence areas and environmental attitude by regression analysis. They found that there were no difference between genders in terms of environmental attitude while the female students had more scores than males at nature intelligence category. They offered that natural intelligence might be used in order to predict environmental attitude. As seen above there have been different results in terms of gender therefore gender difference was checked out at this study as well.

The aims of this study are to determine effectiveness of an ecopedagogy-based and community of practice- based environmental education project which was titled 'Ecology in Canakkale and Around, 2010' on environmental attitude of in-service

teachers and to examine whether there is any significant difference between genders in terms of environmental attitude.

Methodology

The methodology of the study was mixed method within a case study. The qualitative and the quantitative data were collected simultaneously and evaluated together. Environmental attitude scale was developed in order to collect the quantitative data. The diaries of participants, semi-structured interview and non-participant observation documents were used in order to collect the qualitative data.

Quantitative Data Collection Intervention: Development of Environmental Attitude Scale

The scale which was developed by Okur and Yalçın-Özdilek (2012) was used (Annex 3). The scale was carried out both explanatory and confirmatory factor analyses. The explanatory factor analysis gave entry factor loads as 0.30 and above, the KMO value as 0.763 and the Bartlett dimensionality test as less than 0.001, the Cronbach Alpha coefficient as 0.740 whereas in the confirmatory factor analysis, the adaptation figures were obtained as χ^2 /sd: 1.88, RMSEA: 0.066, SRMR: 0.062, CFI:0.90, IFI:0.90, GFI:0.92, AGFI:0.87. It was concluded that the figures out of the explanatory factor analysis are consistent for the measurement of the environmental attitude of individuals (Büyüköztürk, 2007; Şencan, 2005) and that its theoretical foundation is strong and solid (Şimşek, 2007). Environmental attitude scale had two-dimensional, and named as having favourable attitude and having unfavourable attitude.

Quantitative Data Analysis

Whether the data retrieved out of the participants feature a normal distribution is tested by Kolmogorov-Smirnov test. This test is preferred to confirm that data do not show a normal distribution even if number of samples in a research is less than 30. If 'p' significant value is bigger than .05 at the end of the Kolmogorov-Smirnov test it means that data do not show normal distribution (Büyüköztürk, 2007). The p value was less than 0.05 end of the Kolmogorov-Smirnov test in this research, it was concluded that the results did not reveal a normal distribution therefore non-parametric tests were used in other analysis.

The analysis of the tests that were run before and after the education was evaluated by the Wilcoxon signed-rank test. This test is suitable if repeated measures are done to same group and results do not show normal distribution (Büyüköztürk, 2007; Huck, 2004; Peers, 1996). Mann Whitney U test confirms that pretests and posttests do not display any significant difference between genders in terms of results. The Mann Whitney U test was picked because the participant points did not display normal distribution and the observation were independent from each other (Büyüköztürk, 2007; Huck, 2004; Peers, 1996).

Qualitative Data Collection Interventions

It is noted that case study is a useful method to collect data about events and individuals (Yıldırım & Şimşek, 2006) and to draw definitive and explanatory conclusions (Morgan, Hamilton, Bentley, & Myrie, 2009). Likewise, it is also underlined that case study is a reliable method in the literature to have deeper understanding of events (Mitchell, 2008; Robinson, 2008; Schmitt, 2005; Yıldırım & Şimşek, 2006). Yıldırım and Şimşek (2006) emphasize that qualitative research is an effective tool in order to understand better human behaviour.

Case study was used in this study as a qualitative research method. The participants were asked to keep a diary in order to collect the qualitative data. A diary was given to each participant for that purpose. The participants were asked to write down on a daily basis what they had learnt during the day, how they were planning to use these skills in their lives and how they felt about that day. This particularly sought to ensure that the participants make an independent and impartial comment on the program (Morgan et al., 2009). Morgan et al., (2009) note that individuals may express themselves more accurately when they do this independently and freely, suggesting that this is actually allowing researchers to gather proper collection of data and information. In addition, a project meeting was held with the participants at the end of the program. At the meeting, they were asked to share their experiences on the most influential and amazing part of the project and how they thought to share this in their social and daily lives in the future. The meeting was camera-recorded; after the meeting, the transcript of the record was made available for effective use.

It is noted that additional techniques should be employed in order to have greater reliability of qualitative data, (Yıldırım & Şimşek, 2006). Different methods are offered to achieve reliability (Morgan et al., 2009; Yıldırım & Şimşek, 2006). One of these methods is non-participant observation (Zanovello, 1999). Baş and Akturan (2008) recall that researcher may not be able to spend his or her whole time with the participants or participants may act differently when they are with researchers. For this reason, the project supervisor and 4 assistants working in the project observed the participants during the education and took notes. At the end of the project, the diaries, the transcripts of the meeting as well as the observation notes have been analysed by reliance on content analysis.

Education Programme

The education program was designed as an academic programme for 10 days in line with eco-pedagogic approach as well as the objective of the science-society projects (TUBITAK Call for Paper, 2010, 1-2). The goal of an academic programme is to ensure participant becomes part of knowledge, perceive nature as a whole and think like a scientist (McNeil, 1996). Within the academic program, knowledge and information are disseminated from simple to complicated version and in connection with other disciplines (McNeil, 1996). Bruner also expresses support for an academic outlook in the programs (in Demirel, 2005). The biggest criticism to the academic program underlines that every teacher cannot be as knowledgeable as a scientist in any given subject (McNeil, 1996). However, the educators were picked in terms of community of practice. In line with the same goal, different scholars from 21 different disciplines were brought together to create a learning environment of social and cognitive salience.

The subject matters of the project included production of compost out of domestic organic waste, vertebral animals in Canakkale and its nearby towns, the geological history and outlook of the same vicinity, the endemic flora in the region, the river ecology, its importance and features, the Troy National Park since the Prehistoric era, ethno-botanic, seaweed and their crucial importance, the historical importance of Canakkale, underwater and sea ecology, underwater scuba-diving, ecotourism, the climate and aerial aspects of the region, electromagnetic field created by man and environmental safety and health, astrophysics, Can coal basin and water resources, ecological footprints, the role of insects in protection of the nature and biological combat, and deep ecology. As seen above the researcher used the subjects related to either natural sciences or social sciences for the ecopedagogy-based education programme.

Gadotti (2008) emphasizes that the subjects related to either natural sciences or social sciences might be used within an ecopedagogy-based education programme. On the other hand ecopedagogy has four key principals (Lummis, 2002): equity, morality, respect and inclusion. Equity explains relationships between human and non-human communities. Moral explains to consider human and the other life forms. Respect explains to consider cultural and biological diversity. Inclusivity explains to codify all human as men, women, minorities, and the other life forms in an ethical framework. (Lummis, 2002) In this perspective biodiversity was often emphasized in this research. For example the educator who lectured 'vertebral animals in Canakkale and its nearby towns' lesson directed an activity at Kalkim Village. The educator demonstrated how to catch a vertebral animal at the area and wanted to participants to catch some vertebral animals. The participants found mostly tortoises and lizards but could not find any snake so the educator used the snake samples which were fixed in formaldehyde in order to show to the participants. (Annex 2)

Participant Selection

TUBITAK asks greater involvement and participation of students, teachers, and public civil servants working rural areas as well as graduate students in the target group for an effective and reliable outcome in the research. The call for application in 2010 asked participation of the in-service teachers working in the Darüşşafaka Education Institution, Childcare Institution regional boarding schools (YİBO) (TUBITAK Call for Paper, 2010, 3). Priority was given to the teachers from YİBO schools.

A survey was designed in order to select participants. A paper which explained the aim of the project and the survey e-mailed to all primary and secondary schools' e-mail accounts. It was asked to the in-service teachers to write down an essay related to why they wanted to join to the project. All essays were collected by e-mail. Project director selected the participants according to their essays. The total number of participants in the project was 24; 13 of them were male, 11 of them were female. The demographic characteristics of the participants were presented at Annex 1.

Results

It is evident that there is statistically significant difference between the pretest and posttest results out of the environmental attitude scale ($z = -2.620$, $p < .05$, Table 1). A review of the difference results average as well as the totals confirms that this is in favour of the positives. According to these findings, it could be argued that the ecopedagogy-based environmental education has been effective on changing the environmental attitudes favourably.

Table 1.

Comparison of the pretest and posttest results of the participants out of the environmental attitude scale by use of Wilcoxon Signed-Rank Test

Posttest-Pretest	N	Average	Total	z	p
Negatives	6	9.75	58.50	-2.620*	.009
Positives	18	13.42	241.50		
Equal	0				

* Based on negatives

Participant no 2, female science teacher, made the following statement after diving activity on the diary and she affirmed the impact of the event on change attitude:

"I could not sleep at night; I was scared because I could not swim and it would be my first time on the sea. I was undecided on diving...It was nice to see the underwater world. I was fun touching the plants down there and seeing fishes swimming around me. I will pay utmost attention not to do harm on the underwater living things."

The participants had 3 m. scuba diving experience helping with diving experts at Bozcaada, Aquarium Cove. She emphasized that she were nervous at the first stage but later her attitude has changed as favourably when she saw under sea and biodiversity.

Participant no 23, female biology teacher, stated his favourable attitude towards nature on the diary after the 'vertebral animal of Canakkale and around' lesson on 25.07.2010:

"I realized that I had some prejudices I have to get rid of. Everything in the nature plays a role whether you like it or not."

All living things in the world are equal."

I had an opportunity to talk with 23 coded participant while diving activity. She mentioned how she liked natural environment and tried to inspire her children to like the natural environment. She emphasized that she might like the natural environment because of motherhood or hormones. Participant no 1, female mathematics teacher, made the following statement on the diary after the same lesson on 25.07.2010:

"The lecture was a little big rough given that it was after the lunch. I had prior prejudices because I was not good with the animals; this has significantly changed owing to the professor. I never put myself in place of the animals. I learned some new terms on vertebral animals. I went beyond my limitations in the practice session. I even touched a snake. I was pretty nervous before the class; but now I am perfectly fine. I also acquired extensive information on how to discern these animals."

23rd participant expressed her favourable attitude within holistic perspective and 'equality' concept, the 1st participant stated that her attitude changed favourably. One of the most interesting points for the participants at vertebral animal lesson were to

touch a snake for the first time in their lives even it was dead. The other was to learn that the farmers was thinking blind lizard as a snake and killed it. The participants might refer to 'equality' because of this kind of killing.

Participant no 11, male primary school mathematics teacher, expressed his attitude after 'the endemic flora in Canakkale and around' lesson on 26.07.2010 as follows:

"I talked to my friends before; I am actually fond of nature; I truly love animals, the flowers, the trees and the plants; I really care about the nature. I remember myself sobbing because I witnessed mass killing of street animals. Because I am extremely concerned about the environment, I am really careful about dumping and littering. But I did not know I had actually a lot more to learn; this course made me realize there are a lot more to think about on nature and environment. This project made me see that the circle was actually bigger and larger than I used to think."

The participants firstly had theoretical lesson mentioned above and the day after practical lesson in land. The lecturer explained why Canakkale has had rich endemic flora and wanted the participants to pick up some flora samples. 11th participant mentioned this richness. During the lecture sessions, the project team has also observed the participants. It was noted that the participants were heavily interested in the course content as evidenced by frequent questions directed at the instructor and the participants' eagerness to buy books recommended by the teacher. 8th participant, male science and technology teacher, asked how they could create a herbarium in their school. Creation of a herbarium is a fairly expensive endeavour. Such a question means that he developed strong interest in the subject during the course.

The participants were also mentioned how their attitude changed favourably at the meeting which was held at the end of the project. Participant no 9, male science teacher, made the following statement on his environmental attitude:

"People develop attitudes towards the nature based on their profession or experiences; for instance, I majored in physics; after that, I took some advanced education. I realized that everybody here was devoted to education on a voluntary basis. Of course, I already knew that I had a lot to catch up during this process. I was particularly aware that my knowledge on biology was pretty poor; so during the course, I had a chance to fill this gap. I think I did amazing in this endeavour. Like I said, I tended to think by formula; but it is amazing to see that there are a lot in the nature affecting everything going on around you. So this course has been particularly helpful to me in understanding the nature and the universe. "

Social science teacher 10th male participant expressed his feelings on attitude as follows:

"The people actually cut the branch they are holding on. Worse, I think, is that they do not even know they are actually doing this...To address this situation, teacher, clerics and the non-governmental organizations need to do their part and warn the people. "

Science teacher 14th male participant expressed his feelings on attitude as follows:

"After the education I received, a lot has changed in my life about nature. I now know that we are part of the nature, not owner of it. I promise that I will use the information I got here and teach them all to my students. "

The following was the statement of science teacher 15th male participant on environmental attitude:

“Above all, I should note that the biggest benefit of this program is its ability to address my prejudices. I have often stood against the people’s reaction against, say, gold mining, or exploitation of natural resources for energy. I assumed that somebody was actually manipulating these people. I still think this is actually a possibility in at least some occasions. But I noticed during the project that such activities actually do harm on nature and the natural habitat of animals down there. I always say this: Turkey is more important to me; but it turns out the future of these animals was also important; and I realized this at this program. “

Primary school teacher 16th female participant was a scout leader; his statement read as follows:

“I was impressed by the visible interaction between different fields of science and the thought that each is an integrated part of a whole.”

22nd participant, female science teacher, expressed his environmental attitude towards nature as follows:

“Each creature in the nature complement another one.”

15th male participant mentioned ‘the geological history and outlook of the same vicinity’ lesson which was held on 26.07.2010 and field trip to ‘Can Thermal Reactor and coal basin’ on 01.08.2010. It was lectured earthquakes, rock structure of Canakkale and Turkey, and how to form mines at the first lesson. The participants had opportunity to visit to coal basin and to observe how human could affect the natural environment in order to mine. The other participants mentioned ‘Deep Ecology’ lesson which was held on 02.08.2010. In fact deep ecology is a kind of philosophical approach to nature; in other words it aims to be understood nature within ecopedagogical approach. All the environmental subjects in the programme were mentioned one more time and connected one another. It was wanted participants to understand each environmental subject does not an independent subjects, all of them related to each other.

As evidenced by the statements above, the participants developed an attitude by which they tend to see the nature as a whole. They made comments on the entire session of education regardless of a particular section in it. It was also observed that the participants use the knowledge and education they received during this session for developing synthesis and holistic views. They particularly tend to see themselves as part of the nature.

There is no significant difference between genders in terms of total points out of the final test and the entire environmental attitude scale ($p > .05$). This refers to a finding in favour of females in terms of preliminary tests ($U = 30.50$, $p < .05$, Table 2).

Table 2.

Mann Whitney U analysis results of the preliminary test point out of the environmental attitude scale

Group	N	Average	Total	U	p
Male	13	9.35	121.50	30.50	.017
Female	11	16.23	178.50		

It is concluded that the implemented education has been far more influential upon male participants in changing their environmental attitudes considering that there is no significant difference in favour female participants in the posttest and the above statements.

Discussion, Conclusion and Suggestions

A review of the quantitative and qualitative data reveals that the education has been influential in changing the attitudes of the participants towards the natural environment in a positive manner (Table 1). It was concluded that the education has been more influential upon the male participants in changing their environmental attitudes considering that there is significant difference for the female participants in the environmental attitude scale while there is no significant difference at the posttest and the content analysis includes stronger attitudinal statements made by male participants. (Table 2). There are empirical findings suggesting that the participants' views on nature have been changed as favourable subsequent to the ecopedagogy-based education intended for in-service teachers (Keleş et al., 2010; Okur-Berberoğlu & Uygun, 2013b, Yalçın & Okur, 2014). The difference between this study and these three researches was that they followed up the participants so they could examine the long term impacts of the education programmes. The other important point was research design. The participants of this study were organised according to one group; control group was not used however Okur-Berberoğlu and Uygun (2013) used pretest-posttest-control group (PPC) design. PPC is a very powerful design in order to determine the impact of independent variable on dependent variable (Büyüköztürk, 2007). The other research found favourable attitude change however if they used control groups their results would be more reliable. This study has remarkable findings in terms of professional development of in-service teachers about environmental subjects although it has some limitations such as not to have control group and following up process. This study also helps to fill the gap which Misiaszek (2011) mentioned ecopedagogy education of the in-service teachers. The education programme which was given at Annex 2 might be repeated in another study, be used PPC, and carried out following up process.

The other important point is how to done following up process. Keleş et al., (2010) followed up the participants after 3 months while Yalçın and Okur (2014), Okur-Berberoğlu and Uygun (2013b) followed up the participants after 6 months. This process included all group. The in-service teachers who joined TUBITAK projects came from all over Turkey so it was difficult to follow up all group members one by one but it is believed that project teams should start to individual following up process. Brymer and Davis (2012) point out that there are no 'one size fits all' programme design. Individuals might reflect same output at different time scale or different outputs at the same time. Human is social existence. It has not been known what the impacts of community of practice, social interactions at professional and social lives or environmental problems that in-service teachers witnessed on their acquisitions. It is needed less project participants and longer following up time (1 year or 3 years). It might be determined as more reliable common impacts of the projects on public or the impact of the educations on in-service teachers' professional lives. It has not been seen yet these kind of researches.

Turner (2011) used community of practice with students at her research though she did not follow up the students. Turner's results and this research's results are consistent. Some theme in Turner's research were also mentioned by the participants of this research. For example 11 coded participant mentioned 'empathy', 23 coded participant mentioned 'mutuality and equality', 10 coded participant mentioned 'agency', 1 and 11

coded participants mentioned 'perspective'. On the other hand Turner's programme were mostly based on the social sciences while the programme of this research was based on the natural sciences. Gadotti (2008) suggests to use both sciences while designing ecopedagogy-based programmes. However he emphasizes that the programme should be mostly based on the social sciences because valuable outputs might be had by ignoring positivist-reductionist approach of natural sciences. This is controversial. As seen this research, there were favourable outputs though the programme was mostly based on the natural sciences' subjects. The other important point is the application process of the programme. Turner lectured all the subjects herself in her programme while each specialist lectured own subject in this research. The researcher was also a facilitator in this research. Turner focused on the indoor activities, I focused on the outdoor activities. The other important point is the programme time. The TUBITAK projects were about for 10 days while Turner's programme was for 14 weeks. Turner might not need to follow up the students because of this long period. An ecopedagogy-based education programme intended for in-service teachers for 14 weeks might be carried out in further researches.

There has been a problem at professional development of in-service teachers about environmental education as said Oğurlu et al. (2013). The content analysis on the environmental attitude reveals that holistic perspective was made possible by the education. The views by participants no 9, 11, 15 and 23 particularly confirmed that some progress was made with respect to development of environmental attitude. 9 coded male participant majored in physics and currently has been working as a teacher of science and technology. He noted that they have been trying to explain everything by formula and equations in physics education, adding that he realized at the education that there were a lot of variables that required something greater than equations and formulae. This is further testified by a statement that participant no 11, male a math teacher, made. McCallum (2008) recalls that reliance on a positivist approach to explain the universe via equations in the history of science has negatively affected the integrity of the nature. In other words, one single event may lead to several conclusions or vice versa. To this end, participant no 15 noted that he realized complex relationship between industry and ecology in the education. Currently, ecology and industry are seen as opposing phenomena. However, they should actually be considered as complementing each other (Goleman, 2010; Kahn, 2010). Kahn (2010) stresses the salience of education and education for achievement of sustainable development. In short, eco-pedagogical perspective gains prominence for better preservation of natural resources for future generations.

While human beings tend to be more interested in issues directly concerning their lives because of their selfish nature (Hadlock & Beckwith, 2002), the indirect impacts also require greater attention considering that holistic approach needs to be developed. This applies to case of biological diversity (Lummis, 2002) as it is essential to have a basic comprehension of the species in the world and what they mean to the human life (McCallum, 2008). The principle of preservation of biological diversity is adopted at the 1992 Rio Summit; however, its full implementation became possible only in 2010. It is not certain how many species have become extinct during this period and how this process of extinction has affected human life (CBD, 2010b). The time runs out as said 9th, 11th, 15th, and 16th participants, it is obvious that favourable environmental attitude and holistic perspective should be created and considered together to address not just for biodiversity but also to address different subjects such as water resource, geographical structure, culture, tourism because all these subjects are within the principles of the ecopedagogy (Lummis, 2002)

The United Nations declared 2010 as the year of biological diversity (CBD, 2010a). The growing industrial and human pressure amounted to a level to threaten the lives of other creates (Çepel, 2008, Öztunalı- Kayır, 2003). For this reason, biological diversity was stressed by a motto reading “biological diversity is life itself and the life is biological diversity” (CBD, 2010a). At a meeting held in Nagoya of Japan, the delegates from 193 countries agreed on a road map to protect the biological diversity in the land and sea ecosystems (CBD, 2010b). Turkey holds a special place in terms of efforts over the matter given its rich biological diversity (Çepel, 2008). Under the current conditions, Turkey has a lot to lose unless proper measures are taken. For this reason, different education programs should be drafted to pay attention and preserve local biological diversities.

There were 21 different environmental subjects in this study. It was impossible to explain everything about environmental subjects within just for 10 days education programme. Different education programmes might be designed for each environmental subject as seen biodiversity. Yalçın and Okur (2014) carried out a study related to electromagnetic area (EMA) awareness within a TUBITAK project. However EMA subject was only one of the environmental subjects in the programme. They did not design a specific education programme about EMA. It has not been seen yet a specific education programme related to any environmental subject. Different specific education programmes might be designed related to EMA, biodiversity, ecotourism etc and TUBITAK might start to finance these kinds of programmes.

It cannot be reached enough projects outputs although TUBITAK has been financing environmental education programmes since 1999 (Erentay & Erdoğan, 2009). TUBITAK did not open own archive even it was applied personally. The lack of academic outputs of the projects has been causing educational and economic deficits. It is possible to design more effective education programmes, to have different outputs or to use different learning/teaching models if project teams share their findings. It was not known which programmes or models were using, what their contents were, which outputs they succeed. It was known that hundreds of projects were financed since 1999. It is so difficult to say something within considering just 7 researches. The other significant point is that there are more academic outputs of environmental education programmes intended for children. Is it ignored professional development of in-service teachers? The other important problem is the economic side of the projects. Average budget of each project is 30,000 TL (Okur- Berberoğlu & Uygun, 2013a). It is known that how project team uses this money but also it is important to know publicly what happened at the end of the project in order to use Turkey’s budget effectively.

Projects teams should consider some important points while designing a programme. For example some research (Csobod, 2002; Fien& Maclean, 2000; Fien& Rawling, 1996) said that teachers would like to be in the developing process of the programme. It has not been seen yet a programme which is developed with in-service teachers. It is a big deficient for Turkey and it should be researched.

It is also possible to compare working years or disciplines of the teachers. Oğurlu et al., (2013) just considered geography teachers in their study. It was not also consider disciplines of the in-service teachers in this study. It was enough to have in-service teachers as participants for the project director. It might be compared working years or disciplines of the in-service teachers in further researches.

Some studies on ecology found significant differences between genders (Kellstedt et al., 2008; Mostafa, 2007; Stern, 2000; Tikka et al., 2000) whereas some did not (Yalçın-Özdilek et al., 2006; Fernandez Lo Faso et al., 2006). Ecopedagogy-based educations in Turkey appeared to have ignored the gender variable in the sessions. This study did not find any significant difference between genders. However there was

a significant difference in favour of females at pretest but there was not any difference at the posttest. It was evaluated that the males rank orders increased at posttest so the programme might be more effective on males than females. The gender variable should be analysed in order to develop effective education programmes. Fox-Keller (1983) notes that women were more interested in ecology, suggesting that their environmental attitudes were more constructive and attentive (in Bowen and Roth, 2007). The primary reason for this difference was reported as their ability to become more emphatic, meaning that they thought as if they were a living organism (in Bowen and Roth, 2007). Participant no 23 recalled that her affection with the nature may stem from the inherent feeling of motherhood. On the other hand Okur et al., (2013) said that nature intelligence might be used to predict environmental attitude. The nature intelligence level of in-service teachers might be considered at participants' selection in any further research. It might be examined correlation between environmental attitude and multiple intelligence. Whether there could be differences between genders in regards to love for nature should be taken into consideration. Kellstedt et al. (2008), in their model on global warming, introduced two separate settings, one on males and the other on females. They did so because of the possibility that their model could be affected given that the females were more sensitive towards the nature. Particular attention could be paid to create gender-based ecology educations.

Actually ecopedagogy consider environmental education with holistic perspective as all humans. (Kahn, 2008). The important point here is sustainable development and social transformation. On the other hand human should limit consumption behaviour for sustainable development. Due to increasing consumerism, people tend to spend and consume more regardless of whether they actually need to do so (Aracıoğlu & Tatlıdil, 2009). However, they barely think over what raw materials have been used during the making of these goods and commodities and how nature has been affected by production process (Goleman, 2010). Goleman (2010) recalled that what needed to be done in order to minimize the damage is to purchase ecological products. It was also stressed that ecological items were more expensive than others (Aracıoğlu & Tatlıdil, 2009). Goleman (2010) underlined that even though ecological products were more expensive, the producers would market more ecological products if the consumers tended to buy these products, leading to harmonization with nature. As a result, industrial production would not do any harm to nature. In this way social transformation will happen. Social transformation is not easy and short process. The impression that one can never achieve something significant if he or she acts alone may raise despair and hopelessness. Participant no 23, a biology teacher, identifies himself as a small fish, implying that maybe small fishes come together to do something. This is a very constructive thought as an outcome of the education given that like any other educations (Kıncal, 2006), the ecopedagogy-based education seeks to create a change on behaviours (Barr & Gilg, 2007; Kaiser vd., 1999). Concrete results in this respect will become possible in case of changes in individual attitudes regardless of offering academic education sessions. Ecologically speaking, for concrete changes, the national policies should also be subjected to a through process of change. In this way, more effective results are attained. The most suitable example of this was the decision by the Italian government. Considering that use of plastic bag was so frequent in the country, the central government introduced a ban on its use effective by start of 2011; the supermarkets now sell cloth bags for shoppers (Euractiv, 2011).

In fact, ecology can be considered as a quadratic or cubic equation. The value to be attributed to the variables in the equation can change the values on the other side of the equation. This means that n° combination is possible. It is believed that the optimal

level of the equations is achieved by compliance with the world convention and respect for the human beings as well as the nature.

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Annex 1.*Demographic characteristics of the participants*

Participant No	Gender	Age	Profession
1	Female	25	Math teacher (elementary graders)
2	Female	26	Science and tech teacher
3	Male	20	Science and tech teacher
4	Female	31	Landscape teacher (Academic)
5	Female	26	Science and tech teacher
6	Female	28	Primary school teacher
7	Male	49	Social science teacher
8	Male	35	Science and tech teacher
9	Male	32	Science and tech teacher
10	Male	37	Social science teacher
11	Male	26	Math teacher (elementary school)
12	Male	32	Science and tech teacher
13	Male	33	Primary school teacher
14	Male	24	Science and tech teacher
15	Male	35	Science and tech teacher
16	Female	29	Primary school teacher
17	Male	34	Science and tech teacher
18	Female	20	Biology teacher
19	Male		Primary school teacher
20	Male		Science and tech teacher
21	Female	26	Science and tech teacher
22	Female	22	Science and tech teacher
23	Female	44	Biology teacher
24	Female	26	Primary school teacher

Annex 2.

Education programme

Date	Time	Name of the event	Place
25.07.2010	12:00-13:00	Opening speech and filling out preliminary surveys	ÇATOML (Çanakkale Vocational High School for Tourism and Hotel Management)
25.07.2010	13:00-14:00	E 25. Introduction and meeting	ÇATOML
25.07.2010	14:00-16:00	E. 1. First aid in emergency cases	ÇATOML
25.07.2010	16:30-18:30	E.2. Producing compost out of domestic waste	ÇATOML
25.07.2010	19:00-22:00	E3. Vertebral animals in Çanakkale and nearby towns-Theory	ÇATOML
26.07.2010	9:00 -12:00 (Theory) 13:00-17:00 (Practice)	E.4. Geological and historical structure of the region Theory and practice	Kalkım Municipality
26.07.2010	18:00-20:00	E.5. Endemic plants in the region Theory	Adatepe
27.07.2010	9:00-12:00	E3. Vertebral animals in the region Practice	Kalkım Municipality
27.07.2010	13:00-19:00	E 7. Rive ecology and its significance (Theory and practice)	Kalkım Municipality
28.07.2010	09:00-12:00	E 9. Troy national park since the prehistoric era	Troy National Park
28.07.2010	13:00-16:00	E 6. Ethnobotanic	Tevfikiye Village- nearby Troy National Park
28.07.2010	16:00-18:00	E 10. Improving national parks by focusing on preservation	Tevfikiye Village- nearby Troy National Park
28.07.2010	18:30-20:00	E 16. Seaweeds and their vital importance Theory and practice	Harmanyeri- Kepez Coast
29.07.2010	08:00-19:00	E 11. Historical importance of the city	Gallipoli Peninsula
29.07.2010	20:30-22:00	E 15. Underwater and sea ecology Theory	ÇATOML
30.07.2010	10:00-15:00	E 17. Scuba-diving event	Bozcaada
30.07.2010	16:00-17:00	E 15. Underwater and sea ecology Practice	Bozcaada
30.07.2010	18:30-19:30	E 13. Ecotourism	Bozcaada
31.07.2010	9:00-12:00	E 22. Climatic features of the region	ÇATOML (Theoretical) Çanakalan Wildfire check point
31.07.2010	13:00-17:00	E 12. Natural and human-made magnetic field and environmental health	Çanakalan Wind Stations
31.07.2010	20:30-23:00	E 20. Astrophysics: are we alone in the universe	Ulupınar Observation House (ÇOMÜ) Çanakkale
01.08.2010	9:00-15:00	E 18. Çan Coal reserves and water resources	Çan
01.08.2010	15:00-19:00	E 19. Drinking water filling facilities Atikhisar Dam-trip	Çanakkale-Çan Highway
01.08.2010	20:00-21:30	E. 24. Ecological footprints; life 100 years ago; life now	ÇATOML

02.08.2010	09:00-11:00	E 21. Role of insects in preserving the nature Theory and practice	ÇATOML (Theory) Dardanos Facilities (Practice)
02.08.2010	11:00-12:00	E 2. Producing compost out of domestic waste	ÇATOML
02.08.2010	13:00-16:00	Deep ecology	ÇATOML
02.08.2010	20:00-22:00	Interactive presentation Final surveys	ÇATOML
03.08.2010	09:00-11:00	Evaluation of the project by the participants	ÇATOML

Annex 3.

The attitude scale which is developed by Okur and Yalcin-Ozdilek (2012)

	Very suitable	Suitable	Not sure	Not suitable	Never Suitable
1. If I see it has been switched on I switch off the electric lamp. 2. I like to read the books related to natural environment. 3. It annoys me to see the lamp which has been switched on. 4. It is interesting to reconcile what I have learnt at school with nature. 5. I do not disturb plants or animals because I think that they are also living things. 6. I turn off the tap while brushing my teeth or shaving. 7. I think I am doing everything in order to protect nature. 8. If I see it turned on I turn off the tap. 9. I collect papers in a recycle bin at the school. 10. I prefer to buy reusable battery. 11. It annoys me to see people who throw away their rubbish to street.					
					The first theme (having favourable attitude)
12. It is very silly to think that destruction of the rain forests has impact on global warming. 13. It is very silly to think that extinction of any species might impact on me and my children lives. 14. The water in nature never runs out.					
					The second theme

Ekopedagoji Temelli Çevre Eğitiminin Öğretmenlerin Çevresel Tutumlarına Etkisi

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Özet

Çevresel tutum, bir kişinin çevreyle ilgili konu ya da faaliyetlere ilişkin inançlarını ve davranışsal amaçlarını içerir. Çevresel tutumun, çevresel davranışın kestiriminde kullanılabileceği belirtilmektedir. Bu çalışmanın amacı, eko-pedagoji temelli bir TÜBİTAK çevre eğitimi projesi olan ve topluluk pratiğinden oluşan ‘Çanakkale ve Çevresinde Ekoloji, 2010’ projesinin, öğretmenler üzerindeki etkisini analiz etmek ve cinsiyetler arasında çevresel tutum açısından herhangi bir farklılığın olup olmadığını belirlemektir. Projede vaka çalışması kapsamında karma metodoloji kullanılmıştır. Nitel ve nicel veriler eşzamanlı olarak toplanmış ve birlikte değerlendirilmiştir. Nicel verilerin toplanmasında çevresel tutum ölçeği kullanılmıştır. Nitel verilerin kullanılmasında katılımcı günlükleri, yarı-yapılandırılmış görüşme ve katılımsız gözlem notları kullanılmıştır. Eko-pedagoji temelli çevre eğitiminin öğretmenlerin çevresel tutumunu olumlu etkilediği ve bu değişimin en çok erkek öğretmenlerde gözlemlendiği görülmüştür.

Anahtar Kelimeler: Eko-pedagoji, topluluk pratiği, öğretmen, çevresel tutum, TÜBİTAK